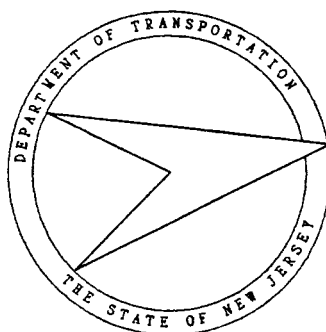


OPERATION OF WEAVING AREAS UNDER NON-FREEWAY CONDITIONS

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Division of Transportation Research
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16. Abstract This report presents the methodology of traffic data collection for the project "Operation of Weaving Areas Under Non-Freeway Conditions." Included in this report are the criteria for selecting the study sites, list of selected study sites, description of video equipment in the traffic collection system, diagrams of the video camera placements for various study categories, and the time period of data collections. All VHS videotapes containing traffic data were submitted to New Jersey Institute of Technology where they were evaluated and analyzed as part of the Region II University Transportation Research Center project with the same title.					
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DATA REQUIREMENTS

This project, "Operations of Weaving Areas Under Non-Freeway Conditions" required extensive data collection effort during 1989 - 1993 period. A plan was devised for collecting necessary data using existing NJDOT CCTV equipment and expertise. The data requirements were:

- Traffic volumes and classification by each movement
- Lane changing behavior
- Travel times and speeds
- Delay times

It was determined that all operational data would be collected by videotaping actual traffic flows on the sites, during the predetermined day of the week and including hours of peak periods in order to observe changes in operating conditions as traffic volumes increased and reached the maximum.

Guidelines on field operation were also established. The data collection would be performed on the clear days only (no data collection during rainy or snowy days). The data collection effort for the day would terminate or be aborted in case of: police or fire department activity, accidents, truck and equipment breakdowns, and other incidents that would affect a typical traffic operation for the segment under observation.

Two separate CCTV set-ups utilizing two (2) TV vans equipped with roof platforms and heavy-duty tripods for the required camera elevation, AC power supplies, state-of-the-art video cameras (Sony

DXC-M7), digital clocks, VCRs and walkie-talkies (to provide necessary synchronization of videotapings) were used at each site of the data collection.

A pilot study was performed prior to the start of the project. Several sites were selected for this effort. The data was collected for the period of three (3) hours during the peak periods and analyzed by NJIT personnel according to established procedures.

Data collection required orchestrated cooperation among NJIT, NJDOT, and local police personnel. It was also essential to survey each site prior to videotaping, so that the geometry of the site and placement of TV equipment could be determined and documented for future data analysis.

Because the criteria for selecting the study sites required high traffic volumes at specific road geometries, it was necessary to look for sites in New Jersey, Pennsylvania, and New York states. The selected sites in New York were mostly located in Long Island and required long travel times.

Prior to performing data collection, each of the suggested sites were visited by NJDOT employees to determine the feasibility of equipment set-up, determine equipment requirement, site plan, and safety at the proposed location.

During the period 10/5/89 - 10/2/90 (Phase I of the study) a total of fourteen (14) sites were videotaped in the morning or evening peak traffic periods. Duration of videotaping was normally 3 1/2 hours. Following are the locations:

- Broad Street and I-95 (Hamilton Township, N.J.)
- Route 9 and Route 35, N.J.

- I-80 and I-20, N.J.
- Route 202 and I-80 East, N.J.
- Long Island Expressway Exit 30 North, N.Y.
- Jersey City Route 1 and Route 9, N.J.
- Queens Grand Central Avenue, N.Y.
- Route 4 Westbound and Route 17, N.J.
- Route 4 Eastbound and Route 17, N.J.
- Route 17 Southbound and Route 4, N.J.
- Route 1 and Market Street, N.J.
- Route 73 Northbound and I-295 (am), N.J.
- Route 73 Southbound and I-295 (pm), N.J.
- Route 73 Northbound and I-295 (pm), N.J.

It should be noted that no CCTV breakdowns were experienced during this effort, even as the ambient temperatures fluctuated between cold winter and hot summer months. On several occasions vehicle breakdowns were experienced, and the sites had to be rescheduled with all participating units.

Several configurations of equipment set-up were required for data collection, the equipment set-ups are shown on Pages 7-11.

During this project, between 1991 and 1993, video - photogrammetry (stereo imaging techniques), an innovative method of data collection was used. This technique was utilized on about ten (10) sites, where each site had to be surveyed according to the established procedures in order to identify and document the geometry of roadway and camera locations prior to data collection. Two (2) TV cameras were used, one on each side of the roadway, with overlapping field of view utilizing 20 mm lens focal length

settings. The equipment layout of this set-up is shown on Page 11.

This video-photogrammetry provided an absolute method to pinpoint or locate objects in space, thereby enabling a precise time and distance measurements for analysis from the data provided on VHS tapes.

SITE SELECTION CRITERIA:

- No Signal in the Vicinity
- With or without Auxiliary Lane
- Desirable $L \leq 600$ ft
- Maximum $L = 1000$ ft
- Minimum Weaving/Non-Weaving Volume ≤ 800 vph
- Any Lane Combination Configuration

TABLE 1 - LOCATION AND GEOMETRIC CHARACTERISTICS OF WEAVING SITES (CASE - I)

LOCATION	SURVEY DATE AND TIME	WIDTH (FT)	LENGTH (FT)	AUXILIARY LANE	NUMBER OF LANES
ROUTE 4 WEST BOUND AND ROUTE 17 ✓	3/19/90 14:30 - 17:30	36	259	LANE ADDITION	3
ROUTE 4 EAST BOUND AND ROUTE 17 ✗	3/19/90 07:30 - 09:00	47	300	NO	3
ROUTE 17 SOUTH BOUND AND ROUTE 4 ✗	7/27/90 14:30 - 16:30	34	246	YES	3
ROUTE 1 AND MARKET STREET ✗	14:00 - 17:30	44	216	YES	3
ROUTE 73 NORTH BOUND AND I-295 (AM)	9/21/90 06:45 - 09:00	48	280	YES	3
ROUTE 73 SOUTH BOUND AND I-295	9/25/90 15:30 - 18:20	48	284	YES	3
ROUTE 73 NORTH BOUND AND I-295 (PM)	10/2/90 15:30 - 18:30	48	280	YES	3

TABLE 2 – LOCATION AND GEOMETRIC CHARACTERISTICS OF WEAVING SITES (CASE II)

LOCATION	SURVEY DATE AND TIME	WIDTH (FT)	LENGTH (FT)	MARKED CROWN LINE
BROAD STREET AND I-195	10/5/89 15:00 - 17:45	26	478	NO
ROUTE 9 AND ROUTE 35	12/19/89 07:10 - 09:15	37	520	NO
MARKET STREET, I-80, AND I-20	2/1/90 06:55 - 09:00	31	210	YES
ROUTE 202 AND I-80 EAST	4/27/90 07:15 - 09:00	26	385	NO
LONG ISLAND EXPRESSWAY EXIT 30 N	7/16/90 15:00 - 18:30	30	302	NO
JERSEY CITY ROUTE 1 & 9 AND ROUTE 7	8/1/90 15:50 - 18:15	46	250	NO
QUEENS GRAND CENTRAL AVENUE	8/2/90 15:30 - 18:15	28	520	NO

FIGURE 1 - LAYOUT OF VIDEOTAPING

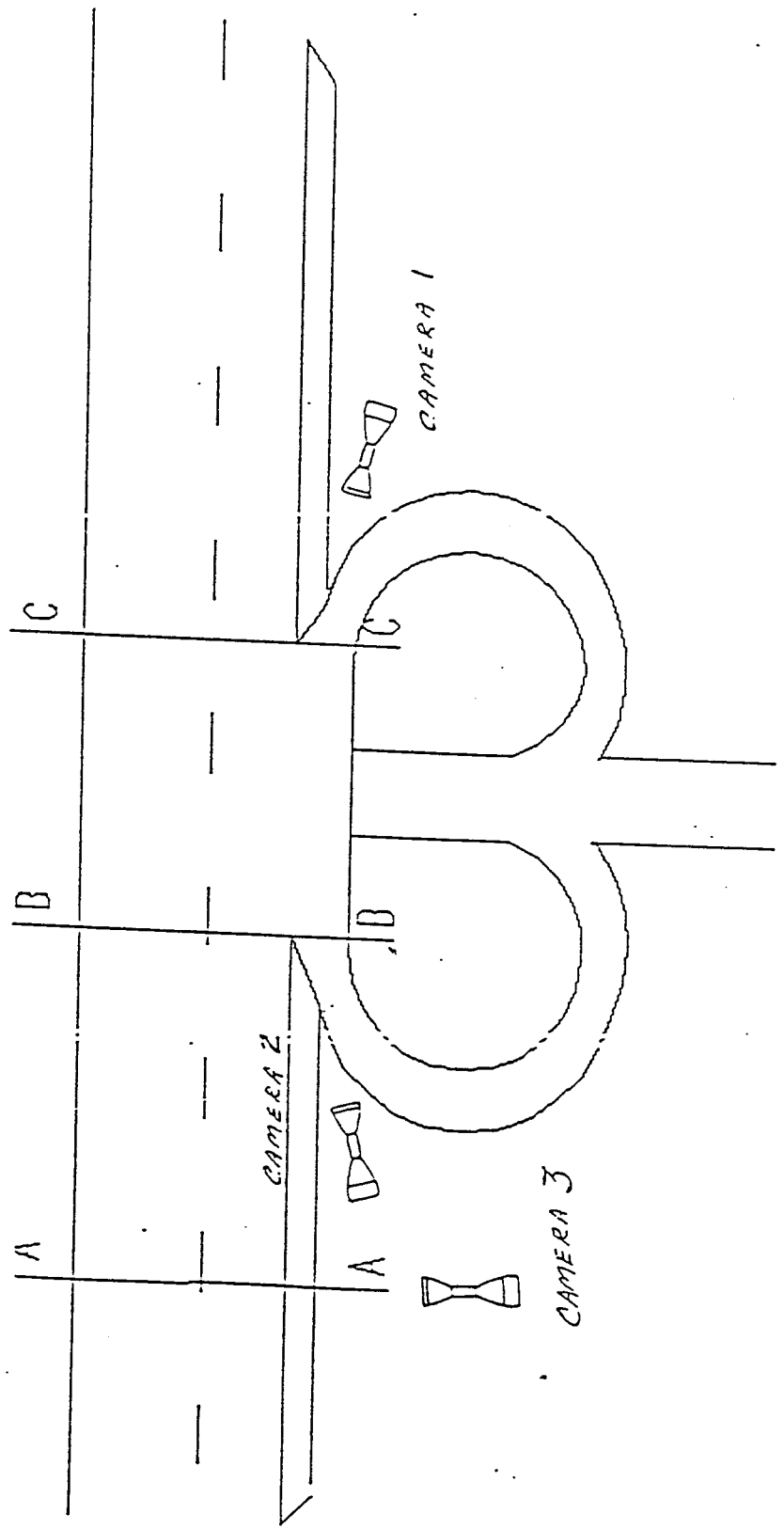


FIGURE 2 - LAYOUT OF VIDEOTAPING

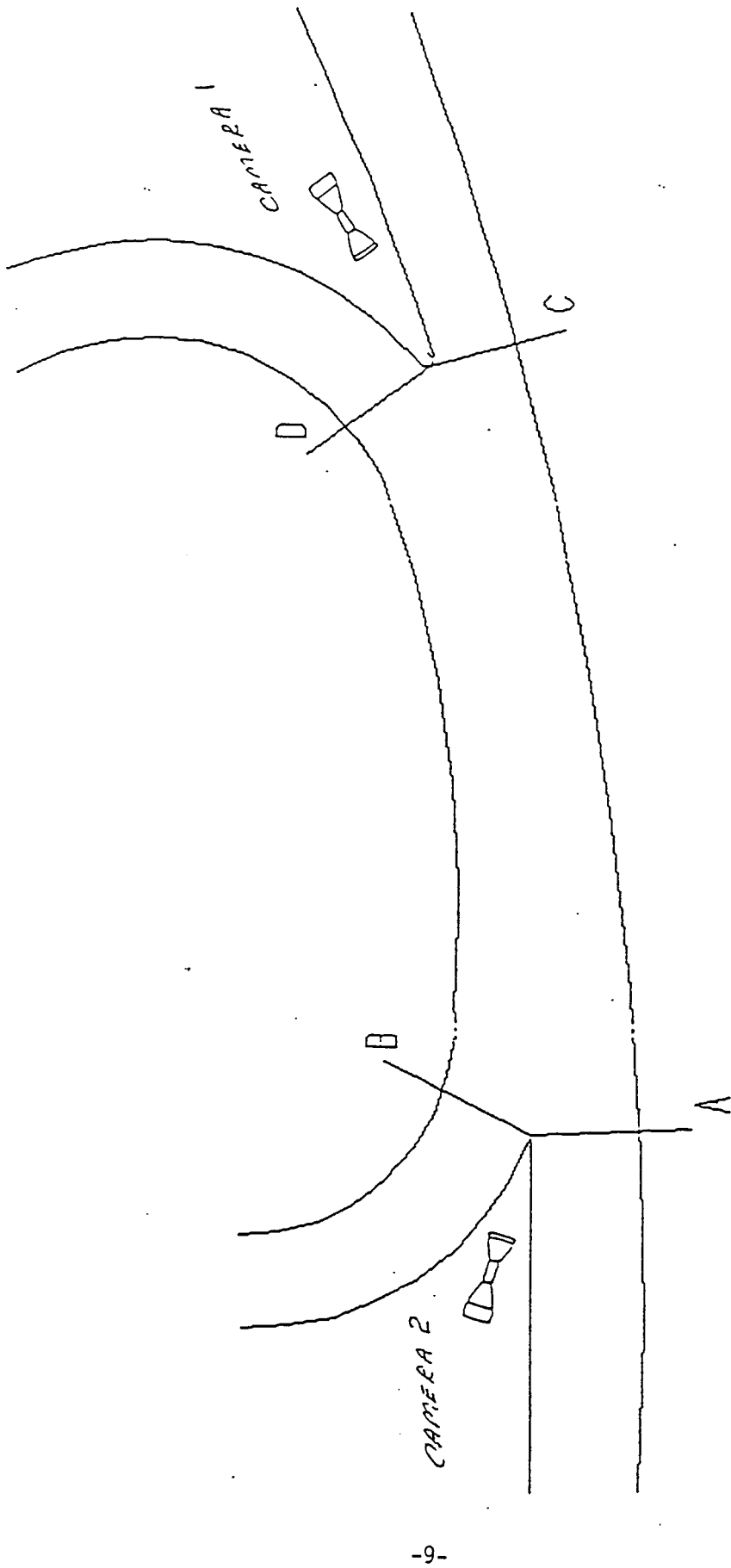


FIGURE 3 - LAYOUT OF VIDEOTAPING

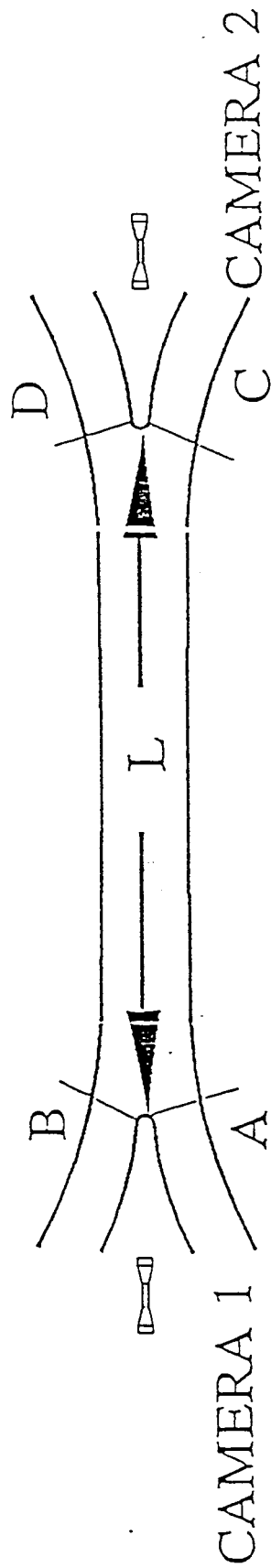


FIGURE 4 - LAYOUT OF VIDEOTAPING
USING VIDEO-PHOTOGRAMMETRY

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