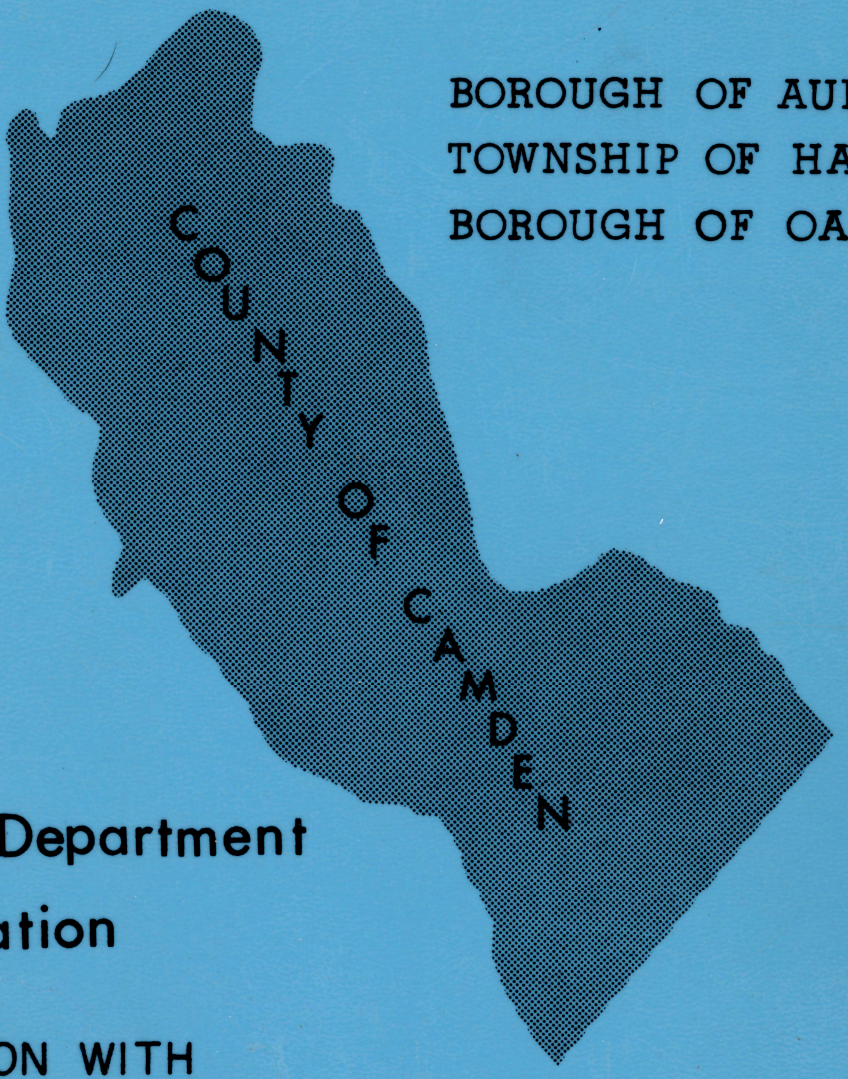
TOPICS STUDY



BOROUGH OF AUDUBON PARK
TOWNSHIP OF HADDON
BOROUGH OF OAKLYN

T-4002(6)

PREPARED
FOR

New Jersey Department of Transportation

IN COOPERATION WITH

U.S. Department of Transportation
Federal Highway Administration

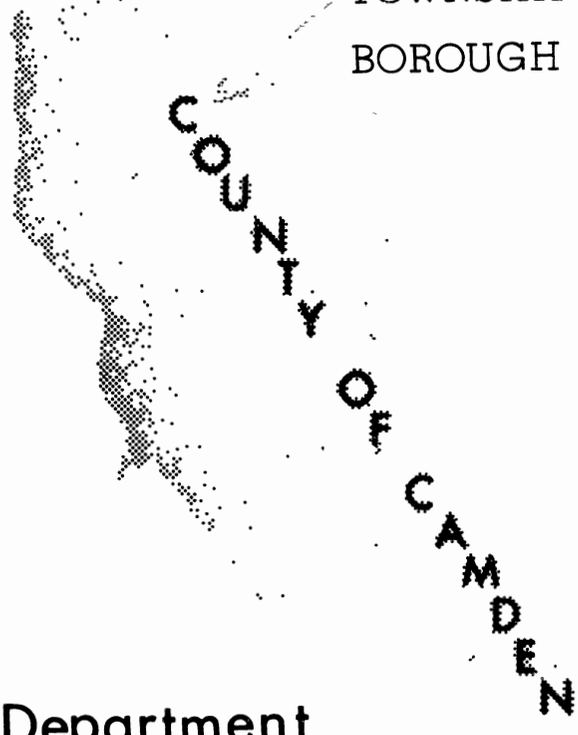
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KAMMERER, SYMES ASSOCIATES INC.
CONSULTING ENGINEERS
CHERRY HILL, NEW JERSEY

January 1974

TOPICS STUDY

BOROUGH OF AUDUBON PARK
TOWNSHIP OF HADDON
BOROUGH OF OAKLYN



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KAMMERER, SYMES AND ASSOCIATES INC
CONSULTING ENGINEERS
CHERRY HILL, NEW JERSEY

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January 1974

Kammerer, Symes & Associates, Inc.
CONSULTING ENGINEERS
P. O. BOX 151 - ROCKHILL ROAD, CHERRY HILL, N. J. 08002
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January 31, 1974

Mr. John C. Kohl
Commissioner of Transportation
N.J. Department of Transportation
1035 Parkway Avenue
Trenton, New Jersey 08625

Director of the Board of
Chosen Freeholders
Camden County Freeholders Office
Court House
Camden, New Jersey

Re: TOPICS Study

Gentlemen:

We are pleased to submit our TOPICS (Traffic Operations Program to Increase Capacity and Safety) Study for the County of Camden. The recommendations included are designed to improve the flow and safety for major roadways within the specific municipalities mentioned in this report.

The report summarizes the studies conducted for the purpose of analyzing the conditions on the existing arterial and collector roadways, identifying major problem areas and recommending short and long range solutions to major problem areas.

We are most appreciative of the opportunity to have been of service to the Department of Transportation and the County of Camden on this assignment.

Respectfully Submitted,

KAMMERER, SYMES & ASSOCIATES, INC.

Allan M Kammerer

Allan M. Kammerer, P.E.,P.P.
Executive Vice-President

AMK:hes

ACKNOWLEDGEMENTS

We are most appreciative to the following organizations and agencies for their assistance and cooperation during the course of this study:

FEDERAL HIGHWAY ADMINISTRATION

NEW JERSEY DEPARTMENT OF TRANSPORTATION

NEW JERSEY DIVISION OF MOTOR VEHICLES

COUNTY OF CAMDEN

BOROUGH OF AUDUBON

BOROUGH OF AUDUBON PARK

BOROUGH OF BARRINGTON

BOROUGH OF BELLMAWR

BOROUGH OF BERLIN

TOWNSHIP OF BERLIN

BOROUGH OF BROOKLAWN

TOWNSHIP OF CHERRY HILL

BOROUGH OF CLEMENTON

BOROUGH OF COLLINGSWOOD

BOROUGH OF GIBBSBORO

CITY OF GLOUCESTER

TOWNSHIP OF GLOUCESTER

TOWNSHIP OF HADDON

BOROUGH OF HADDONFIELD

BOROUGH OF HADDON HEIGHTS

BOROUGH OF HI-NELLA

ACKNOWLEDGEMENTS, CONTINUED

BOROUGH OF LAUREL SPRINGS

BOROUGH OF LAWNSIDE

BOROUGH OF LINDENWOLD

BOROUGH OF MAGNOLIA

BOROUGH OF MERCHANTVILLE

BOROUGH OF MOUNT EPHRAIM

BOROUGH OF OAKLYN

TOWNSHIP OF PENNSAUKEN

BOROUGH OF PINE HILL

BOROUGH OF PINE VALLEY

BOROUGH OF RUNNEMEDE

BOROUGH OF SOMERDALE

BOROUGH OF STRATFORD

BOROUGH OF TAVISTOCK

TOWNSHIP OF VOORHEES

TOWNSHIP OF WATERFORD

BOROUGH OF WOODLYNNE

DELAWARE RIVER PORT AUTHORITY

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

HERBERT H. SMITH ASSOCIATES

TRANSPORT OF NEW JERSEY

URBAN ENGINEERS

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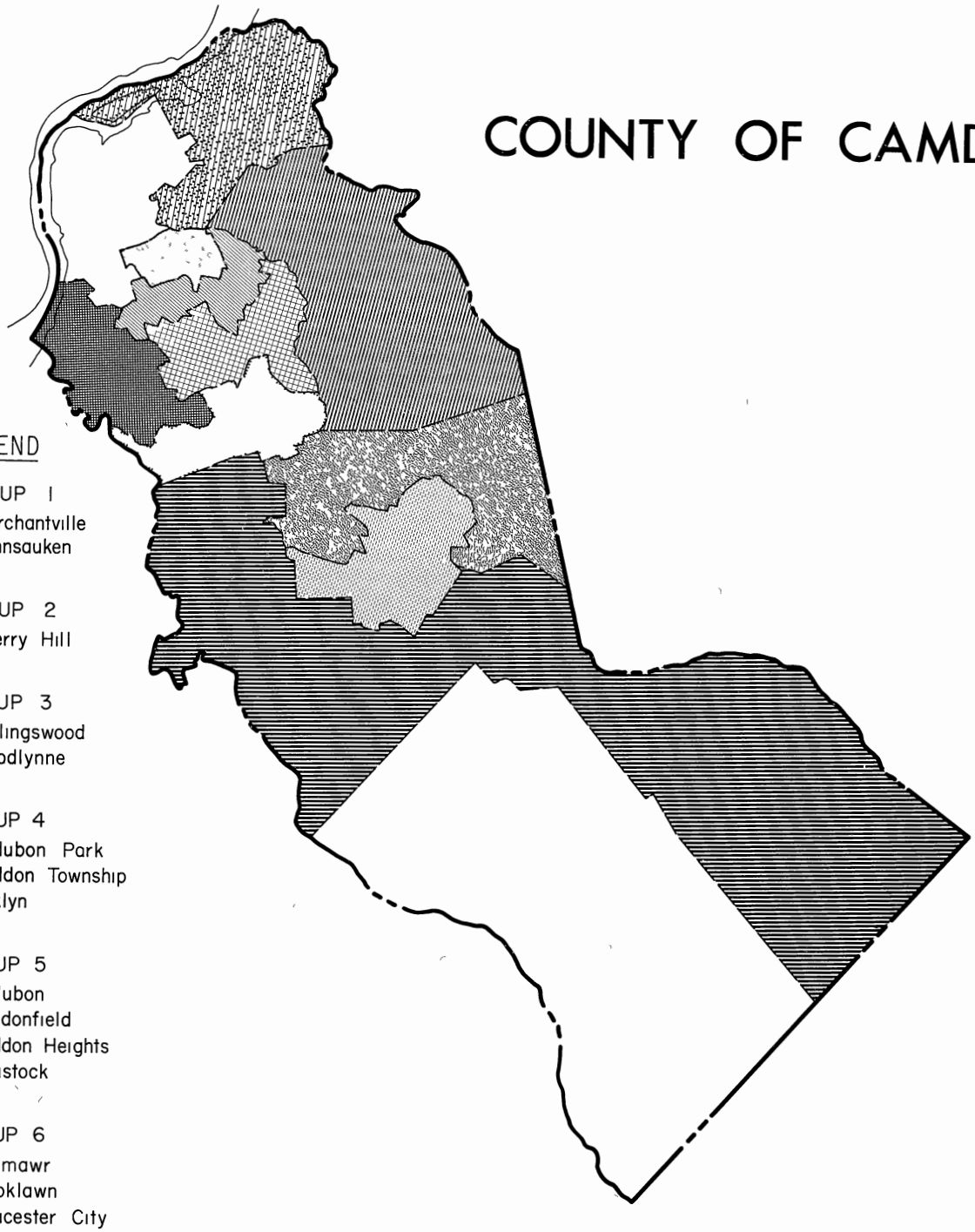
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COUNTY OF CAMDEN



LEGEND

GROUP 1
Merchantville
Pennsauken

GROUP 2
Cherry Hill

GROUP 3
Collingswood
Woodlynne

GROUP 4
Audubon Park
Haddon Township
Oaklyn

GROUP 5
Audubon
Haddonfield
Haddon Heights
Tavistock

GROUP 6
Bellmawr
Brooklawn
Gloucester City
Mt Ephraim

GROUP 7
Barrington
Lawnside
Magnolia
Runnemede

GROUP 8
Hi Nella
Laurel Springs
Somerdale
Stratford
Voorhees Township

GROUP 9
Clementon
Gibbsboro
Lindenwold

GROUP 10
Berlin
Berlin Township
Gloucester Township
Pine Hill
Pine Valley
Waterford Township

AREA MAP

EXHIBIT NO. 1

Kammerer, Symes & Assoc
Consulting Engineers

CHAPTER 1

THE TOPICS PROGRAM

The authorization, scope and objectives of the TOPICS Program and its ultimate aims are set forth in the following:

> "Policy and Procedure Memorandum 21-18", of May 12, 1972, Federal Highway Administration, United States Department of Transportation, refers to "-- the development of a TOPICS plan based on a systematic traffic engineering analysis --". TOPICS means Traffic Operations Program to Increase Capacity and Safety. The objective of the Program is not to supplant long range planning but to complement it.
>
> The Program is administered under the authority provided by Section 10 of the Federal-Aid Highway Act of 1968, approved August 23, 1968, which amended Chapter 1 of Title 23, United States Code, by adding a new Section 135, "Urban Area Traffic Operations Improvement Programs".

This report provides traffic improvement recommendations under the Camden County TOPICS Program for Audubon Park Borough, Haddon Township and Oaklyn Borough, based on the type of systematic traffic engineering analyses called for by the Act of 1968, as amended.

The objective of TOPICS is to obtain better use of existing streets and roadways by improvements which will fit into and become part of a general long range highway plan. In brief, it will be a series of short range improvements which will mesh with those for the long range.

Among the more important considerations are adequate traffic engineering, up-dated pavement marking systems, more efficient channeling of intersecting traffic, more responsive signals, improved street lighting, and construction or reconstruction of short sections of highway where traffic problems exist.

The following is a list of the types of improvements which may be eligible for financing under the TOPICS Program.

a. Channelization of intersections.

b. Widening traffic lanes.

c. Provide additional traffic lanes on approaches to signalized intersections.

d. Install traffic control systems to make traffic signal operation responsive to traffic conditions.

e. Install traffic surveillance systems.

f. Upgrade traffic control signs and pavement markings.

g. Provide improved areas for loading and unloading bus passengers including separate bus lanes and shelters.

h. Upgrade highway and or street lighting.

i. Modifications associated with restricting curb parking.

j. Construction of pedestrian grade separations or highway grade separations at complex intersections.

k. Limited construction or reconstruction where such an improvement is essential for route continuity along a street of otherwise adequate width.

The report which follows describes the study findings and sets forth recommended solutions to existing problem areas.

CHAPTER 2

SUMMARY OF RECOMMENDATIONS

The following summary of recommendations outlines the recommended improvements which are detailed later in this report.

TRAFFIC SIGNALS - BOROUGH OF AUDUBON PARK

The only existing signalized intersection in the Borough of Audubon Park is Route 168 and Kennedy Drive. This intersection was previously studied and corrected by the New Jersey Department of Transportation. As a result of this study no new signals have been proposed in the Borough.

TRAFFIC SIGNALS - TOWNSHIP OF HADDON

Many of the existing signalized intersections within the Township are overloaded during the early morning and evening rush hours. Six (6) of the signalized intersections are equipped with fixed time signals, all other signals are semi-actuated. Recommendations to provide additional turning lanes and adjustment to the signal phasing are also included in this report. A new traffic signal has been proposed at the intersection of Haddon Avenue and Maple Avenue. Recommended projects are included in Chapter 13 of this report for the reconstruction and or modification of traffic signals at the following locations.

a. Emerald Avenue and Cuthbert Road

b. Haddon Avenue and Crystal Lake Avenue

c. Haddon Avenue and Cuthbert Road

d. Crystal Lake Avenue and Park Avenue

e. Cuthbert Road and Park Avenue

f. Route 30 and Cuthbert Road

TRAFFIC SIGNALS - BOROUGH OF OAKLYN

All three (3) of the existing signalized intersections in the Borough of Oaklyn are overloaded during the early morning and evening rush hours. The signal at Clinton Avenue and Atlantic Avenue is a fixed time signal while the signals at Route 30 and Clinton Avenue and Route 168 and Kendall Boulevard are semi-actuated. No new signals have been proposed in the Borough, however a recommended project is included in Chapter 13 of this report for the reconstruction and modification of the traffic signal at Route 30 and Clinton Avenue.

ROADWAY GEOMETRY

Major roadways have exceeded their capacity with present traffic. With traffic continuing to increase, recommendations have been included to widen main arteries and improve geometry.

TRAFFIC FLOW

Recommendations have been included regarding the improvement of the flow of traffic along East and West Atlantic Avenue in the Borough of Oaklyn and are discussed in Chapter 13 of this report.

PARKING CONTROLS

Restriction of parking on certain roads in the study area will greatly facilitate the smooth flow of traffic. Included in Chapter 13 of this report are recommendations for the elimination of parking adjacent to the buildings in shopping areas and on main collector streets within residential neighborhoods.

Parking should be restricted on the following roads:

a. Clinton Avenue

b. Cuthbert Road

c. Crystal Lake Avenue

d. Emerald Avenue

e. Haddon Avenue

f. Park Avenue

g. Route 30

SIGNS AND PAVEMENT MARKINGS

Many locations are deficient in signing and pavement markings. Specific recommendations include standardizing signs and pavement markings, providing restricted turning lanes at signalized and unsignalized intersections and additional regulatory signs as required.

TRAFFIC REGULATIONS AND ENFORCEMENT

The analysis of the existing traffic regulations in the Borough of Audubon Park, The Township of Haddon and the Borough of Oaklyn indicates that they cover the requirements of the Municipalities. However, the analysis of the enforcement of existing regulations indicates that greater emphasis should be placed on the enforcement of speed limits, stop controls and yield controls.

LONG RANGE PLANNING

Many of the improvements recommended in this report will solve immediate traffic problems in the study area. With the growth anticipated during the seventies and beyond in this area, steps should be taken to plan for the additional capacity which will be required along existing routes plus the need for additional routes to by-pass built up areas. With this end in mind, the Camden County Planning Department has prepared a report titled "Master Plan for Highways, dated October 1970" which provides a guide for developing an improved highway system.

To insure that adequate right of way is available for future expansion, restrictions should be placed on the development of remaining lands adjacent to existing roads. This can be accomplished through the local Planning and Zoning Boards.

CHAPTER 3

STUDY DESCRIPTION

STUDY AREA - COUNTY OF CAMDEN - BOROUGH OF AUDUBON PARK

Audubon Park Borough is a residential community located in the northwestern part of Camden County. The Borough is bounded on the north by Peters Creek, on the east and south by the Borough of Audubon and on the west by Haddon Township. The 1970 population of fifteen hundred (1,500) people shows a decrease of two hundred (200) or thirteen (13) percent of the 1960 population of seventeen hundred (1,700) people.

The Borough borders on Nicholson Road and Route 168, both of which are major arterial roads and carry heavy volumes of traffic. Traffic volumes within the Borough proper, however, are light. *(See Exhibit No. 11).*

Audubon Park is one of the three (3) smallest municipalities in Camden County occupying an area of two-tenths (0.2) of a square mile. The Borough has no business or industrial areas. *(See Exhibit No. 2).*

The terrain within the study area is flat and in no way hampers the flow of traffic. Streets within the Borough are narrow and curvilinear, however, ample parking areas are provided for residents.

STUDY AREA - COUNTY OF CAMDEN - TOWNSHIP OF HADDON

Haddon Township is a residential and commercial community located in the northern part of Camden County. The Township is split into three (3) separate geographic sections, one being called Haddon Township proper, one being called West Collingswood and one being called West Collingswood Heights. All three (3) sections are bounded at some point, by the Main Branch of Newton Lake. The 1970 population of eighteen thousand, two hundred (18,200) people shows an increase of eleven hundred (1,100) or six point four (6.4) percent over the 1960 population of seventeen thousand, one hundred people.

Many connector and arterial roads in addition to Routes 30, 130 and 168 pass through various parts of the Township. *(See Exhibit No. 3).* Commuters generate most of the traffic on the state highways and several of the connector streets. Additional commuter traffic has also been generated by the Westmont Station of the Rapid Transit System.

Haddon Township is one of the smaller municipalities in Camden County occupying an area of two point eight (2.8) square miles. The Township has no industrial areas as such. The Central Business District (C.B.D.) is stretched out all along Haddon Avenue from the Collingswood Borough Line to the Haddonfield Borough Line. The Central Business District has a profound effect on the majority of the traffic problems in the Township. *(See Exhibit No. 2).*

The terrain within the study area is generally flat to rolling and has little adverse effect on the movement of traffic.

LAND USE MAP

EXHIBIT NO 2

CITY OF CAMDEN

CITY OF GLOUCESTER

BOROUGH OF COLLINGSWOOD

BOROUGH OF AUDUBON

BOROUGH OF HADDONFIELD

HADDON TOWNSHIP

HADDON TOWNSHIP

HADDON TOWNSHIP

AUDUBON PARK

OAKLYN

COLLINGS AVENUE

CRESCENT BLVD.

(CO. RTE. 630)

(RTE. N.J. 168)

CRESCENT BLVD.

(U.S. RTE. 130)

NICHOLSON ROAD

HORSE PIKE

BLACK HORSE PIKE (CO. RTE. 635)

(CO. RTE. 650)

CLINTON AVENUE (CO. RTE. 649)

(U.S. RTE. 30)

BETTLEWOOD AVENUE (CO. RTE 648)

CLINTON AVE.

OAKLAWN AVENUE

BLVD.

KENDALL

CEDAR AVENUE

EAST ATLANTIC AVENUE (CO. RTE. 729)

HORSE PIKE

JOHNSON AVENUE

WHITE HORSE PIKE

MADISON AVE. (CO. RTE. 652)

CAPITOL ST. (CO. RTE. 739)

CUTHBERT ROAD

HEATHER ROAD

LEES LAKE

(CO. RTE. 636)

CUTHBERT

SOUTH PARK DRIVE (CO. RTE. 629)

ROAD

EMERALD

HADDON AVENUE (CO. RTE 561)

COOPER STREET

AVENUE

HOPKINS AVENUE (CO. RTE 647)

McARTHUR BLVD.

McARTHUR DRIVE (CO. RTE. 643)

GRAISBURY AVENUE

AVONDALE AVENUE

LAKE AVENUE

PYLE AVENUE

(CO. RTE. 641)

STOY AVE.

LOCUST AVENUE

CARLTON AVENUE

WESTMONT AVENUE

MAPLE AVENUE (CO. RTE. 642)

CRYSTAL AVENUE (CO. RTE. 646)

ELM AVENUE

PARK

Business & Professional
Residential
Governmental , Educational & Civic
Parks & Recreation
Industrial
Lakes & Streams
Undeveloped Land

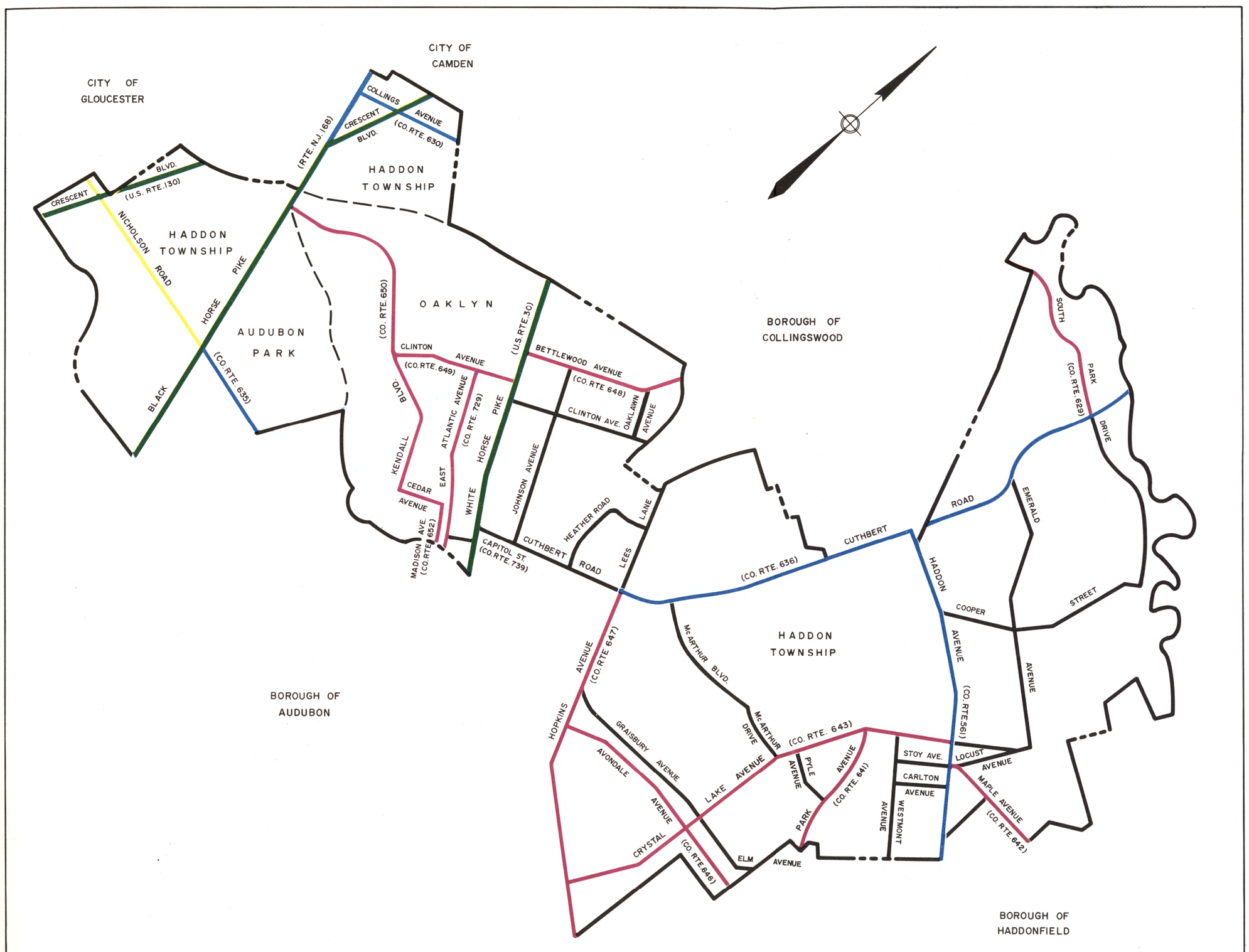
LAND USE MAP

EXHIBIT NO. 2

Kammerer, Symes & Assoc.
Consulting Engineers

INITIAL STUDY SYSTEM &
RECOMMENDED FEDERAL AID SYSTEM MAP

EXHIBIT NO. 3



SCALE

5000' 0' 1000' 2000'

Streets in the Initial Study System		
Primary Type I (State Highways)	2.73	miles
Secondary - F.A.S. (County Roads)	0.56	miles
Primary Type II (Proposed)	6.98	miles
Federal Aid Urban System	3.47	miles

INITIAL STUDY SYSTEM &
RECOMMENDED FEDERAL AID SYSTEM MAP

EXHIBIT NO. 3

Kammerer, Symes & Assoc.
Consulting Engineers

STUDY AREA - COUNTY OF CAMDEN - BOROUGH OF OAKLYN

The Borough of Oaklyn is a residential and commercial community located in the western part of Camden County. The Borough is bounded on the north by the Main Branch of Newton Lake, on the east by Haddon Township, on the south by the Borough of Audubon and on the west by Peters Creek. The 1970 population of four thousand, six hundred (4,600) shows a decrease of two hundred (200) or three point two (3.2) percent of the 1960 population of four thousand, eight hundred (4,800) people.

Several connector roads in addition to a major arterial, Route 30, pass through the Borough. Route 30 carries a heavy volume of traffic throughout each day and handles extremely heavy loads during commuter rush hours. *(See Exhibit No. 11).*

The Borough of Oaklyn is one of the smaller municipalities in Camden County occupying an area of seven-tenths (0.7) of a square mile. The Borough has no industrial areas as such. The Central Business District is concentrated between West Clinton Avenue and Cuthbert Road along Route 30. This area has somewhat of an effect on the traffic problems in the Borough. *(See Exhibit No. 2).*

The terrain is generally rolling with several areas having grades severe enough to effect traffic movement. The connector streets are narrow and the efficient flow of traffic is hampered on streets where parking is permitted.

STUDY ROADWAY SYSTEM

The roadways and intersections included in the initial study system were developed through field inspections by the Consultant and meetings with Municipal, County and State Officials.

The study system was composed of existing Federal-Aid Urban, Federal Aid Primary and Secondary routes and major connector and collector streets within the Boroughs and Township. *(See Exhibit No. 3).*

Through the initial investigation of traffic volumes and accident data, the study system was reduced to that shown also on *Exhibit No. 3* and consists of the Federal-Aid Urban System, Federal-Aid Primary Type I, Federal-Aid Secondary and Federal-Aid Primary Type II roads. The Federal Aid Primary Type II System is composed of the major connector and collector streets located within the three (3) Municipalities. Road mileage for each system is included on *Exhibit No. 3.*

THE ANALYTICAL APPROACH

A sequence was developed by which those locations exhibiting poor traffic operation characteristics were identified, corrective measures formulated, relative importance of each location compared and an improvement schedule developed. The roadways were analyzed in terms of their accident history, or safety, their ability to handle traffic volume, or capacity and their ability to move traffic, or travel quality.

The first step in the study was the collection of data. The following is the data which was collected relative to the roadways within the study network:

1. Traffic data from Municipal, County and State officials including ordinances relating to traffic, accident records and traffic volumes.

2. Traffic operation data from extensive ground surveys including rights of way, signs, pavement markings, inventories of intersections, public transportation and traffic signals.

3. Peak and off-peak traffic volumes and intersection turning movements.

4. Classification of traffic as to passenger cars, buses, trucks and tractor-trailers.

5. Spot speed checks and time delay studies for peak and off-peak hours.

OPERATIONAL REVIEW

During the operational review, data was gathered at various locations. This review included the analysis of the data collected with the purpose of identifying operational problems and developing workable solutions.

PROJECT PRIORITY

Following the development of solutions to problem areas, a tentative priority was developed for each project based on the accident history, volume-capacity ratio and quality of flow established from the time delay studies. Project priorities developed were reviewed with Municipal and County Officials and the final list of priorities, as presented in this report, reflects the results of that meeting.

Upon completion of the preparation of preliminary design and cost estimates, a schedule for the implementation of the projects on the priority list was developed.

CHAPTER 4

DATA COLLECTION

Data for the TOPICS study was collected during the period March 1971 through September 1972 by the Consultant and included the following:

a. Traffic Volumes - traffic volumes and turning movements were determined at specific locations for various durations.

b. Roadway Inventory - right of way and roadway widths, type and condition of pavement, location of curbs, shoulders, sidewalks, poles and trees, etc.

c. Traffic Control Devices - location of and condition of traffic control devices such as traffic signals, signs and pavement markings.

d. Accident History - records of all reported accidents were reviewed, but only locations where five (5) or more accidents occurred per year for the years 1968, 1969 and 1970, were studied extensively and included in this report.

e. Time and Delay - travel speeds on roads within the study area were graphically recorded, using electronic equipment, for peak and off-peak periods.

f. General Observations - during the study period, observations were made by both the Consultant and local officials of traffic operations, pedestrian problem areas, roadway lighting and the enforcement of existing traffic regulations.

At the outset of the project, meetings were held with Municipal and County Officials, members of the Police Departments and the Consultant to introduce personnel, to develop lines of communication and to explain the various procedures to be used.

At the completion of the field inventory phase of the work, the Consultant contacted Municipal and County Officials to review the data collected, familiarize them with the TOPICS Program and to obtain their views on problems within the study area.

CHAPTER 5

ACCIDENT RECORDS

Accident records for locations reporting five (5) or more accidents per year for any one year from 1968 through 1970 enabled comparisons to be made for several different factors. An analysis was made of the data collected for the purpose of developing accident patterns which might be based on day or night, weather conditions, roadway conditions, traffic control and traffic density.

CAUSES - BOROUGH OF AUDUBON PARK

In the Borough of Audubon Park, two (2) of the four (4) intersections which can be classed as accident breeding had accident experience of five (5) or more accidents per year. Both of these intersections repeated in two (2) or the three (3) reporting years.

From the accident data collected, five (5) types of accidents were noted. In order of their frequency of occurrence, they were:

1. Right Angle
2. Same Direction
3. Left Turn
4. Fixed Object
5. Head On

Table No. 4 lists all accidents that were identifiable by type. Most significant were those classified as right angle. These accounted for forty-three point eight (43.8) percent of all accidents. Failure of the driver to exercise safe driving habits, misjudging speed of traffic and failure to obey traffic control devices were contributing factors to this condition. Our findings indicate that seventy-two (72) percent of all accidents occurred during the daylight hours. This report will include recommendations to attempt to materially reduce the number of accidents.

CAUSES - TOWNSHIP OF HADDON

In the Township of Haddon, nineteen (19) of the twenty-six (26) intersections which can be classed as accident breeding had accident experience of five (5) or more accidents per year. Of these six (6) repeated in each of the three (3) reporting years, four (4) repeated twice and nine (9) only once each.

From the accident data collected, six (6) types of accidents were noted. In order of their frequency of occurrence, they were:

1. Same Direction
2. Right Angle
3. Left Turn
4. Fixed Object
5. Head On

TABLE NO. 4

SUMMARY OF ACCIDENT TYPES
PERIOD JAN 1968 - DEC 1970
LOCATIONS WITH 5 OR MORE ACCIDENTS PER YEAR

BOROUGH OF AUDUBON PARK

TYPE	TOT NO	NIGHT	DAY	ROAD CONDITION			INJURIES	FATALITIES	% TOTAL ACCIDENTS
				WET	DRY	ICE			
RIGHT ANGLE (R A)	14	3	11	1	13	0	3	0	43.8
LEFT TURN (L T)	5	2	3	0	5	0	3	0	15.6
SAME DIRECTION (S D.)	9	2	7	3	6	0	3	0	28.1
FIXED OBJECT (F O)	3	1	2	1	2	0	1	0	9.4
HEAD ON (H O)	1	1	0	0	1	0	1	0	3.1
TOTAL	32	9	23	5	27	0	11	0	100 0

Table No. 5 lists all accidents that were identifiable by type. Most significant were those classified as same direction. These accounted for forty-five point one (45.1) percent of all accidents. Failure of the driver to exercise safe driving habits, misjudging speed of traffic and failure to obey traffic control devices were contributing factors to this condition. Our findings indicate that fifty-seven (57) percent of all accidents occurred during the daylight hours. This report will include recommendations to attempt to materially reduce the number of accidents.

CAUSES - BOROUGH OF OAKLYN

In the Borough of Oaklyn, six (6) of the thirteen (13) intersections which can be classed as accident breeding had accident experience of five (5) or more accidents per year. Of these two (2) repeated in two (2) of the three (3) reporting years and four (4) were reported only once each.

From the accident data collected, five (5) types of accidents were noted. In order of their frequency of occurrence, they were:

1. Same Direction
2. Left Turn
3. Right Angle
4. Fixed Object
5. Pedestrian

Table No. 6 lists all accidents that were identifiable by type. Most significant were those classified as same direction. These acacounted for forty-two point nine (42.9) percent of all accidents. Failure of the driver to exercise safe driving habits, misjudging speed of traffic and failure to obey traffic control devices were contributing factors to this condition. Our findings indicate that fifty-nine (59) percent of all accidents occurred during the daylight hours. This report will include recommendations to attempt to materially reduce the number of accidents.

SUMMARY

In order to make effective recommendations, it is necessary to detail the number of each accident type at the reporting locations. *Table No. 7 (Audubon Park), Table No. 8 (Haddon Township) and Table No. 9 (Oaklyn)*, present a summary of this data. From the accident reports filed for these locations, collision diagrams were prepared and a detailed analysis based on the circumstances and conditions surrounding each accident was made. The number and severity of the occurrences at any given location became an integral part of the decision making process required to select the locations needing improvement. The nature of the individual accidents at a specific location became a decisive factor in the design of the appropriate improvement.

TABLE NO. 5

SUMMARY OF ACCIDENT TYPES
PERIOD JAN 1968 - DEC 1970
LOCATIONS WITH 5 OR MORE ACCIDENTS PER YEAR

TOWNSHIP OF HADDON

TYPE	TOT NO	NIGHT	DAY	ROAD CONDITION			INJURIES	FATALITIES	% TOTAL ACCIDENTS
				WET	DRY	ICE			
RIGHT ANGLE (R A.)	112	45	67	23	88	1	42	1	31 7
LEFT TURN (L T)	45	18	27	6	39	0	14	0	12 8
SAME DIRECTION (S D)	159	72	87	41	110	8	52	0	45 1
FIXED OBJECT (F.O)	22	10	12	3	16	3	9	0	6.2
PEDESTRIAN (PED)	4	2	2	1	3	0	4	0	1.1
HEAD ON (H O)	7	4	3	3	3	1	5	0	2 0
OTHER *	4	2	2	1	3	0	1	0	1 1
TOTAL	353	153	200	78	262	13	127	1	100 0

*DENOTES ACCIDENTS WITHOUT DETAILS AND MISCELLANEOUS PARKING INCIDENTS

TABLE NO. 6

SUMMARY OF ACCIDENT TYPES
PERIOD JAN. 1968 - DEC 1970
LOCATIONS WITH 5 OR MORE ACCIDENTS PER YEAR

BOROUGH OF OAKLYN

TYPE	TOT NO	NIGHT	DAY	ROAD CONDITION			INJURIES	FATALITIES	% TOTAL ACCIDENTS
				WET	DRY	ICE			
RIGHT ANGLE (R A)	15	6	9	2	13	0	2	0	21.4
LEFT TURN (L T)	15	6	9	5	10	0	2	0	21 4
SAME DIRECTION (S.D)	30	12	18	3	27	0	6	0	42 9
FIXED OBJECT (F O)	9	5	4	1	8	0	4	0	12 9
PEDESTRIAN (PED)	1	0	1	0	1	0	1	0	1 4
TOTAL	70	29	41	11	59	0	15	0	100.0

TABLE NO. 7

SUMMARY OF ACCIDENTS AT REPORTING LOCATIONS

BOROUGH OF AUDUBON PARK

INTERSECTION	YEAR	TOTAL	RIGHT ANGLE	LEFT TURN	SAME DIRECT	FIXED OBJECT	HEAD ON
ROUTE 168 & KENNEDY DRIVE	1968	5	1	1	3	0	0
	1969	5	3	0	1	1	0
	1970	4	3	0	1	0	0
ROUTE 168 & NICHOLSON ROAD	1968	3	0	0	1	1	1
	1969	10	5	3	2	0	0
	1970	5	2	1	1	1	0

TABLE NO. 8

SUMMARY OF ACCIDENTS AT REPORTING LOCATIONS

TOWNSHIP OF HADDON

INTERSECTION	YEAR	TOTAL	RIGHT ANGLE	LEFT TURN	SAME DIRECT.	FIXED OBJECT	PEDEST	HEAD ON
CUTHBERT ROAD & ATLANTIC AVENUE	1968	2	0	1	1	0	0	0
	1969	2	1	0	0	0	0	1
	1970	5	2	0	3	0	0	0
CUTHBERT ROAD & EMERALD AVENUE	1968	6	0	0	4	2	0	0
	1969	5	0	1	3	1	0	0
	1970	4	1	0	3	0	0	0
CUTHBERT ROAD & LINDISFARNE AVENUE	1968	5	0	4	1	0	0	0
	1969	5	1	4	0	0	0	0
	1970	6	6	0	0	0	0	0
CUTHBERT ROAD & ORIENTAL AVENUE	1968	2	2	0	0	0	0	0
	1969	1	0	0	1	0	0	0
	1970	7	5	0	1	1	0	0
CUTHBERT ROAD & PARK AVENUE	1968	4	1	0	3	0	0	0
	1969	6	5	0	1	0	0	0
	1970	6	2	1	2	0	0	1
CUTHBERT ROAD & SOUTH PARK DRIVE	1968	6	0	3	3	0	0	0
	1969	4	2	0	2	0	0	0
	1970	2	1	0	1	0	0	0
HADDON AVENUE & CRYSTAL LAKE AVENUE	1968	8	5	1	2	0	0	0
	1969	10	5	2	3	0	0	0
	1970	8	2	1	4	0	0	1
HADDON AVENUE & CUTHBERT ROAD	1968	12	1	4	6	0	0	1
	1969	15	6	5	4	0	0	0
	1970	13	4	3	5	0	0	1
HADDON AVENUE & MAPLE AVENUE	1968	3	1	1	0	0	0	1
	1969	5	3	1	1	0	0	0
	1970	6	4	1	0	1	0	0
HADDON AVENUE & STRAWBRIDGE AVENUE	1968	2	0	0	2	0	0	0
	1969	1	0	0	1	0	0	0
	1970	6	2	3	1	0	0	0
PARK AVENUE & CRYSTAL LAKE AVENUE	1968	4	1	1	1	1	0	0
	1969	3	1	0	1	1	0	0
	1970	7★	1	0	2	0	0	0
ROUTE 30 & CUTHBERT ROAD	1968	4	1	0	2	1	0	0
	1969	9	0	2	5	2	0	0
	1970	3	1	0	2	0	0	0
ROUTE 130 & COLLINGS AVENUE	1968	10	4	0	5	0	1	0
	1969	9	1	0	8	0	0	0
	1970	20	6	0	12	1	1	0
ROUTE 130 & ELDRIDGE AVENUE	1968	3	2	0	1	0	0	0
	1969	6	2	1	2	1	0	0
	1970	0	0	0	0	0	0	0
ROUTE 130 & GRANT AVENUE	1968	3	1	0	2	0	0	0
	1969	10	0	1	7	2	0	0
	1970	2	2	0	0	0	0	0
ROUTE 130 & NICHOLSON ROAD	1968	5	4	0	1	0	0	0
	1969	7	2	0	3	2	0	0
	1970	4	0	0	2	1	1	0
ROUTE 130 & WILSON AVENUE	1968	14	4	0	8	2	0	0
	1969	15	7	1	5	1	1	0
	1970	12	3	0	9	0	0	0
ROUTE 130 & ROUTE 168	1968	6	1	0	5	0	0	0
	1969	11	0	2	6	2	0	1
	1970	11	3	1	7	0	0	0
ROUTE 168 & BERWICK AVENUE	1968	1	0	0	1	0	0	0
	1969	2	1	0	1	0	0	0
	1970	5	2	0	3	0	0	0

★ TOTAL INCLUDES ONE (1) OVERTURNED VEHICLE ACCIDENT & THREE (3) ACCIDENTS WITH INSUFFICIENT DATA FOR CLASSIFYING

TABLE NO. 9

SUMMARY OF ACCIDENTS AT REPORTING LOCATIONS

BOROUGH OF OAKLYN

INTERSECTION	YEAR	TOTAL	RIGHT ANGLE	LEFT TURN	SAME DIRECT	FIXED OBJECT	PEDEST	HEAD ON
NEWTON AVENUE & WEST CLINTON AVENUE	1968	5	1	4	0	0	0	0
	1969	5	2	1	1	1	0	0
	1970	3	2	0	1	0	0	0
ROUTE 30 & EAST BEECHWOOD AVENUE	1968	1	0	0	1	0	0	0
	1969	5	1	1	2	1	0	0
	1970	2	0	0	2	0	0	0
ROUTE 30 & EAST BETTLEWOOD AVENUE	1968	3	0	1	2	0	0	0
	1969	5	2	0	2	1	0	0
	1970	3	2	1	0	0	0	0
ROUTE 30 & WEST BETTLEWOOD AVENUE	1968	1	0	0	1	0	0	0
	1969	2	1	0	0	0	1	0
	1970	6	1	2	2	1	0	0
ROUTE 30, WEST CLINTON AVENUE & HADDON AVENUE	1968	6	3	1	2	0	0	0
	1969	3	0	2	0	1	0	0
	1970	10	0	1	9	0	0	0
ROUTE 168 & KENDALL BOULEVARD	1968	3	0	0	1	2	0	0
	1969	5	0	0	4	1	0	0
	1970	2	0	1	0	1	0	0

CHAPTER 6

TRAFFIC VOLUMES

Data for projection of traffic volumes and the conversion of traffic counts to Average Annual Daily Traffic (A.A.D.T.) was furnished by the New Jersey Department of Transportation. This data was supplemented by traffic counts taken at specific locations for various durations.

TRAFFIC VOLUMES

The weekday traffic volumes encountered during the survey periods were higher than the A.A.D.T. volumes from May through December and lower than the A.A.D.T. volumes from January through April, due mainly to the monthly variations in traffic. *Chart No. 10* indicates traffic variations by months for Route 30 in the general area of Audubon Park, Haddon Township and Oaklyn. The A.A.D.T. volume using Route 30 is ninety (90) percent of the volume of traffic recorded on an average June day. This chart confirms the effects of the heavy volumes of holiday and vacation traffic experienced during the year in urbanized areas such as the Borough of Audubon Park, Haddon Township and the Borough of Oaklyn.

The daily traffic counts taken at specific locations indicate that traffic is generally uniform throughout the week. Sunday traffic volumes were the lowest with Friday traffic volumes the highest when compared to an average day.

The average daily traffic exhibits a morning peak between 7:30 a.m. and 8:30 a.m., declines slightly, then increases again between 12:30 p.m. and 1.30 p.m., declines once again and reaches an afternoon peak at 5:30 p.m. before tapering off in the evening hours.

1970 A.A.D.T. volumes on the study roadways are illustrated on *Exhibit No. 11*. Collings Avenue, Cuthbert Road, Haddon Avenue, Nicholson Road, Route 30, Route 130 and Route 168 carry the heaviest volumes in the study area. The above mentioned roads serve as the main arterial routes for the study area. They carry heavy commuter traffic and intersect with the collector and feeder streets from the residential areas.

SYSTEM CAPACITY

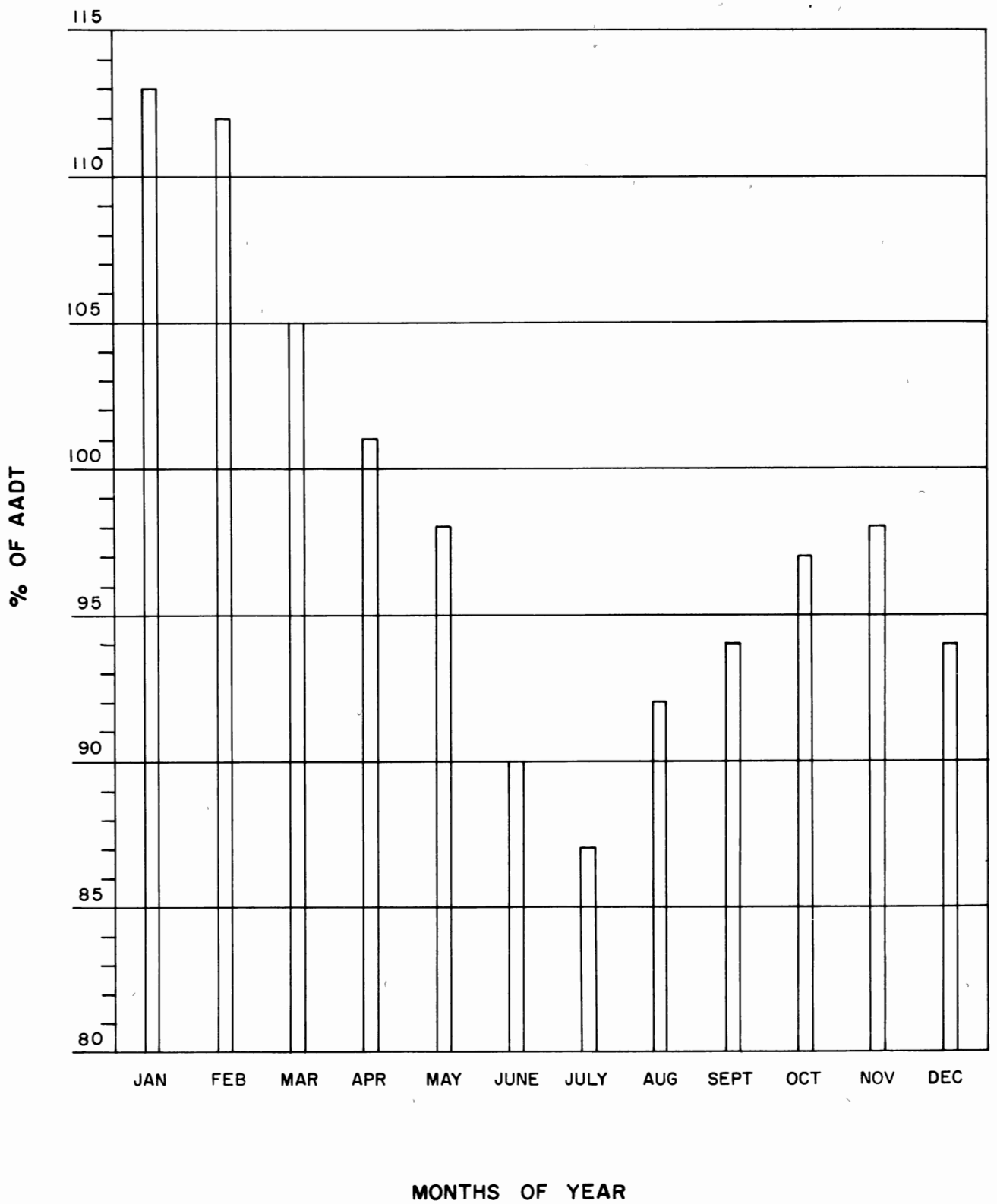
The relationship of traffic volume to roadway capacity is an accepted method of measuring the ability of a street to carry existing and projected traffic. The nature of the street system in this study area is such that intersection capacities are the controlling factors in determining the overall capacities of the roadways to handle traffic.

The capacity of the major intersection approaches was calculated and compared to the peak hour traffic volume. The peak hour traffic volume was used in computing levels of service.

The capacity (as defined in the 1965 Highway Capacity Manual) was computed for critical segments of the roadways in the study area for

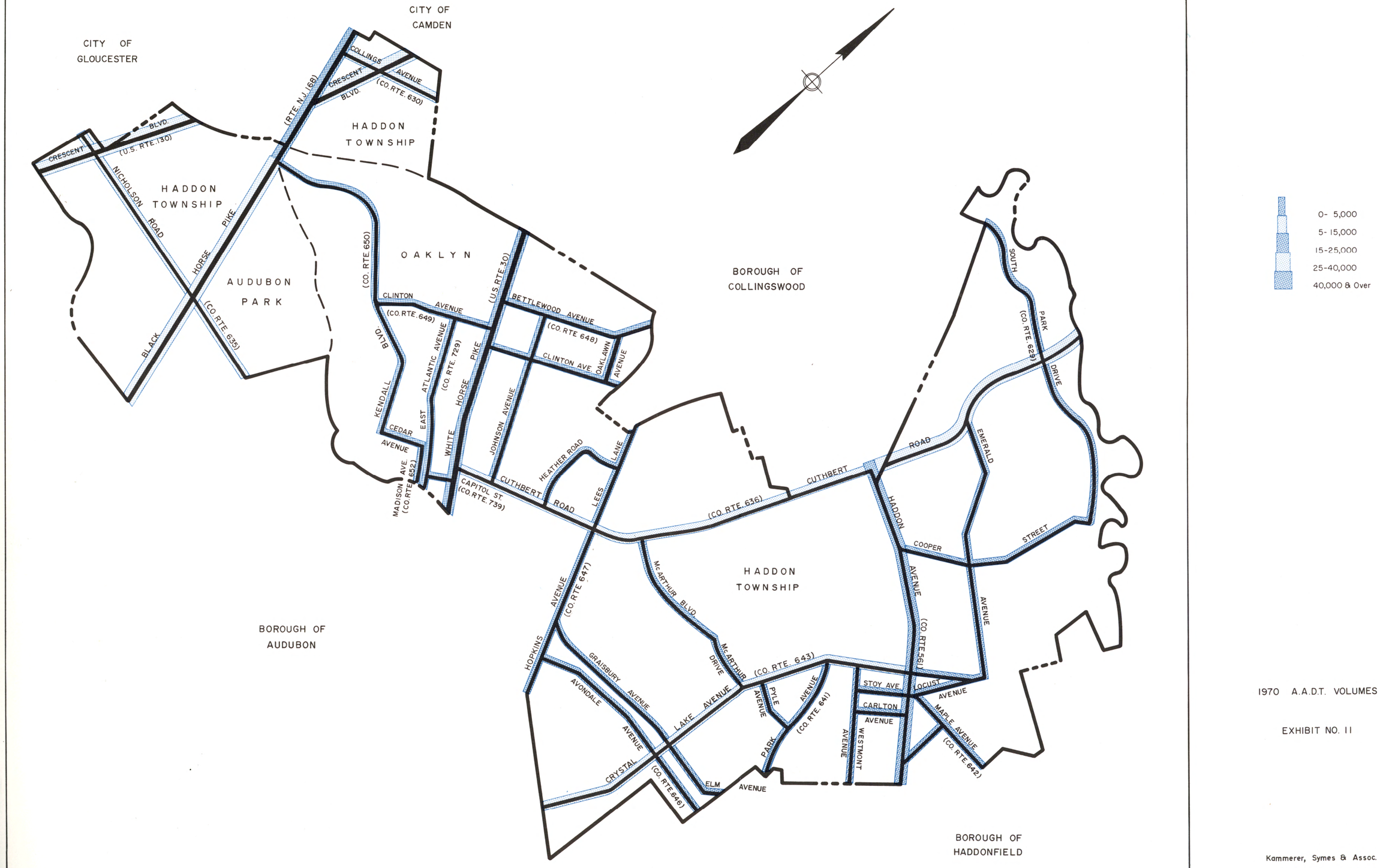
CHART NO. 10

MONTHLY TRAFFIC VARIATION OF A TYPICAL WEEKDAY ON ROUTE 30 AS % OF AADT



1970 A.A D T VOLUMES

EXHIBIT NO 11



1970 A.A.D.T. VOLUMES

EXHIBIT NO. 11

Kammerer, Symes & Assoc.
Consulting Engineers

use in making a comparison with the demand hourly volumes. The resulting quotient, termed volume-capacity ratio (i.e., the V/C ratio), is a useful index for identifying locations deficient in capacity. As the value of the ratio approaches one (1), the intersection approach volume converges to the maximum number of vehicles possible under prevailing roadway and traffic conditions, regardless of delay or restricted maneuverability.

Inspection of the resulting V/C ratios indicated the following locations are deficient in capacity:

BOROUGH OF AUDUBON PARK

a. None

TOWNSHIP OF HADDON

a. Cuthbert Road and Haddon Avenue

b. Cuthbert Road and Park Avenue

c. Cuthbert Road and Emerald Avenue

d. Haddon Avenue and Crystal Lake Avenue

e. Route 30 and Cuthbert Road

BOROUGH OF OAKLYN

a. None

CHAPTER 7

TRAFFIC INFLUENCES

This chapter discusses the traffic influences exerted by parking supply and usage, traffic control devices, roadway lighting, pedestrian movements and roadway geometry.

PARKING - BOROUGH OF AUDUBON PARK

At present there is no metered parking within the Borough. Parking is restricted on all streets with the exception of certain designated areas such as small lots.

There are no industrial or commercial areas within the Borough consequently there are no real "on" or "off" street parking problems.

PARKING - TOWNSHIP OF HADDON

At present there is no metered parking within the Township. Parking is restricted on most of the roads making up the study system.

Business is conducted primarily along Haddon Avenue from the Collingswood Borough Line to the Haddonfield Borough Line. There are few off-street parking facilities in this area. Some traffic congestion is caused by shoppers parking on roads adjacent to business establishments thereby restricting the number of traffic lanes. Recommendations for parking restrictions are included in Chapter 13 of this report.

PARKING - BOROUGH OF OAKLYN

At present there is no metered parking within the Borough. Parking is restricted on most of the roads making up the study system.

Business is conducted along Route 30 between West Clinton Avenue and Cuthbert Road. There are few off-street parking facilities in this area. The major parking problems in the Borough occur along Route 30, due to the limited amount of off-street parking facilities. Certain recommendations for parking restrictions are included in Chapter 13 of this report.

TRAFFIC CONTROL DEVICES - BOROUGH OF AUDUBON PARK

Traffic signals are located and operating at the following intersections:

LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
a. Route 168 and Kennedy Drive	Semi-Actuated	2	Approved

TRAFFIC CONTROL DEVICES - TOWNSHIP OF HADDON

Traffic signals are located and operating at the following intersections:

LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
a. Crystal Lake Avenue and Haddon Avenue	Fixed Time	2	Approved
b. Crystal Lake Avenue and Park Avenue	Fixed Time	2	Approved
c. Cuthbert Road and Emerald Avenue	Semi-Actuated	2	*
d. Cuthbert Road and Haddon Avenue	Fixed Time	1	*
e. Cuthbert Road and McArthur Boulevard	Fixed Time	2	*
f. Cuthbert Road and Park Avenue	Fixed Time	2	*
g. Route 30 and Cuthbert Road	Semi-Actuated	2	Approved
h. Route 30 and East Holly Avenue	Semi-Actuated	2	Approved
i. Route 130 and Collings Avenue	Semi-Actuated	2	Approved
j. Route 130 and Nicholson Road	Semi-Actuated	1	Approved
k. Route 130 and Wilson Avenue	Semi-Actuated	2	Approved
l. Route 130 and Route 168	Fixed Time	1	Approved
m. Route 168 and Collings Avenue	Semi-Actuated	2	Approved
n. Route 168 and Grant Avenue	Semi-Actuated	2	Approved
o. Route 168 and Nicholson Road	Semi-Actuated	1	Approved

* Denotes signals where approvals could not be found.

TRAFFIC CONTROL DEVICES - BOROUGH OF OAKLYN

Traffic signals are located and operating at the following intersections:

LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
a. Clinton Avenue and East Atlantic Avenue	Fixed Time	7	Approved
b. West Clinton Avenue, East Haddon Avenue and Route 30	Semi-Actuated	2	Approved
c. Route 168 and Kendall Boulevard	Semi-Actuated	2	Approved

Exhibit No. 12 shows the existing signal locations in the study area. All of these signals are warranted in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways. Additional signal installations accompanied by improvements to existing facilities will be discussed under "Detailed Recommendations".

Timing cycles vary from sixty (60) to ninety (90) seconds for all of the signals within the three (3) municipalities.

PEDESTRIAN MOVEMENTS

Pedestrian traffic is moderate to heavy at most of the intersections in Haddon Township particularly along Haddon Avenue.

In the Borough of Oaklyn pedestrian traffic is heaviest at the intersection of Route 30 and Clinton Avenue with moderate pedestrian traffic at various locations throughout the Borough.

The Borough of Audubon Park has heavy pedestrian traffic in school areas only, with no other major pedestrian problems in the Borough.

In general crossing guards control the pedestrian traffic at intersections utilized by school children. The crossing guards have little or no adverse effect on traffic.

ROADWAY LIGHTING

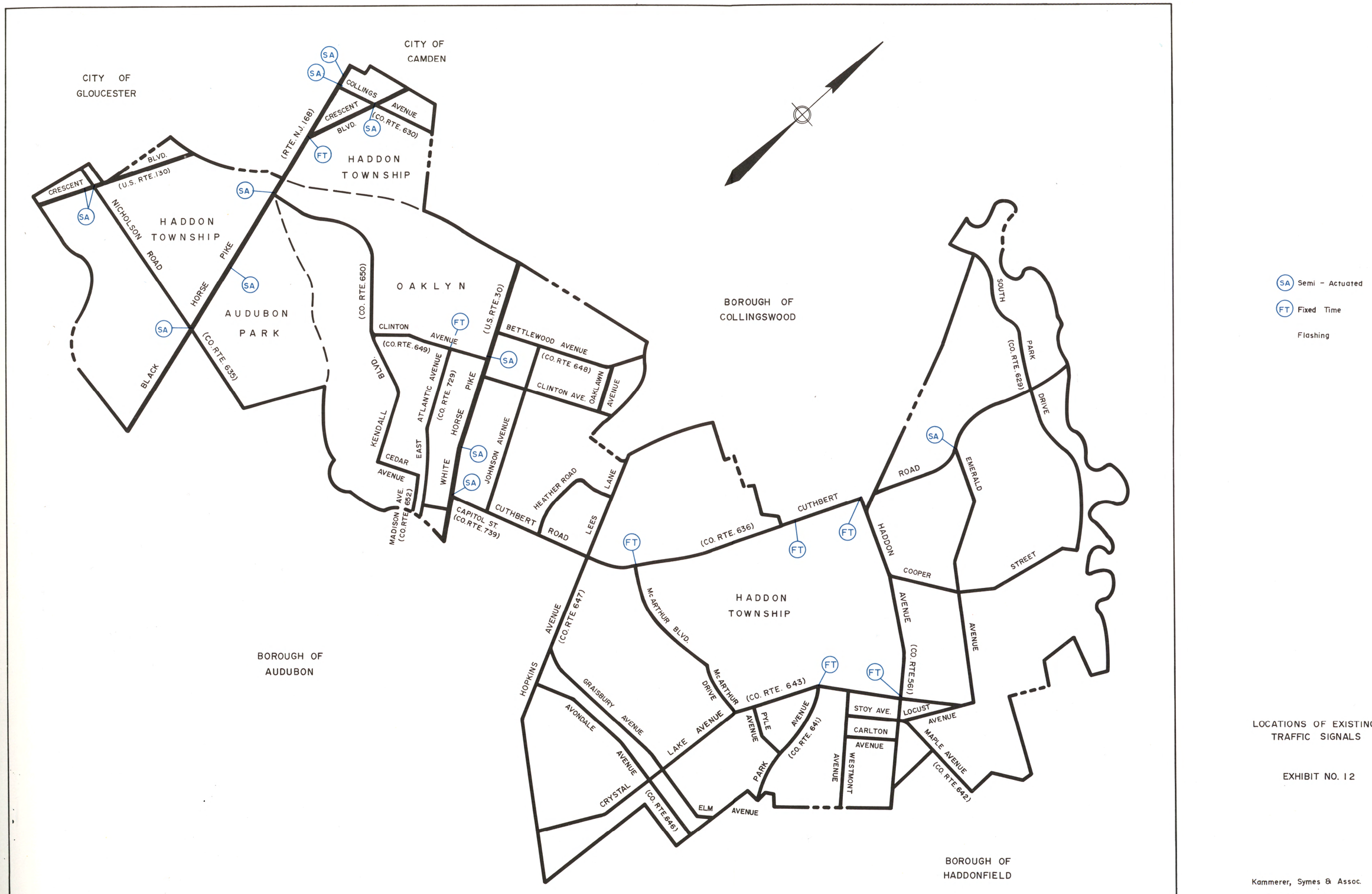
Most of the roadways in the Borough of Audubon Park, the Township of Haddon and the Borough of Oaklyn appear to be only fairly lighted. Only a very small percentage of residential streets have modernized lighting systems. Lighting on the County roads is, in general, confined to the intersections. Even though some of the County roads may be reconstructed in the near future, there is a present need for additional lighting on these roadways.

ROADWAY GEOMETRY

Geometry on most of the roadways in the study area is good to fair. Some of the collector streets have cartways varying from thirty (30) feet to forty (40) feet. These roads are suitable for two (2) lane but not four (4) lane operation, especially with parking on one or, in some cases, both sides of the roadway. In many cases where separate turning lanes have been provided, their effectiveness has been reduced due to inadequate width and length. Corner radii at many of the intersections are very small thereby severely restricting turning

LOCATIONS OF EXISTING
TRAFFIC SIGNALS

EXHIBIT NO 12



LOCATIONS OF EXISTING TRAFFIC SIGNALS

EXHIBIT NO. 12

Kammerer, Symes & Assoc.
Consulting Engineers

CHAPTER 8

BUS AND TRUCK OPERATION

BUS SERVICE

Transport of New Jersey is operating a temporary feeder system in conjunction with the Port Authority Transit Corporation (PATCO) High Speed Line. It involves the rerouting of twenty (20) bus routes to terminate at various PATCO stations in addition to a modified normal local service.

The deadline for the trial system was February 1, 1973; however, it has been extended until the latter part of 1973. At this time it will revert to its original status unless the outcome of the experiment is favorable and further monies are appropriated by the New Jersey State Legislature to subsidize the program. The Consultant recommends that the system be continued and even further implemented if possible.

BOROUGH OF AUDUBON PARK

Transport of New Jersey operates four (4) routes which serve the Borough of Audubon Park. These routes operate through the areas along Route 168, Nicholson Road, Road A and Road B. The routes connect Audubon Park with Philadelphia and other southern New Jersey communities. Transportation is provided twenty-four (24) hours daily by two (2) of the routes along Route 168. The other two (2) routes operate along Nicholson Road and Roads A and B. On the latter routes there are seven (7) trips each way on week days between 7:00 a.m. and 6:00 p.m. at approximately ninety (90) minute intervals. There are five (5) trips each way on Saturday and four (4) on Sunday. Service on the Route 168 routes is normally offered at fifteen (15) minute intervals with the intervals decreased to five (5) minutes during the morning and evening commuter peak hours. There are presently two (2) routes partially re-routed to the Collingswood PATCO station from Audubon Park. All routes are easily accessible to the residents.

TOWNSHIP OF HADDON

Transport of New Jersey operates five (5) routes serving the areas along Haddon Avenue, Linwood Avenue, Park Avenue, Cuthbert Road to Crystal Lake Avenue, Avondale Avenue, east to Haddonfield and Hopkins Avenue. The routes connect Haddon Township with Philadelphia and other southern New Jersey communities. Transportation is provided daily except Sundays and Holidays at thirty (30) minute intervals from 5:00 a.m. to 10:00 p.m. Service at fifteen (15) minute intervals is provided during heavy commuter hours from 6.30 a.m. to 9:00 a.m. and 3.30 p.m. to 6:00 p.m. Saturday service is provided at one (1) hour intervals from 6.00 a.m. to 10:00 p.m. There is no service on Sunday. The routes are easily accessible to residents. There are presently two (2) routes serving other communities partially rerouted shuttling passengers to the PATCO High Speed Line station in Westmont. They enter the Township via Crystal Lake Avenue.

BOROUGH OF OAKLYN

Transport of New Jersey operates nine (9) routes serving the areas along Route 30 and Kendall Boulevard in the Borough of Oaklyn. The routes connect Oaklyn with Philadelphia and other southern New Jersey communities. Transportation service is provided daily at thirty (30) minute intervals from 4:00 a.m. to 2.00 a.m. Service at five (5) minute intervals is provided during the peak commuter hours from 6:30 a.m. to 9:00 a.m. and from 3:30 p.m. to 6:00 p.m. On Saturdays service at one (1) hour intervals is provided from 5:00 a.m. to midnight and on Sundays from 7:00 a.m. to midnight at ninety (90) minute intervals. There are presently five (5) routes partially rerouted to the Broadway, City Hall, Ferry Avenue and Collingswood PATCO stations from Oaklyn and surrounding communities. The routes are easily accessible to residents.

TRUCK OPERATIONS

BOROUGH OF AUDUBON PARK

There are no truck operations in the Borough of Audubon Park other than local deliveries.

TOWNSHIP OF HADDON

The only major trucking company in Haddon Township is J.A. Tucker and Co. on Cuthbert Road. All other trucking operations are for local deliveries.

BOROUGH OF OAKLYN

Local deliveries are the only trucking operations in the Borough of Oaklyn.

INFLUENCE ON TRAFFIC

The current traffic volumes and patterns of trucks and buses have no adverse influence on the traffic in the Borough of Audubon Park, Haddon Township or the Borough of Oaklyn.

Most of the bus routes serving the municipalities do not present a problem; however, bus operations do cause congestion along Route 30. This is due to restricted capacity, especially at intersections, poor bus stop locations and on street parking too close to the bus stop.

CHAPTER 9

TRAFFIC REGULATION AND ENFORCEMENT

This chapter is concerned with Municipal ordinances and State laws, the enforcement thereof and the effects on traffic.

ORDINANCES

Title 39 of the Revised Statutes of the State of New Jersey "Motor Vehicles and Traffic Regulations" governs the regulating powers of local municipalities with respect to local roadways. In accordance with R.S. 39:4-197, the municipality has the power to adopt ordinances concerning traffic and parking as follows:

a. Speed Limits.

b. One-way streets.

c. Placement of stop and yield signs.

d. Areas of restricted parking.

e. Restricting heavy commercial vehicles on certain streets.

f. Establishing bus and taxi stops.

g. Establishing curb loading zones.

h. Traffic signals.

All ordinances pertaining to the above must be approved by the Commissioner of the New Jersey Department of Transportation.

CODIFICATION AND APPROVAL

BOROUGH OF AUDUBON PARK

Of the four (4) ordinances regulating parking in the Borough of Audubon Park, one (1) has been approved and three (3) have not.

TOWNSHIP OF HADDON

Ordinance Number 550 dated October 21, 1969, and titled "Regulating the Operation and Parking of Vehicles in and Along the Streets and Public Ways in the Township of Haddon" was approved December 17, 1969. This is the only traffic ordinance in the Township.

BOROUGH OF OAKLYN

Two (2) ordinances concerning parking have been enacted but neither has been approved.

There are ten (10) ordinances concerning regulation and control of traffic. Of the ten (10), only two (2) have been approved.

Five (5) ordinances have been enacted and approved regulating parking and direction of travel.

GENERAL

It is the recommendation of the Consultant that where all necessary ordinances have not been proposed and approved, expeditious action be taken to accomplish this goal. Also, it is the Consultant's recommendation that all ordinances concerning traffic regulation, control and enforcement be codified into one (1) section.

ENFORCEMENT

The enforcement of speed limits, parking and signal regulations by Audubon Park, Haddon Township and Oaklyn is generally acceptable; however, there is need for improvement in enforcing the parking regulations on some streets in Haddon Township and Oaklyn in the business districts.

Accident records of the three (3) municipalities reveal the following regarding observation of traffic control devices.

ACCIDENT RECORDS

BOROUGH OF AUDUBON PARK

Accident records indicate that forty-three point eight (43.8) percent of the occurrences were right angle accidents, fifteen point six (15.6) percent were left turn and twenty-eight point one (28.1) percent same direction accidents. There seems to be clear indication from these records and field observations that the major causes are failure to obey traffic control devices, misjudging speed of traffic and failure to observe safe driving habits. Improvement in enforcing these regulations and in restricting the indiscriminate use of STOP and YIELD signs on roads not included in the study system is considered warranted.

TOWNSHIP OF HADDON

Accident records indicate that thirty-one point seven (31.7) percent of the occurrences were right angle accidents, twelve point eight (12.8) percent were left turn and forty-five point one (45.1) percent were same direction accidents. The same comments made by the Consultant regarding causation in the Borough of Audubon Park apply with equal force to Haddon Township.

BOROUGH OF OAKLYN

Accident records indicate that twenty-one point four (21.4) percent of the occurrences were right angle accidents, twenty-one point four (21.4) percent were left turn and forty-two point nine (42.9) percent were same direction accidents. The same comments made by the Consultant regarding causation in the Borough of Audubon Park apply with equal force to Oaklyn.

GENERAL

Traffic would flow more freely on local streets if the enforcement of all municipal and State parking regulations were improved. The Consultant believes that many serious accidents could be eliminated by a program of strictly enforcing the use of existing traffic control devices.

CHAPTER 10

GENERAL INFORMATION ON IMPROVEMENTS

IMPROVEMENTS

This report covers four (4) basic areas of recommended improvements for the Borough of Audubon Park, the Township of Haddon and the Borough of Oaklyn. They are:

a. Traffic control devices.

b. Physical roadway system.

c. Traffic flow.

d. Parking.

TRAFFIC CONTROL DEVICES

This area covers proposed traffic signals, reconstruction of existing signals, pavement markings, signing and channelization.

Some traffic signal installations have been in operation for many years, and should be reconstructed to conform to the Manual on Uniform Control Devices for Streets and Highways. Other signals need reconstruction to efficiently control the increased traffic demands.

Traffic signal installations reach maximum efficiency when they are set up to be responsive to traffic demands with provisions for fluctuations by means of semi and fully actuated controllers in order to optimize the distribution of green time. Existing and proposed signals can be timed to provide progressive movement of traffic for various volumes which are encountered during the day.

Through the use of pavement markings and/or signs, more efficient use of existing traffic lanes can be achieved. Recommendations include revision of non-standard devices and the placement of traffic control devices on the study network with the objective that increased safety, capacity and desirable quality of flow will be achieved.

PHYSICAL ROADWAY SYSTEM

Recommendations will be made covering renovations to the geometry of the roadway system within the study area to provide additional capacity and smoother traffic flow. Areas of consideration include widening of roadways, restricted turning lanes, channelization and improved riding quality. In areas where geometric improvements have been considered, specific recommendations have been made in an effort to stay within existing rights of way. The area of additional right of way which may be required to construct proposed improvements has been kept to a minimum.

TRAFFIC FLOW

Many of the major roadways in the study area are operating at capacity during peak hours. All indications of growth in Camden County denote a continued increase in the volumes of traffic. With the existing restrictions on right of way, it will be necessary to reduce the

rate of growth of traffic by encouraging traffic to use alternate routes, car pools or mass transportation.

PARKING - BOROUGH OF AUDUBON PARK

There are no parking problems as such within the Borough of Audubon Park.

PARKING - TOWNSHIP OF HADDON

The only parking problems in Haddon Township occur in the area of the Central Business District, along Route 30 and Haddon Avenue where inadequate off-street parking is provided. On-street parking for residents and visitors appears to be adequate.

PARKING - BOROUGH OF OAKLYN

The only parking problems in th Borough of Oaklyn occur in the area of the Central Business District along Route 30 where inadequate off-street parking is provided. On-street parking for residents and visitors appears to be adequate.

CHAPTER 11

AREA WIDE CONSIDERATIONS

LAND USE

Traffic flow on the road network studied in this report is heavily influenced by the land use patterns of not only Audubon Park Borough, Haddon Township and Oaklyn Borough but also the surrounding communities. In this study, consideration has been given to the changing land use patterns of the entire area.

GROWTH FACTORS

Development of realistic growth factors for use in projecting 1971 traffic volumes to the volumes expected in 1976 and 1981 took into consideration the land use, area, population growth and data on growth of traffic volumes on surrounding roadways.

IMPROVED CRITERIA

Improvements recommended in this report are based on the TOPICS concept of improving the safety, capacity and quality of traffic flow on a selected street system.

A detailed analysis has been made of locations on the study system that are deficient in capacity, have a poor quality of travel, and a high accident incidence to determine those traffic engineering improvements which would be best suited to solving specific problems.

PROJECT PRIORITIES

In the interest of comparing the needs of each location found deficient in the TOPICS Study with that of the other locations, a priority has been developed for each project. The method used considered accident experiences, the volume to capacity ratios and the travel time delays. Through the use of these parameters a tentative priority number was assigned to each deficient area to develop a tentative project list. The priority listing was then reviewed with local and County Officials. The final project priorities were established following the review with the local officials.

PROBLEM AREAS - BOROUGH OF AUDUBON PARK

There are no traffic problems within the Borough.

PROBLEM AREAS - TOWNSHIP OF HADDON

The following problem areas were established in the order of their priority:

Project No. HT-1 Haddon Avenue and Cuthbert Road

Project No. HT-2 Haddon Avenue and Crystal Lake Avenue
Haddon Avenue, Maple Avenue and Stoy Avenue

Project No. HT-3 U.S. Route 30 and Cuthbert Road

Project No. HT-4 Cuthbert Road and Park Avenue

Project No. HT-5 Crystal Lake Avenue and Park Avenue

Project No. HT-6 Emerald Avenue and Cuthbert Road

Project No. HT-7 U.S. Route 130 and Eldridge Avenue

Project No. HT-8 U.S. Route 130 and Grant Avenue

Project No. HT-9 Crystal Lake Avenue and Hopkins Avenue

PROBLEM AREAS - BOROUGH OF OAKLYN

The following problem areas were established in the order of their priority:

Project No. OA-1 U.S. Route 30, West Clinton Avenue and East Haddon Avenue

Project No. OA-2 Improvement to the Flow of Traffic Along East and West Atlantic Avenues.

PROBLEM AREAS - GENERAL

Project No. G-1 Typical Left Turn Lane Pavement Markings

Project No. G-2 General Speed Limits

CHAPTER 12

INTERSECTIONS INVOLVING STATE HIGHWAYS - GROUP FOUR

The following is a summary on the status of intersections involving State Highways in the Borough of Audubon Park, the Township of Haddon and the Borough of Oaklyn, which were studied under the Camden County TOPICS Program. The Borough of Audubon Park has three (3) such locations, the Township of Haddon has five (5) such locations, while the Borough of Oaklyn has two (2) such locations. The New Jersey Department of Transportation employs a continuing program of study, evaluation and improvement of the State Highway System in its entirety. A meeting was held with State Officials in March of 1972, regarding the problems encountered on State Highways and intersections involving State Highways. Outlined below are the results of that meeting.

BOROUGH OF AUDUBON PARK

1. PROBLEM LOCATIONS WHICH WERE PREVIOUSLY STUDIED AND CORRECTED BY THE NEW JERSEY DEPARTMENT OF TRANSPORTATION

   a. Route N.J. 168 and Kennedy Drive.

2. LOCATIONS WHICH WERE STUDIED BUT ARE NOT CONSIDERED AS PROBLEM AREAS.

   a. Route N.J. 168 between Nicholson Road and Peters Creek

   b. Route N.J. 168 and Nicholson Road.

TOWNSHIP OF HADDON

1. PROBLEM LOCATIONS FOR WHICH PLANS AND RECOMMENDED SOLUTIONS ARE STATED IN CHAPTER 13 OF THIS REPORT

   a. U.S. Route 30 and Cuthbert Road

2. PROBLEM LOCATIONS FOR WHICH RECOMMENDED SOLUTIONS ARE STATED IN NARRATIVE FORM IN CHAPTER 13 OF THIS REPORT

   a. U.S. Route 130 and Eldridge Avenue

   b. U.S. Route 130 and Grant Avenue

3. PROBLEM LOCATIONS WHICH WERE PREVIOUSLY STUDIED AND CORRECTED BY THE NEW JERSEY DEPARTMENT OF TRANSPORTATION

   a. Route N.J. 168 and Berwick Avenue

   b. U.S. Route 130 and Route N.J. 168

BOROUGH OF OAKLYN

1. PROBLEM LOCATIONS FOR WHICH PLANS AND RECOMMENDED SOLUTIONS ARE STATED IN CHAPTER 13 OF THIS REPORT

   a. U.S. Route 30, West Clinton Avenue and East Haddon Avenue

2. LOCATIONS WHICH WERE STUDIED BUT ARE NOT CONSIDERED AS PROBLEM AREAS

a. Route N.J. 168 and Kendall Boulevard

CHAPTER 13

DETAILED RECOMMENDATIONS

The detailed recommnedations presented in this Chapter are divided into two (2) main categories: (1) improvements requiring changes in geometry, and (2) those minor changes requiring only signing or pavement markings.

Thirteen (13) recommended projects for improvement are included in this report, nine (9) are located in Haddon Township, two (2) are located in the Borough of Oaklyn and two (2) are general in nature. Several projects involve more than one (1) location within the area. The major changes are presented graphically showing the existing and proposed geometry in addition to an aerial photograph of the location. Minor changes have been presented in narrative or graphic form, depending on the nature of the recommendation. *Exhibit No. 13* shows the locations of the recommended improvements.

The recommendations presented have taken into consideration the following:

a. Traffic flow problems.

b. Accidents.

c. Capacity requirements for existing and future traffic flow.

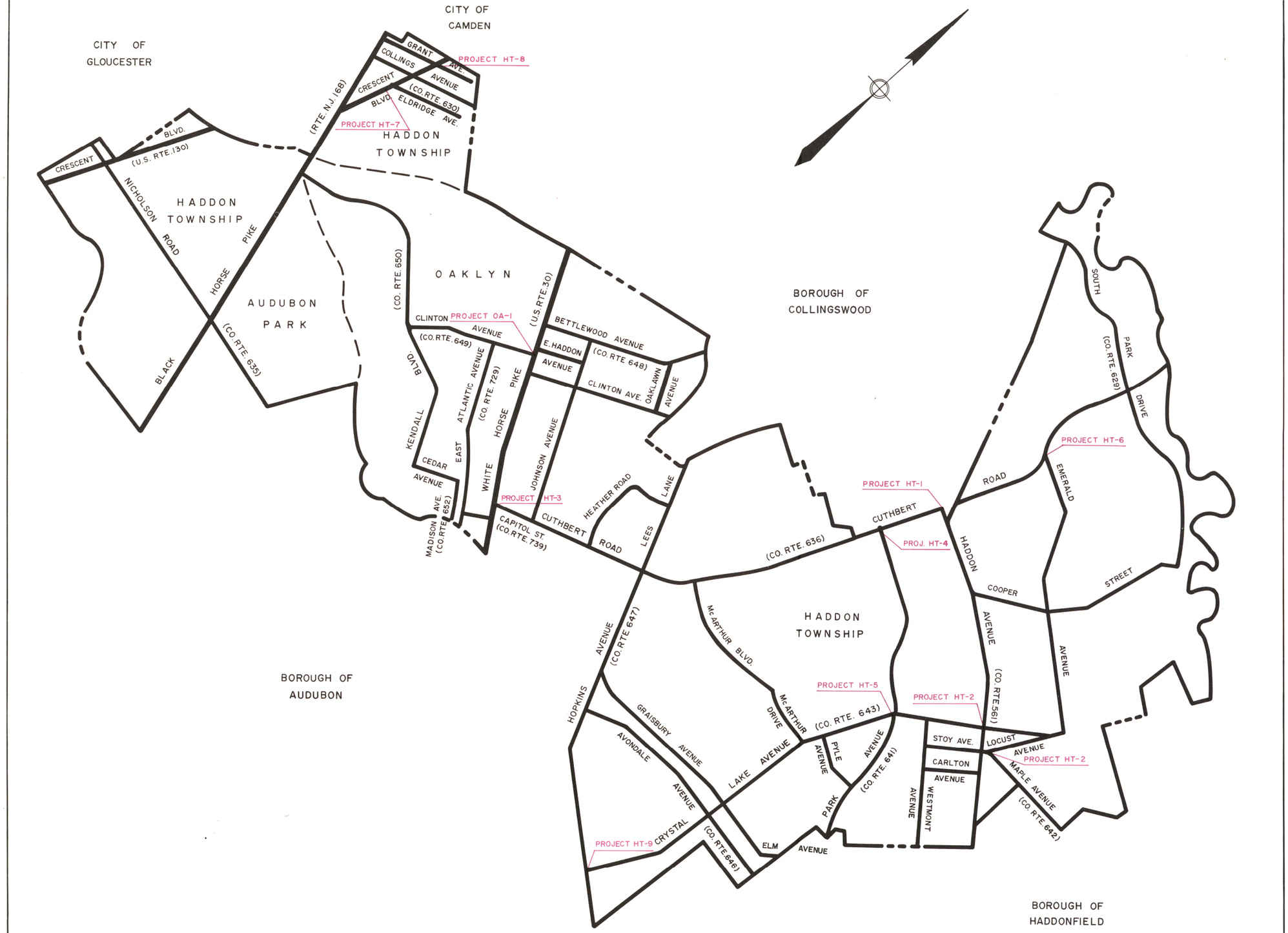
d. Existing topography and land use proposed for each location.

e. Existing and planned geometry of the roadways.

The recommended improvements which follow are listed in the order of priority previously established in conjunction with the Borough, the Township and the County.

LOCATIONS OF
RECOMMENDED IMPROVEMENTS

EXHIBIT NO 13



LOCATIONS OF
RECOMMENDED IMPROVEMENTS

EXHIBIT NO. 13

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT IMPROVEMENTS

TOWNSHIP OF HADDON

Kammerer, Symes & Associates, Inc.
CONSULTING ENGINEERS

PROJECT NO. HT-1 HADDON AVENUE AND CUTHBERT ROAD
TOWNSHIP OF HADDON

Project No. HT-1 covers the reconstruction of the intersection of Haddon Avenue and Cuthbert Road. *(Exhibit No. 14)*.

a. PROBLEMS

(1) Present levels of service, for left turn movements are "F" on the north, east and west approaches, and "E" on the south approach. The 1972 peak left turn volumes for each approach compared to the 1972 average volumes are summarized below:

	1972 PEAK LEFT TURN VOLUME VEH./HR.	1972 AVERAGE LEFT TURN VOLUME VEH./HR.
Cuthbert Road North Approach	273	184
Cuthbert Road South Approach	92	65
Haddon Avenue East Approach	123	83
Haddon Avenue West Approach	141	115

(2) Present levels of service for through and right turn movements are "F" on the south and east approaches, "D" on the north approach and "C" on the west approach. The 1972 peak through and right turn volumes for each approach compared to the 1972 average volumes are summarized below:

	1972 PEAK THROUGH AND RIGHT TURN VOLUME VEH./HR.	1972 AVERAGE THROUGH AND RIGHT TURN VOLUME VEH./HR.
Cuthbert Road North Approach	739	487
Cuthbert Road South Approach	530	512
Haddon Avenue East Approach	641	593
Haddon Avenue West Approach	531	400

NOTE: This intersection is shared with Collingswood.

(3) The approach roadways on Haddon Avenue and Cuthbert Road are not wide enough to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Cuthbert Road North Approach	27	5
Cuthbert Road South Approach	15	20
Haddon Avenue East Approach	16	25
Haddon Avenue West Approach	21	13

(4) Near side bus stops restrict right turn movements on the east and west approaches of the intersection of Haddon Avenue and Cuthbert Road.

(5) Corner radii are not large enough to accommodate safe turning movements.

(6) Accident records indicate a total of forty (40) accidents during the three (3) year period from 1968 through 1970. Of this total, fifteen (15) were classified as same direction accidents, twelve (12) were classified as left turn accidents, eleven (11) were classified as right angle accidents and two (2) were classified as head on collisions.

(7) The Faith Christian High School is located on the northwest corner, children going to and from school must cross at this intersection.

b. RECOMMENDATIONS

(1) Reconstruct all four (4) approaches to provide two (2) lanes for through and right turn traffic in addition to a separate left turn lane with adequate stacking space.

(2) Increase all corner radii.

(3) Provide an advance green indication for the north approach of Cuthbert Road and a separate phase for both approaches of Haddon Avenue.

(4) Relocate the bus stops to the far side corners on Haddon Avenue.

(5) Provide pedestrian signal indications on all four (4) corners.

(6) Prohibit parking on all four (4) approaches.

PROJECT NO. HT-1 HADDON AVENUE AND CUTHBERT ROAD
TOWNSHIP OF HADDON

c. BENEFITS

(1) The capacity and levels of service of the intersection will be improved.

(2) Accident potential will be reduced.

(3) By relocating the bus stops, the friction between buses and other traffic will be reduced.

(4) A safer and smoother flow of traffic will be achieved.

(5) A safer crossing for pedestrians will be provided.

d. ESTIMATED COSTS

(1) Engineering	$ 22,900.00
(2) Construction	105,000.00
(3) Signs and Markings	1,600.00
(4) Traffic Signals	8,000.00
(5) Right of Way	112,000.00
Total Estimated Cost	$249,500.00

PROJECT NO. HT-1

HADDON AVENUE AND CUTHBERT ROAD

EXHIBIT NO. 14

PROJECT NO. HT-1

HADDON AVENUE AND CUTHBERT ROAD

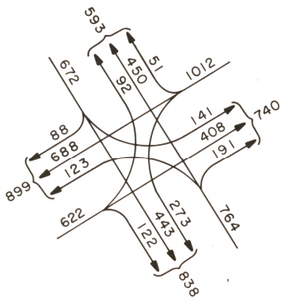
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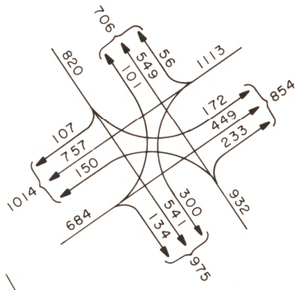
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HADDON AVENUE AND CUTHBERT ROAD

EXHIBIT NO. 14



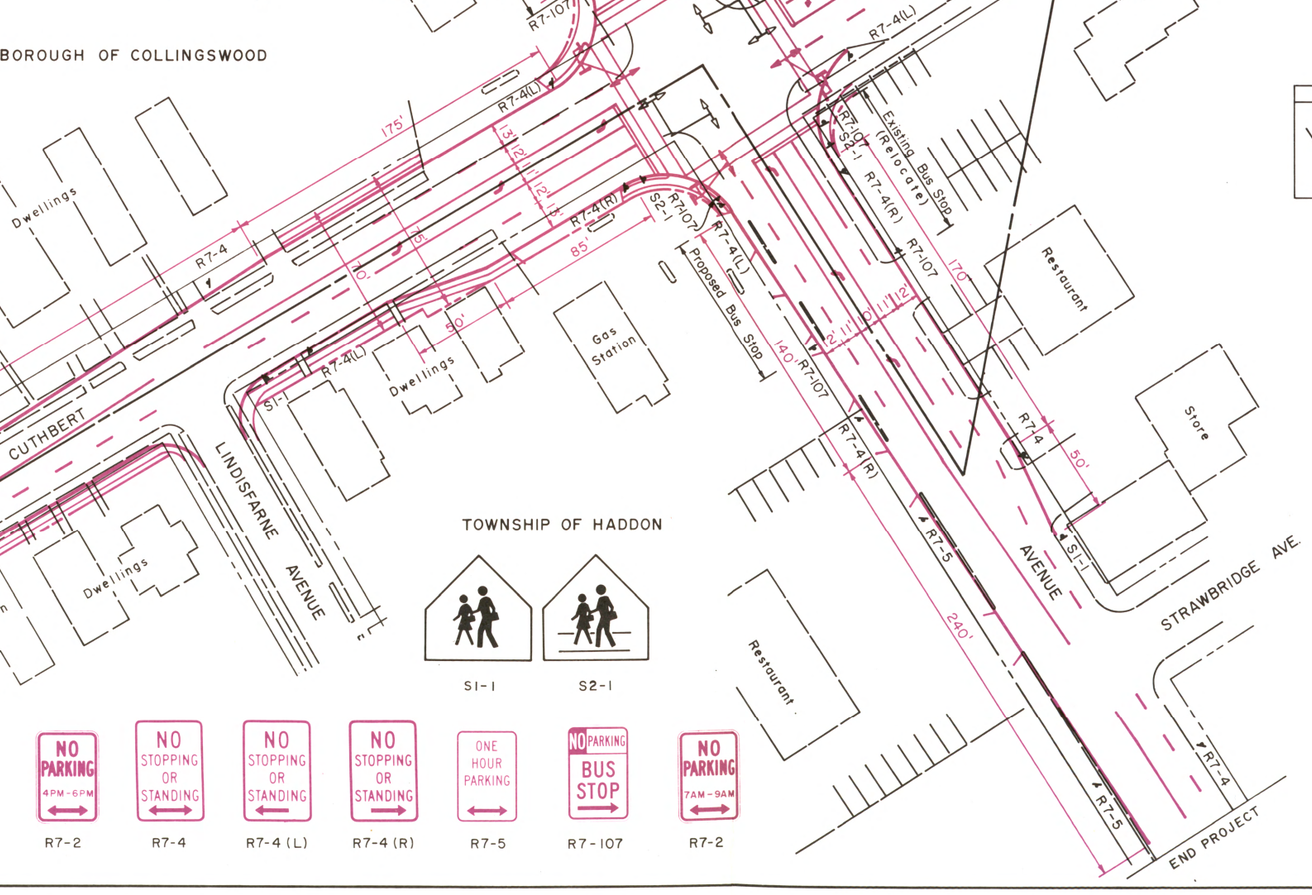
1972 Weekday Peak Hour
Traffic Volume



BOROUGH OF COLLINGSWOOD

TOWNSHIP OF HADDON

1982 D.H.V.



SIGNAL PHASING

Phase A1	Phase A	Phase B	Phase C

LEGEND

- EXISTING TOPOGRAPHY
- PROPOSED CURB
- EXISTING R.O.W.
- PROPOSED R.O.W.
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- INDUCTION LOOP DETECTOR
- P.P.B. PEDESTRIAN PUSH BUTTON
- PROPOSED PEDESTRIAN SIGNAL
- TRAFFIC SIGN
- PROPOSED SIDEWALK
- PROPOSED PAINTED CHANNELIZATION
- 00' PROPOSED CARTWAY OR R.O.W. WIDTH

SCALE
20' 0 40' 80'

S1-1 S2-1

PROJECT NO. HT-1
HADDON AVENUE AND CUTHBERT ROAD
EXHIBIT NO. 14

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-2 HADDON AVENUE AND CRYSTAL LAKE AVENUE
HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE
TOWNSHIP OF HADDON

Project No. HT-2 covers the reconstruction of the intersections of Haddon Avenue and Crystal Lake Avenue and Haddon Avenue, Maple Avenue and Stoy Avenue. *(Exhibit No. 15).*

HADDON AVENUE AND CRYSTAL LAKE AVENUE

a. PROBLEMS

(1) Present levels of service, for left turn movements, are "F" on the south and east approaches. The north approach is one way exiting into the intersection, therefore the left turn movements from this approach and the west approach were not considered. The 1971 peak left turn volumes for the south and east approaches compared to the 1971 average volumes are summarized below:

	1971 PEAK LEFT TURN VOLUME VEH./HR.	1971 AVERAGE LEFT TURN VOLUME VEH./HR.
Crystal Lake Avenue South Approach	221	197
Haddon Avenue East Approach	136	109

(2) Present levels of service are "F" on the south approach, "D" on the north approach, "C" on the east approach and "B" on the west approach. The 1971 peak volumes for each approach compared to the 1971 average volumes are summarized below:

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Crystal Lake Avenue North Approach	482	316
Crystal Lake Avenue South Approach	432	382
Haddon Avenue East Approach	803	687
Haddon Avenue West Approach	888	778

(3) The Westmont High Speed Line Station, a major generator of traffic, is located approximately four hundred (400) feet south of this intersection.

(4) High traffic volumes on Haddon Avenue restrict and cause excessive delays to traffic turning left onto Crystal Lake Avenue. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Crystal Lake Avenue North Approach	22	14
Crystal Lake Avenue South Approach	51	49
Haddon Avenue East Approach	17	*
Haddon Avenue West Approach	*	26

* The north approach of Crystal Lake Avenue is one way exiting into the intersection.

(5) The corner radii on the south approach and the northwest corner are not large enough for safe turning movements.

(6) Near side bus stops on Haddon Avenue restrict right turn movements on the west approach and the free flow of through traffic on the east approach.

(7) Accident records indicate a total of twenty-six (26) accidents during the three (3) year period from 1968 through 1970. Of this total, twelve (12) were classified as right angle accidents, nine (9) were classified as same direction accidents, four (4) were classified as left turn accidents and one (1) was classified as a head on collision.

b. RECOMMENDATIONS

(1) Reconstruct the intersection as shown on the plan.

(2) Remove the existing fixed time traffic signal and install a new semi-actuated traffic signal with pedestrian push buttons. Detectors are to be located on the Crystal Lake Avenue approaches.

(3) Provide an advance green indication for the east approach of Haddon Avenue and for the south approach of Crystal Lake Avenue.

(4) Relocate the bus stops on Haddon Avenue to the far side corners.

(5) Prohibit parking on all four (4) approaches.

PROJECT NO. HT- 2

HADDON AVENUE AND CRYSTAL LAKE AVENUE

HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

EXHIBIT NO. 15

PROJECT NO. HT- 2

HADDON AVENUE AND CRYSTAL LAKE AVENUE

HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

EXHIBIT NO. 15



PROJECT NO. HT-2 HADDON AVENUE AND CRYSTAL LAKE AVENUE
HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE
TOWNSHIP OF HADDON

c. BENEFITS

(1) The capacity and levels of service of the south and east approaches will be improved.

(2) By moving the bus stops, the friction between buses and other traffic will be reduced.

(3) Accident potential will be reduced.

(4) A safer and smoother flow of traffic will be achieved.

HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

a. PROBLEMS

(1) Present levels of service are "F" on the west approach and "B" on the north, south and east approaches. The 1972 peak volumes for each approach compared to the 1972 average volumes are summarized below:

	1972 PEAK VOLUME VEH./HR.	1972 AVERAGE VOLUME VEH./HR.
Maple Avenue North Approach	200	159
Stoy Avenue South Approach	79	35
Haddon Avenue East Approach	655	520
Haddon Avenue West Approach	989	692

(2) The high volume of traffic on Haddon Avenue and the flat angle of intersection create a hazardous condition for vehicles exiting from Maple Avenue onto Haddon Avenue.

(3) Locust Street is located on the northwest corner very close to the intersection and traffic desiring to turn into that street must cross Maple Avenue thereby restricting the flow of the northbound traffic on Maple Avenue.

(4) The approach roadway on Maple Avenue is too narrow to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Maple Avenue North Approach	10	69

(5) Corner radii are not large enough to accommodate safe turning movements.

(6) Accident records indicate a total of fourteen (14) accidents during the three (3) year period from 1968 through 1970. Of this total, eight (8) were classified as right angle accidents, three (3) were classified as left turn accidents, one (1) was classified as a same direction accident, one (1) was a collision with a fixed object and one (1) was classified as a head on collision.

b. RECOMMENDATIONS

(1) Reconstruct the intersection as shown on the plan.

(2) Install a semi-actuated traffic signal, with pedestrian push buttons. Warrant No. 2, Interruption of Continuous Traffic, is satisfied.

(3) Interconnect the new signal with the signal at Haddon Avenue and Crystal Lake Avenue.

(4) Restrict Locust Street to one way traffic from Elm Avenue towards Maple Avenue.

(5) Prohibit left turn movements from Locust Street onto Maple Avenue.

(6) Traffic exiting from Locust Street should be controlled by a STOP sign.

(7) Provide a lag green phase for the west approach of Haddon Avenue.

(8) Prohibit parking on all four (4) approaches.

c. BENEFITS

(1) Capacity of the intersection will be improved.

(2) Level of service will be improved.

(3) Accident potential will be reduced.

(4) A safer and smoother flow of traffic will be achieved.

PROJECT NO. HT-2 HADDON AVENUE AND CRYSTAL LAKE AVENUE
HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

TOWNSHIP OF HADDON

d. ESTIMATED COSTS

(1) Engineering	$15,000.00
(2) Construction	41,600.00
(3) Signs and Markings	1,500.00
(4) Traffic Signals	32,000.00
(5) Right of Way	3,200.00
*Total Estimated Cost	$93,300.00

*Includes both projects.

PROJECT NO. HT- 2

HADDON AVENUE AND CRYSTAL LAKE AVENUE

HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

EXHIBIT NO. 15

SIGNAL PHASING

Phase A1	Phase A	Phase B1	Phase B

HADDON AVENUE & CRYSTAL LAKE AVENUE

Phase A	Phase B	Phase B	Phase B1

HADDON AVENUE, MAPLE AVENUE & STOY AVENUE

NO PARKING BUS STOP — R7-107

PUSH BUTTON FOR GREEN LIGHT — R10-3

NO STOPPING OR STANDING — R7-4(R)

NO STOPPING OR STANDING — R7-4(L)

ONE WAY — R6-1

ONE HOUR PARKING — R7-5(R)

ONE HOUR PARKING — R7-5(L)

NO PARKING ANY TIME — R7-1(R)

NO PARKING ANY TIME — R7-1

NO PARKING ANY TIME — R7-1(L)

DO NOT ENTER — R5-1

ONLY ONLY — R3-8(Modified)

R3-2

ONLY — R3-5

STOP — R1-1

1971 Weekday Peak Hour Traffic Volume

1981 D.H.V.

1972 Weekday Peak Hour Traffic Volume

1982 D.H.V.

LEGEND

- EXISTING TOPOGRAPHY
- PROPOSED CURB
- EXISTING R.O.W.
- PROPOSED R.O.W.
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- INDUCTION LOOP DETECTOR
- P.P.B. PEDESTRIAN PUSH BUTTON
- PROPOSED PEDESTRIAN SIGNAL
- TRAFFIC SIGN
- PROPOSED SIDEWALK
- PROPOSED PAINTED CHANNELIZATION
- 00' PROPOSED CARTWAY OR R.O.W. WIDTH

SCALE 20' 0 40' 80'

PROJECT NO. HT- 2

HADDON AVENUE AND CRYSTAL LAKE AVENUE

HADDON AVENUE, MAPLE AVENUE AND STOY AVENUE

EXHIBIT NO. 15

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-3 U.S. ROUTE 30 AND CUTHBERT ROAD
TOWNSHIP OF HADDON

Project No. HT-3 covers the reconstruction of the intersection of Route 30 and Cuthbert Road. *(Exhibit No. 16)*.

a. PROBLEMS

(1) Present levels of service are "F" on the east approach, "D" on the south approach, and "B" on the north approach. The 1971 peak volumes for each approach compared to the 1971 average volumes are summarized below:

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Route 30 North Approach	477	437
Route 30 South Approach	1206	949
Cuthbert Road East Approach	330	303

(2) High traffic volumes on the south approach of Route 30 make it difficult for traffic desiring to turn left from the north approach onto Cuthbert Road and cause excessive delays.

(3) The corner radii are not large enough to allow traffic, particularly buses and large trucks to turn right without crossing into the opposing lane of traffic.

(4) The approach roadways are too narrow to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Route 30 North Approach	17	--
Route 30 South Approach	--	20
Cuthbert Road East Approach	79	21

(5) Excessive delays are created by existing geometry.

(6) Near side bus stops restrict right turn movements on the east and south approaches of the intersection.

(7) Accident records indicate a total of sixteen (16) accidents during the three (3) year period from 1968 through 1970. Of this total, nine (9) were classified as same direction accidents, three (3) were classified as collisions with fixed objects, two (2) were classified as right angle accidents and two (2) were classified as left turn accidents.

(8) Due to the congestion and delays at this intersection, traffic by-passes the intersection and uses local streets.

b. RECOMMENDATIONS

(1) Reconstruct the Cuthbert Road approach as shown on the plan.

(2) Increase all corner radii.

(3) Provide an advance green indication for the north approach of Route 30.

(4) Relocate the bus stops to the far side corner on Route 30 and to mid-block on Cuthbert Road.

(5) Prohibit parking on all three (3) approaches.

c. BENEFITS

(1) The capacity and level of service of the east approach will be improved.

(2) Capacity for left turns on the north approach of Route 30 will be increased.

(3) Accident potential will be reduced.

(4) A safer and smoother flow of traffic will be achieved.

(5) By widening and moving the bus stops, the friction between buses and other traffic will be reduced.

d. ESTIMATED COSTS

(1) Engineering	$ 4,500.00
(2) Construction	18,200.00
(3) Signs and Markings	500.00
(4) Traffic Signals	4,000.00
(5) Right of Way	13,700.00
Total Estimated Cost	$40,900.00

PROJECT NO. HT-3

U.S. ROUTE 30 AND CUTHBERT ROAD

EXHIBIT NO. 16

PROJECT NO. HT-3

U.S. ROUTE 30 AND CUTHBERT ROAD

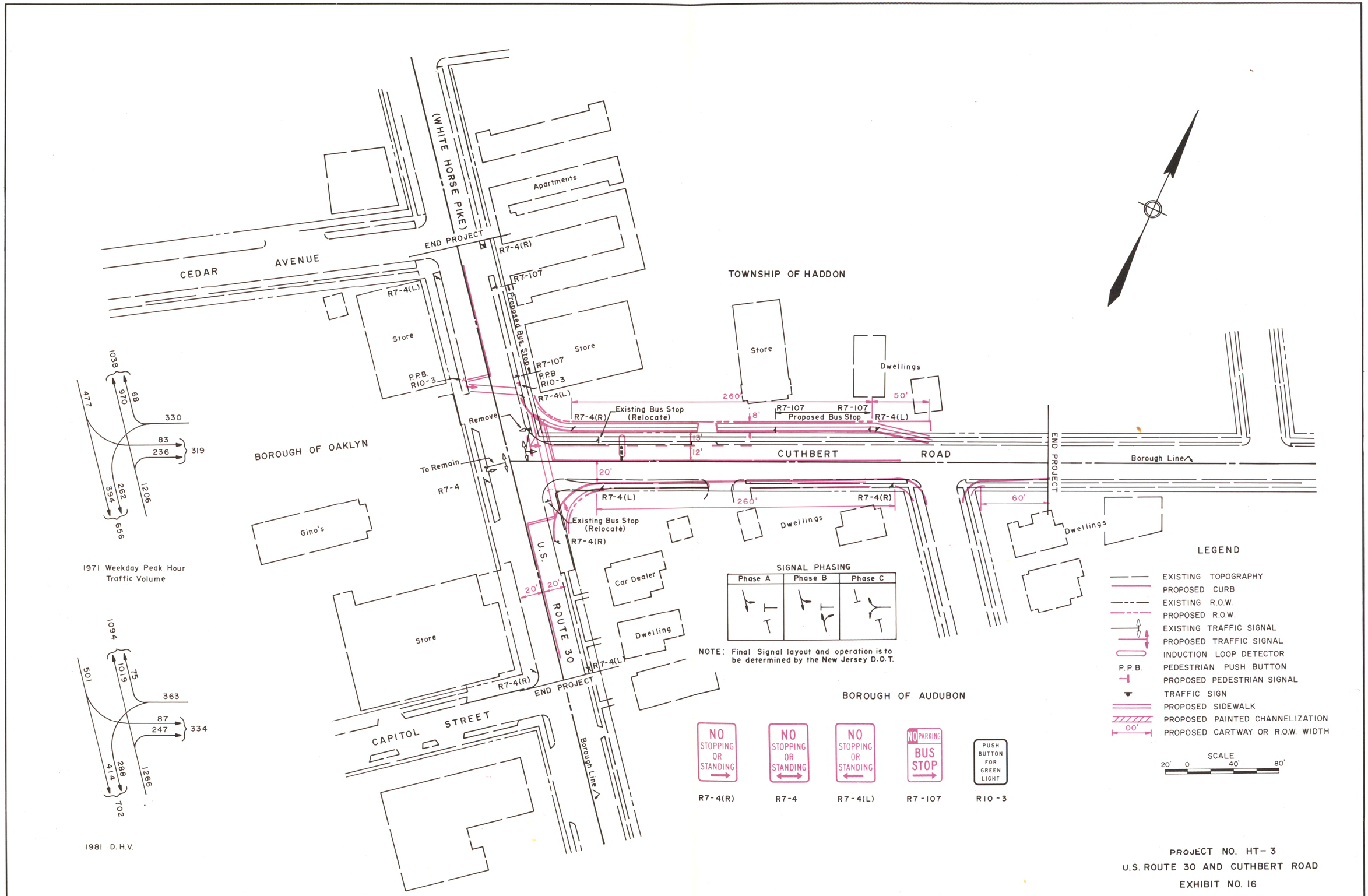
EXHIBIT NO. 16



PROJECT NO. HT-3

U.S. ROUTE 30 AND CUTHBERT ROAD

EXHIBIT NO. 16



PROJECT NO. HT-3

U.S. ROUTE 30 AND CUTHBERT ROAD

EXHIBIT NO. 16

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-4 CUTHBERT ROAD AND PARK AVENUE
TOWNSHIP OF HADDON

Project No. HT-4 covers the reconstruction of the intersection of Cuthbert Road and Park Avenue. *(Exhibit No. 17).*

a. PROBLEMS

(1) Present levels of service are "F" on the west approach, "D" on the north approach and "B" on the south and east approaches. The 1971 peak volumes for each approach compared to the 1971 average volumes are summarized below:

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Cuthbert Road North Approach	852	788
Cuthbert Road South Approach	641	605
Park Avenue East Approach	389	302
Park Avenue West Approach	451	291

(2) The approach roadways on Cuthbert Road and Park Avenue are too narrow to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Cuthbert Road North Approach	7	2
Cuthbert Road South Approach	2	6
Park Avenue East Approach	30	23
Park Avenue West Approach	13	23

(3) Corner radii are not large enough to accommodate safe turning movements.

(4) Traffic traveling on Park Avenue encounters a severe dip as it crosses Cuthbert Road.

NOTE: This intersection is shared with Collingswood.

(5) Accident records indicate a total of sixteen (16) accidents during the three (3) year period from 1968 through 1970. Of this total, eight (8) were classified as right angle accidents, six (6) were classified as same direction accidents, one (1) was classified as a left turn accident and one (1) was classified as a head on collision.

b. RECOMMENDATIONS

(1) Widen all approaches to the intersection.

(2) Provide a restricted left turn lane with adequate stacking space on the east and west approaches of Park Avenue.

(3) Cuthbert Road should be widened to fifty (50) feet throughout the Borough of Collingswood and the Township of Haddon.

(4) Prohibit parking on all four (4) approaches.

c. BENEFITS

(1) The capacity and levels of service of the intersection will be improved.

(2) Accident potential will be reduced.

(3) A safer and smoother flow of traffic will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$ 18,300.00
(2) Construction	78,000.00
(3) Signs and Markings	1,500.00
(4) Traffic Signals	12,000.00
(5) Right of Way	18,200.00
Total Estimated Cost	$128,000.00

PROJECT NO. HT-4

CUTHBERT ROAD AND PARK AVENUE

EXHIBIT NO. 17

PROJECT NO. HT-4

CUTHBERT ROAD AND PARK AVENUE

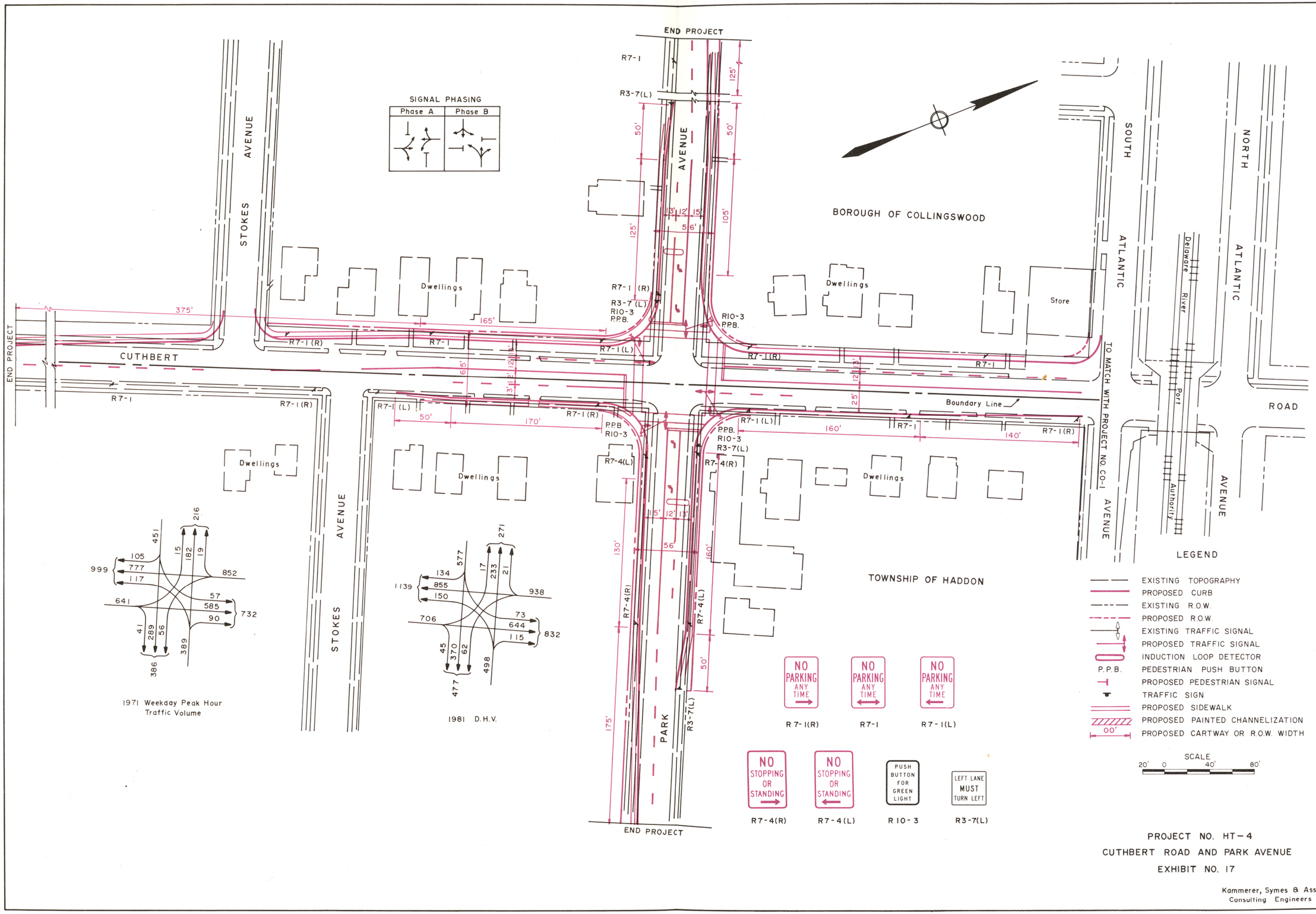
EXHIBIT NO. 17



PROJECT NO. HT-4

CUTHBERT ROAD AND PARK AVENUE

EXHIBIT NO. 17



1971 Weekday Peak Hour Traffic Volume

1981 D.H.V.

PROJECT NO. HT-4

CUTHBERT ROAD AND PARK AVENUE

EXHIBIT NO. 17

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-5 CRYSTAL LAKE AVENUE AND PARK AVENUE
TOWNSHIP OF HADDON

Project No. HT-5 covers the reconstruction of the intersection of Crystal Lake Avenue and Park Avenue. *(Exhibit No. 18).*

a. PROBLEMS

(1) The offset on the north approach of Crystal Lake Avenue creates a hazardous condition for southbound traffic traveling on Crystal Lake Avenue.

(2) The approach roadways, on the north, south and west approaches are too narrow to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Crystal Lake Avenue North Approach	13	11
Crystal Lake Avenue South Approach	12	7
Park Avenue West Approach	21	23

(3) Corner radii are not large enough to accommodate safe turning movements.

(4) Accident records indicate a total of ten (10) accidents during the three (3) year period from 1968 through 1970. Of this total, four (4) were classified as same direction accidents, three (3) were classified as right angle accidents, two (2) were classified as collisions with fixed objects and one (1) was classified as a left turn accident.

b. RECOMMENDATIONS

(1) Realign Crystal Lake Avenue as shown on the plan.

(2) Increase all corner radii.

(3) Reconstruct the north, south and west approaches as shown on the plan.

(4) Install a signal ahead sign on the north approach of Crystal Lake Avenue.

(5) Restrict the center lane on both approaches of Crystal Lake Avenue for left turn movements.

(6) Prohibit parking on all four (4) approaches.

PROJECT NO. HT-5 CRYSTAL LAKE AVENUE AND PARK AVENUE
TOWNSHIP OF HADDON

c. BENEFITS

(1) The approach roadway alignments will be improved.

(2) A safer and smoother flow of traffic will be achieved.

(3) Accident potential will be reduced.

d. ESTIMATED COSTS

(1) Engineering	$ 8,400.00
(2) Construction	27,900.00
(3) Signs and Markings	800.00
(4) Traffic Signals	10,000.00
(5) Right of Way	3,300.00
Total Estimated Cost	$50,400.00

PROJECT NO. HT-5

CRYSTAL LAKE AVENUE AND PARK AVENUE

EXHIBIT NO. 18

PROJECT NO. HT-5

CRYSTAL LAKE AVENUE AND PARK AVENUE

EXHIBIT NO. 18



PROJECT NO. HT-5

CRYSTAL LAKE AVENUE AND PARK AVENUE

EXHIBIT NO. 18

PROJECT NO. HT-5

CRYSTAL LAKE AVENUE AND PARK AVENUE

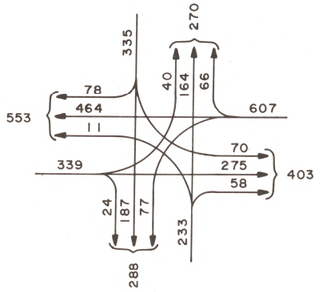
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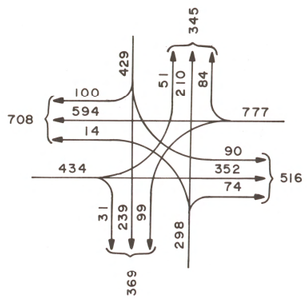
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CRYSTAL LAKE AVENUE AND PARK AVENUE

EXHIBIT NO. 18



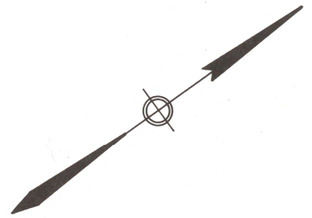
1972 Weekday Peak Hour
Traffic Volume



1982 D.H.V.

SIGNAL PHASING

Phase A	Phase B



LEGEND

- EXISTING TOPOGRAPHY
- PROPOSED CURB
- EXISTING R.O.W.
- PROPOSED R.O.W.
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- INDUCTION LOOP DETECTOR
- P.P.B. PEDESTRIAN PUSH BUTTON
- PROPOSED PEDESTRIAN SIGNAL
- TRAFFIC SIGN
- PROPOSED SIDEWALK
- PROPOSED PAINTED CHANNELIZATION
- 00' PROPOSED CARTWAY OR R.O.W. WIDTH

SCALE
20' 0 40' 80'

PROJECT NO. HT-5
CRYSTAL LAKE AVENUE AND PARK AVENUE
EXHIBIT NO. 18

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-6 EMERALD AVENUE AND CUTHBERT ROAD
TOWNSHIP OF HADDON

Project No. HT-6 covers the reconstruction of the intersection of Emerald Avenue and Cuthbert Road. *(Exhibit No. 19).*

a. PROBLEMS

(1) Present levels of service are "F" on the west approach, "E" on the north approach and "B" on the south and east approaches. The 1971 peak volumes for each approach compared to the 1971 average volumes are summarized below:

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Cuthbert Road North Approach	1267	1064
Cuthbert Road South Approach	918	818
Emerald Avenue East Approach	143	118
Emerald Avenue West Approach	372	223

(2) The two (2) roads intersect on a horizontal curve at an angle greater than ninety (90) degrees.

(3) The approach roadways, on Emerald Avenue are too narrow to safely accommodate turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Emerald Avenue East Approach	11	47
Emerald Avenue West Approach	67	11

(4) Existing channelization at the northwest and southeast corners is unable to safely accommodate the right turn movements.

(5) The crosswalks on the south and west approaches are located ahead of the stop line.

(6) Traffic exiting from the east approach of Addison Avenue onto Cuthbert Road encounters heavy volumes of traffic creating a potential hazard.

(7) The Strawbridge Elementary School is located on Emerald Avenue, approximately three hundred (300) feet east of the intersection. Children going to and from school must cross this intersection.

(8) Accident records indicate a total of fifteen (15) accidents during the three (3) year period from 1968 through 1970. Of this total, ten (10) were classified as same direction accidents, three (3) were classified as collisions with fixed objects, one (1) was classified as right angle accident and one (1) was classified as a left turn accident.

b. RECOMMENDATIONS

(1) Widen Cuthbert Road to provide a restricted left turn lane with sufficient stacking space on the north approach.

(2) Widen Emerald Avenue to provide restricted left turn lanes with sufficient stacking space on both of the approaches.

(3) Prohibit left turns from the south approach of Cuthbert Road onto Emerald Avenue.

(4) Provide an advance green indication for the north approach of Cuthbert Road and for the west approach of Emerald Avenue.

(5) Provide pedestrian signal indications.

(6) Crosswalks are to be located in accordance with the current Manual on Uniform Traffic Control Devices.

(7) Restrict the east approach of Addison Avenue to one-way in an easterly direction from Cuthbert Road to Fern Avenue.

(8) Reconstruct the channelization on the northwest and southeast corners.

(9) Prohibit parking on all four (4) approaches.

c. BENEFITS

(1) The capacity and levels of service of the north and west approaches will be improved.

(2) Additional stacking space for left turns will be provided.

(3) A safer crossing for pedestrians will be provided.

(4) A safer and smoother flow of traffic will be achieved.

(5) Accident potential will be reduced.

PROJECT NO. HT-6 EMERALD AVENUE AND CUTHBERT ROAD
TOWNSHIP OF HADDON

d. ESTIMATED COSTS

(1) Engineering	$ 25,300.00
(2) Construction	113,100.00
(3) Signs and Markings	1,400.00
(4) Traffic Signals	12,000.00
(5) Right of Way	200.00
Total Estimated Cost	$152,000.00

PROJECT NO. HT-6

EMERALD AVENUE AND CUTHBERT ROAD

EXHIBIT NO. 19

PROJECT NO. HT-6

EMERALD AVENUE AND CUTHBERT ROAD

EXHIBIT NO. 19

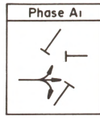
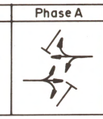
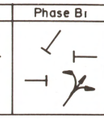
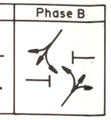


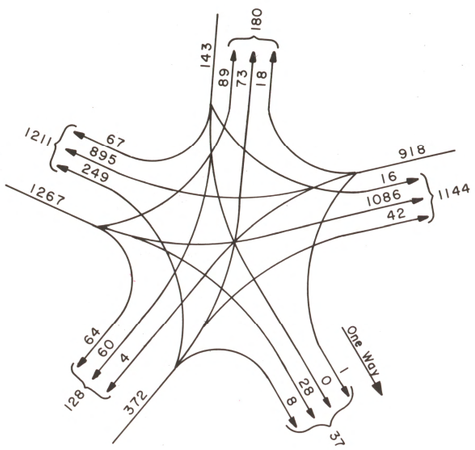
PROJECT NO. HT-6

EMERALD AVENUE AND CUTHBERT ROAD

EXHIBIT NO. 19

SIGNAL PHASING

Phase A1	Phase A	Phase B1	Phase B
			



1971 Weekday Peak Hour
Traffic Volume

1981 D.H.V.

LEGEND

- EXISTING TOPOGRAPHY
- PROPOSED CURB
- EXISTING R.O.W.
- PROPOSED R.O.W.
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- INDUCTION LOOP DETECTOR
- P.P.B. PEDESTRIAN PUSH BUTTON
- PROPOSED PEDESTRIAN SIGNAL
- TRAFFIC SIGN
- PROPOSED SIDEWALK
- PROPOSED PAINTED CHANNELIZATION
- 00' PROPOSED CARTWAY OR R.O.W. WIDTH

SCALE
20' 0 40' 80'



R10-4 R7-4(R) R7-4 R7-4(L) R7-2(L) R7-2 R7-1(R) R7-1(L)



S1-1 S2-1 R3-7(L) R4-7 R3-2 R1-1 R6-1



R3-9 (Modified)

PROJECT NO. HT-6
EMERALD AVENUE AND CUTHBERT ROAD
EXHIBIT NO. 19

Kammerer, Symes & Assoc.
Consulting Engineers


N
130
ELDRIDGE
ROUTE
AVENUE
U.S.

PROJECT NO. HT-7 U.S. ROUTE 130 AND ELDRIDGE AVENUE
TOWNSHIP OF HADDON

Project No. HT-7 covers the improvements to the intersection of Route 130 and Eldridge Avenue.

a. PROBLEMS

(1) This is an unsignalized intersection with STOP signs located on Eldridge Avenue.

(2) The median strip on Route 130 at Eldridge Avenue is open allowing left turns and through movements across Route 130.

(3) No signs are posted on Route 130 or Eldridge Avenue restricting left turns.

(4) The corner radii are not large enough to accommodate safe right turn movements.

b. RECOMMENDATIONS

(1) Close off the median opening on Route 130 at Eldridge Avenue.

(2) Turning movements onto Route 130 from Eldridge Avenue will now be made from Collings Avenue.

(3) Increase corner radii to a minimum of forty (40) feet.

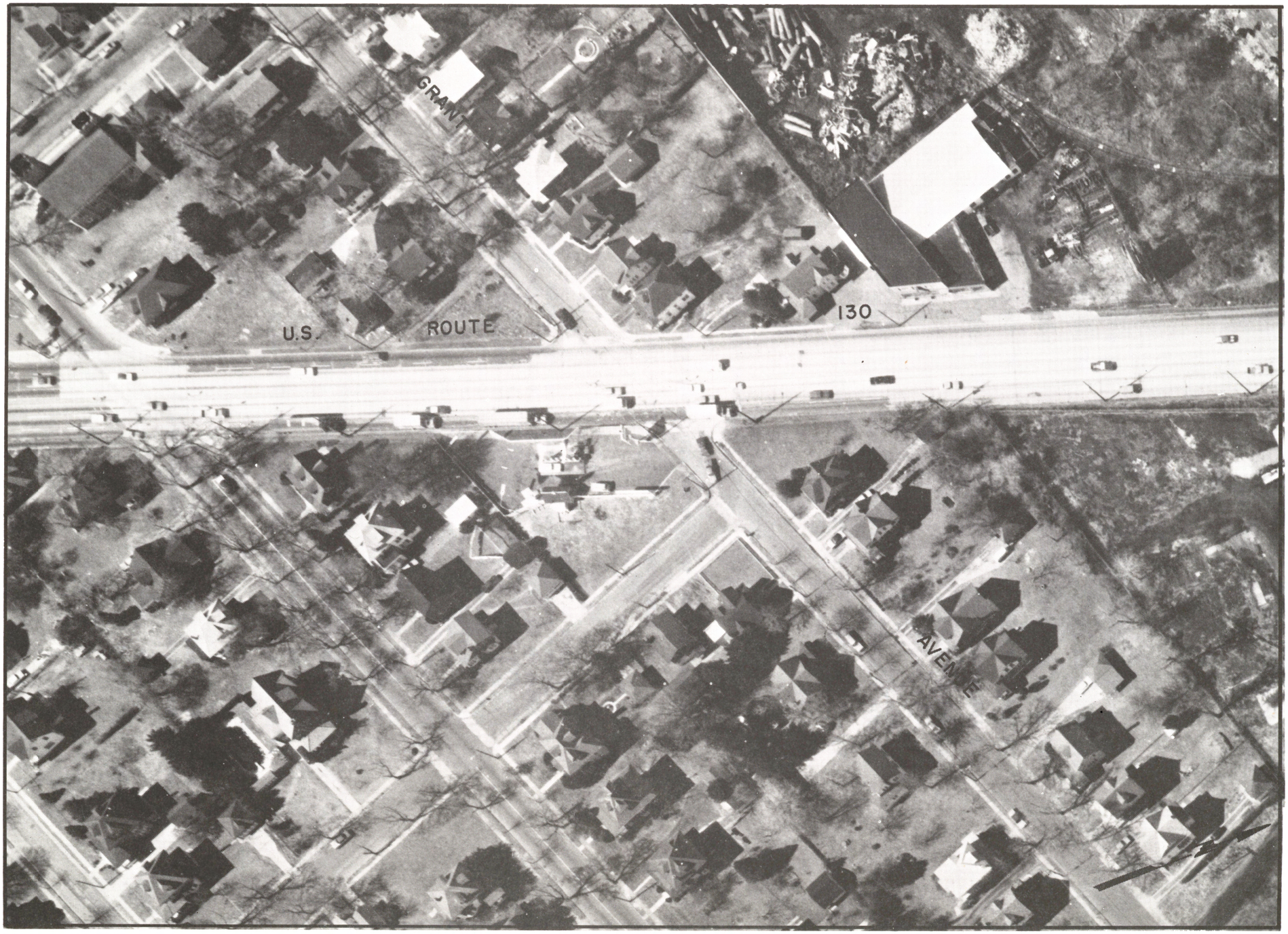
c. BENEFITS

(1) A safer flow of traffic will be achieved.

(2) The right turn movements will be improved.

d. ESTIMATED COSTS

(1) Engineering	$1,000.00
(2) Construction	4,400.00
(3) Signs and Markings	700.00
Total Estimated Cost	$6,100.00


GRANT
U.S.
ROUTE
130
AVENUE

PROJECT NO. HT-8 U.S. ROUTE 130 AND GRANT AVENUE
TOWNSHIP OF HADDON

Project No. HT-8 covers the improvements to the intersection of Route 130 and Grant Avenue.

a. PROBLEMS

(1) This is an unsignalized intersection with STOP signs located on Grant Avenue.

(2) The median strip on Route 130 at Grant Avenue is open allowing left turns and through movements across Route 130.

(3) No signs are posted along Route 130 or Grant Avenue restricting left turns.

(4) Left turns are prohibited at Collings Avenue and Route 130, which is located approximately four hundred (400) feet south of this intersection. Traffic desiring to turn left from the west approach of Collings Avenue and proceed north on Route 130 or to turn left from the south approach of Route 130 and proceed west on Collings Avenue must use the east approach of Grant Avenue as a jughandle. The radius on the northeast and southeast corners is not large enough for safe right turn movements.

b. RECOMMENDATIONS

(1) Close off the median strip on Route 130 at Grant Avenue.

(2) Provide channelization on the northeast corner as shown on the sketch.

(3) Increase the radius on the northeast and southeast corners to a minimum of forty (40) feet.

c. BENEFITS

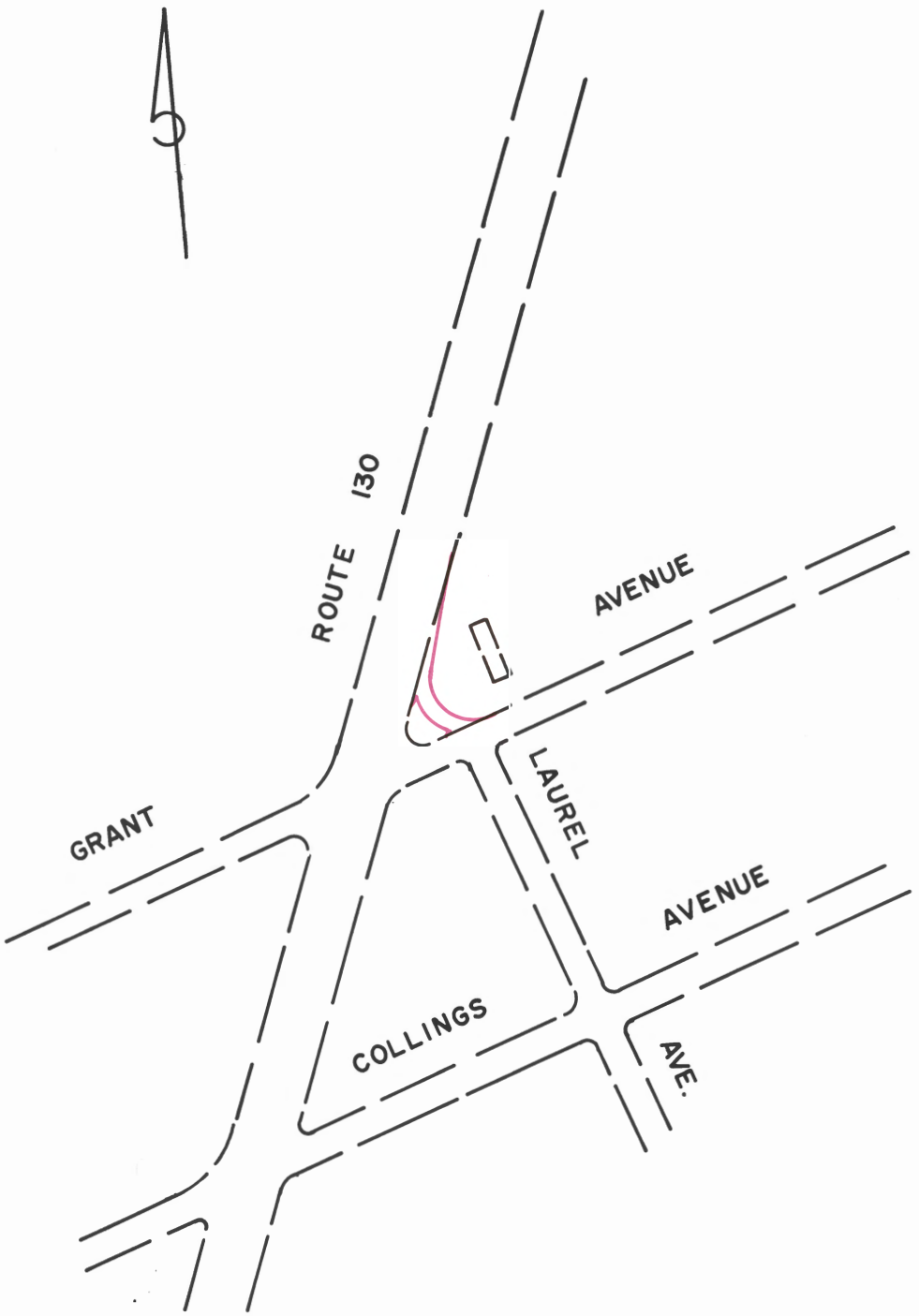
(1) A safer flow of traffic will be achieved.

(2) The right turn movements on the east approach will be improved.

d. ESTIMATED COSTS

(1) Engineering	$ 5,400.00
(2) Construction	14,900.00
(3) Signs and Markings	200.00
(4) Right of Way	12,000.00
Total Estimated Cost	$32,500.00

AVENUE
CRYSTAL LAKE
HOPKINS



PROJECT NO. HT-8

U. S. ROUTE 130 AND GRANT AVENUE

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. HT-9 CRYSTAL LAKE AVENUE AND HOPKINS AVENUE
TOWNSHIP OF HADDON

Project No. HT-9 covers the improvements to the intersection of Crystal Lake Avenue and Hopkins Avenue.

a. PROBLEMS

(1) Tree limbs restrict the view of the STOP signs and red warning flashers located on both approaches of Hopkins Avenue.

(2) The red warning flashers are not located in accordance with the Manual on Uniform Traffic Control Devices.

(3) The STOP AHEAD signs on Hopkins Avenue are located too close to the intersection.

(4) Many drivers disregard the existing STOP signs located on both approaches of Hopkins Avenue.

(5) Accident records indicate a total of eleven (11) accidents during the three (3) year period from 1968 through 1970. Of this total, ten (10) were classified as right angle accidents and one (1) was classified as a left turn accident.

(6) Corner radii are not large enough to accommodate safe turning movements.

(7) Pavement markings are virtually non-existent on all four (4) approaches.

(8) Parking is permitted too close to the intersection.

b. RECOMMENDATIONS

(1) Remove the existing red warning flashers from the Hopkins Avenue approaches.

(2) Install STOP sign beacons on both approaches of Hopkins Avenue in accordance with the Manual on Uniform Traffic Control Devices.

(3) Tree limbs should be kept trimmed to provide a clear view of the STOP signs.

(4) Relocate the STOP AHEAD signs to two hundred and fifty (250) feet in advance of the STOP signs.

(5) Increase all corner radii to forty (40) feet.

(6) Provide the necessary pavement markings in accordance with the current Manual on Uniform Traffic Control Devices.

(7) Prohibit parking on both sides of all four (4) approaches for a minimum of one hundred (100) feet.

NOTE: This intersection is shared with Audubon

PROJECT NO. HT-9 CRYSTAL LAKE AVENUE AND HOPKINS AVENUE
TOWNSHIP OF HADDON

c. BENEFITS

(1) A better view of the STOP signs will be provided.

(2) The turning movements will be improved.

(3) The number of right angle accidents will be reduced.

(4) A safer and smoother flow of traffic will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$1,200.00
(2) Construction	4,700.00
(3) Signs and Markings	400.00
(4) Removal and Relocation of Signs	500.00
Total Estimated Cost	$6,800.00

PROJECT IMPROVEMENTS

BOROUGH OF OAKLYN

Kammerer, Symes & Associates, Inc.
CONSULTING ENGINEERS

PROJECT NO. OA-1 U.S. ROUTE 30, WEST CLINTON AVENUE AND EAST HADDON AVENUE

BOROUGH OF OAKLYN

Project No. OA-1 covers the reconstruction of the intersection of Route 30, West Clinton Avenue and East Haddon Avenue. *(Exhibit No. 20)*.

a. PROBLEMS

(1) The offset of West Clinton Avenue and East Haddon Avenue is a hazard for traffic traveling in an eastbound or westbound direction.

(2) High traffic volumes on Route 30 make it difficult for traffic exiting the bank which is located opposite West Clinton Avenue.

(3) The Mary A. Finney School is located west of the intersection, on West Clinton Avenue. Children going to and from school must cross this intersection.

(4) The corner radii are not large enough to accommodate safe turning movements.

(5) Accident records indicate a total of nineteen (19) accidents during the three (3) year period from 1968 through 1970. Of this total, eleven (11) were classified as same direction accidents, four (4) were classified as left turn accidents, three (3) were classified as right angle accidents, and one (1) was classified as a collision with a fixed object.

b. RECOMMENDATIONS

(1) Make East Haddon Avenue one-way in an easterly direction to Johnson Avenue.

(2) Eliminate the traffic signal at Route 30 and East Haddon Avenue.

(3) Increase the corner radii as shown on the plan.

(4) Provide two (2) lanes for traffic on the west approach.

(5) Provide pedestrian signal indications on all corners.

(6) Prohibit parking on all three (3) approaches.

c. BENEFITS

(1) A safer and smoother flow of traffic will be achieved.

(2) Accident potential will be reduced.

(3) Driver confusion will be reduced.

(4) A safer crossing for children will be provided.

PROJECT NO. OA-1 U.S. ROUTE 30, WEST CLINTON AVENUE AND EAST HADDON AVENUE

BOROUGH OF OAKLYN

d. ESTIMATED COSTS

(1) Engineering	$ 5,480.00
(2) Construction	11,800.00
(3) Signs and Markings	600.00
(4) Traffic Signals	15,000.00
(5) Right of Way	1,350.00
Total Estimated Cost	$34,230.00

PROJECT NO. OA-1

U.S. ROUTE 30, WEST CLINTON AVENUE

AND EAST HADDON AVENUE

EXHIBIT NO. 20

PROJECT NO. OA-1

U.S. ROUTE 30, WEST CLINTON AVENUE

AND EAST HADDON AVENUE

EXHIBIT NO. 20



PROJECT NO. OA-1

U.S. ROUTE 30, WEST CLINTON AVENUE

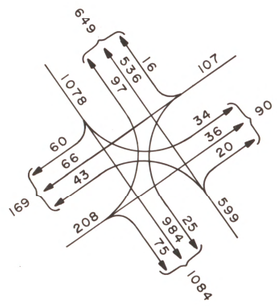
AND EAST HADDON AVENUE

EXHIBIT NO. 20

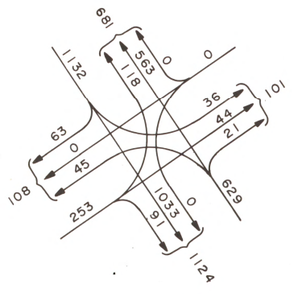
SIGNAL PHASING

Phase A	Phase B

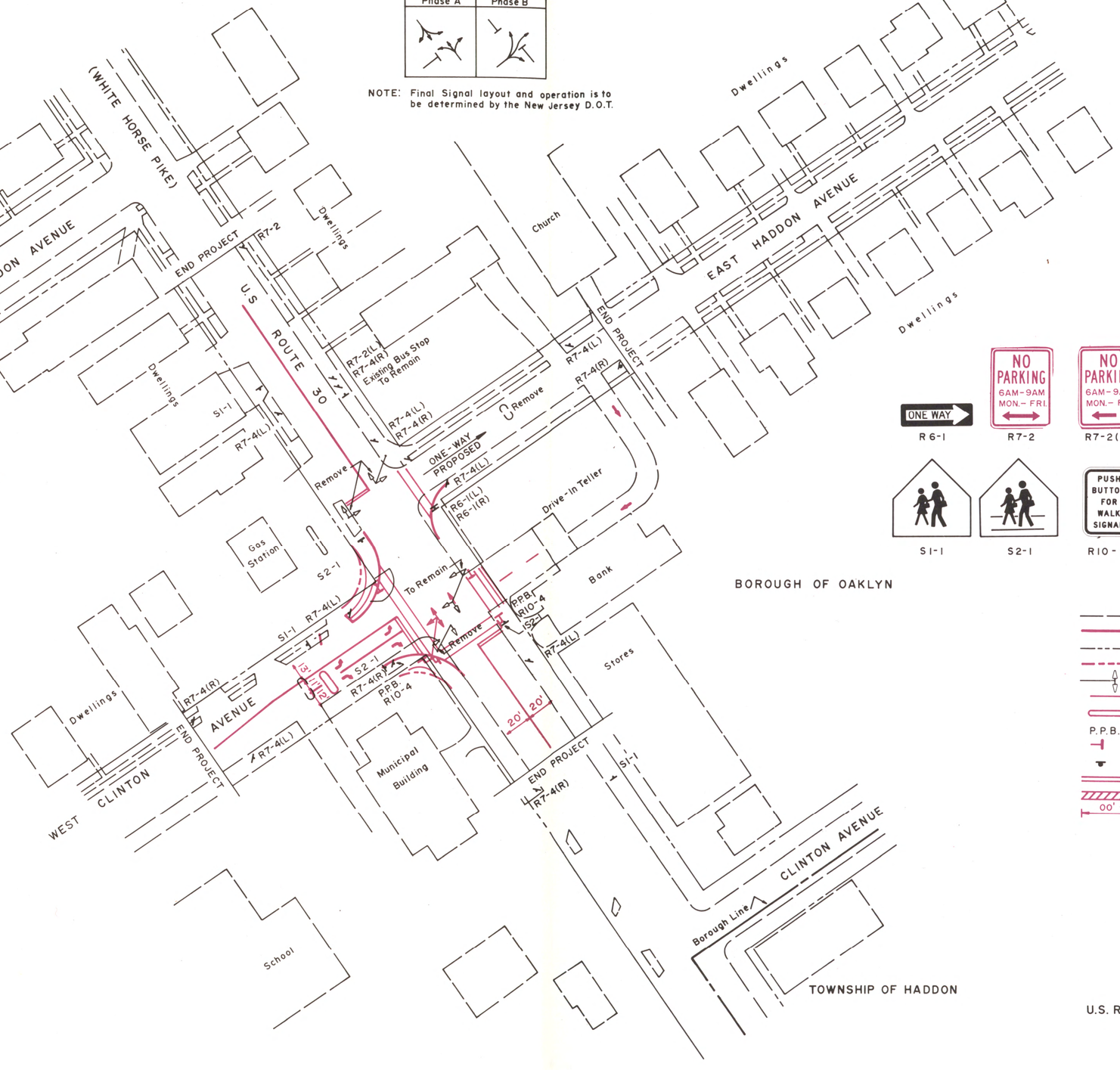
NOTE: Final Signal layout and operation is to be determined by the New Jersey D.O.T.



1972 Weekday Peak Hour Traffic Volume



1982 D.H.V.



LEGEND

- EXISTING TOPOGRAPHY
- PROPOSED CURB
- EXISTING R.O.W.
- PROPOSED R.O.W.
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- INDUCTION LOOP DETECTOR
- P.P.B. PEDESTRIAN PUSH BUTTON
- PROPOSED PEDESTRIAN SIGNAL
- TRAFFIC SIGN
- PROPOSED SIDEWALK
- PROPOSED PAINTED CHANNELIZATION
- 00' PROPOSED CARTWAY OR R.O.W. WIDTH

SCALE
20' 0 40' 80'

PROJECT NO. OA-1

U.S. ROUTE 30, WEST CLINTON AVENUE AND EAST HADDON AVENUE

EXHIBIT NO. 20

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. OA-2 IMPROVEMENT TO THE FLOW OF TRAFFIC ALONG EAST AND WEST ATLANTIC AVENUES

BOROUGH OF OAKLYN

Project No. OA-2 covers the improvement to the flow of traffic along East and West Atlantic Avenues.

a. PROBLEMS

(1) The East Atlantic and West Atlantic Avenue roadway widths are unable to safely accommodate two way traffic and parking.

(2) Angle parking is permitted at several locations along East and West Atlantic Avenues.

(3) Pavement markings are virtually non-existent along East and West Atlantic Avenues.

b. RECOMMENDATIONS

(1) Make East Atlantic Avenue one way northbound from Clements Bridge Road to Oakland Avenue and West Atlantic Avenue one way southbound from Oakland Avenue to Clements Bridge Road.

(2) Remove the angle parking from East and West Atlantic Avenues and provide for parallel parking along these roadways.

(3) Provide pavement markings in accordance with the Manual on Uniform Traffic Control Devices.

(4) Introduce the changed street directions in one phase. Advertising of the proposed change in street directions should be instituted in order to acquaint the public prior to the change.

(5) All traffic regulations should be strictly enforced.

c. BENEFITS

(1) A more convenient by-pass route through the Boroughs of Oaklyn, Audubon and Haddon Heights will be provided.

(2) Angle parking will be eliminated.

(3) A safer traffic movement will be provided.

d. ESTIMATED COSTS

(1) Engineering	$1,000.00
(2) Signs and Markings	5,000.00
Total Estimated Cost	$6,000.00

NOTE: This project is shared with Audubon and Haddon Heights.

GENERAL RECOMMENDATIONS

PROJECT NO. G-1 TYPICAL LEFT TURN LANE PAVEMENT MARKINGS

Several of the arterial and collector roads in the study area do not have sufficient width to be marked for two (2) lanes of traffic in each direction. Provisions for left turn lanes are desirable at many of the major intersections with connector streets. *(Exhibit No. G-1)*.

a. PROBLEMS

(1) Roads on the study system with cartway widths between thirty-six (36) and forty (40) feet are marked for one lane of travel in each direction.

(2) Vehicles desiring to turn into the main connector streets within a residential area must straddle the centerline while waiting to turn.

(3) On-coming traffic receives no pre-warning that a vehicle is straddling the centerline.

b. RECOMMENDATIONS

(1) Construct painted channelization to provide one (1) lane of through traffic in each direction plus a center lane for turning vehicles at locations in the study system which have cartway widths between thirty-six (36) and forty (40) feet and are marked for one lane of travel in each direction.

c. BENEFITS

(1) Will provide a protected area for vehicles to wait for clearance to make left turn movements, thereby reducing exposure to head-on, rear-end and same direction accidents.

(2) Driver confusion will be eliminated.

d. ESTIMATED COSTS

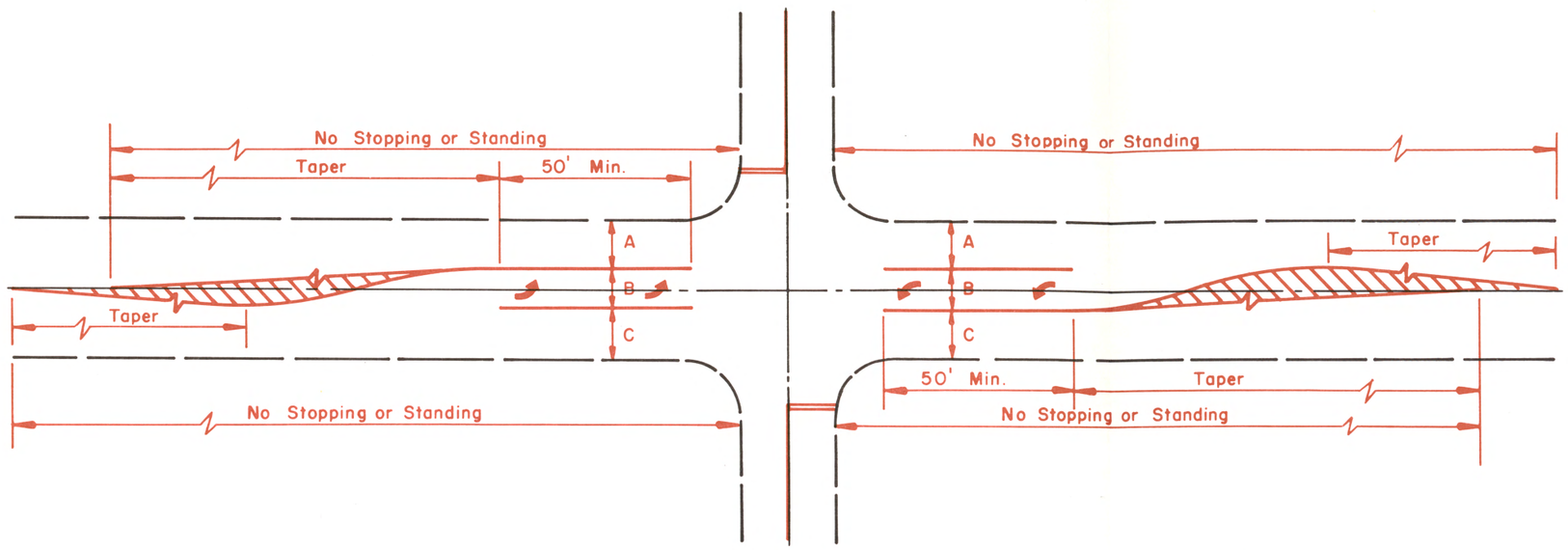
(1) Engineering	$150.00
(2) Signs and Markings	750.00
*Total Estimated Cost	*$900.00

*Denotes cost of typical intersection

PROJECT NO. G-1

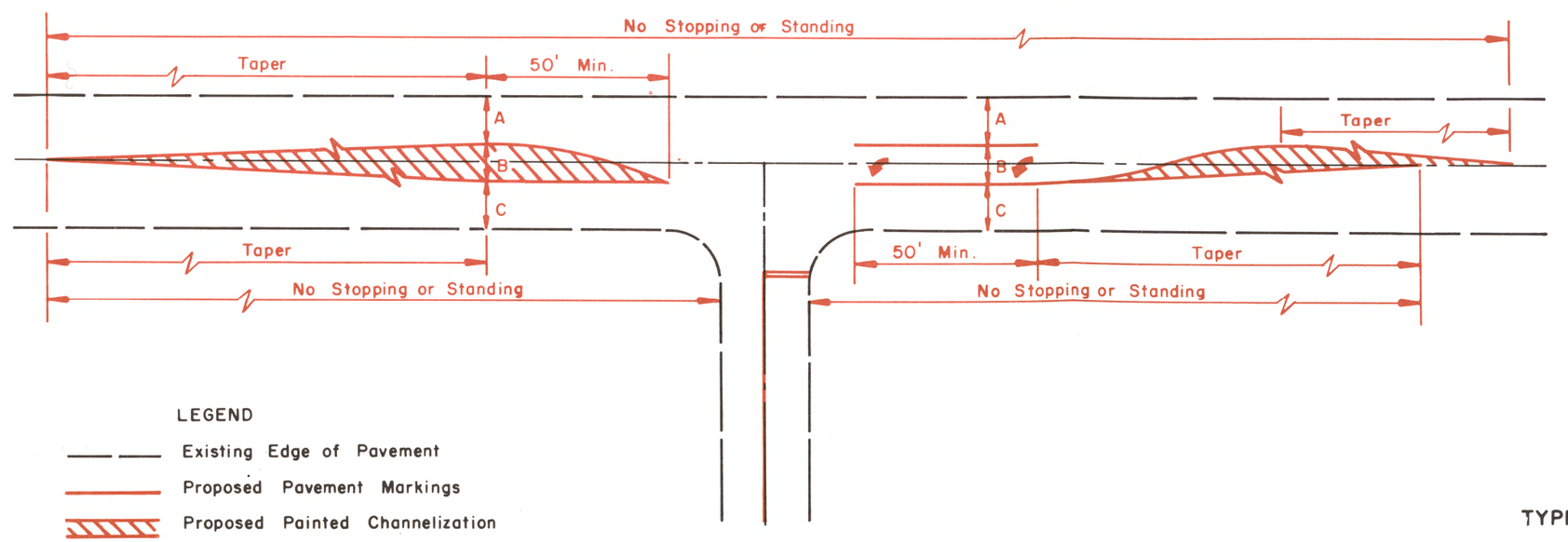
TYPICAL LEFT TURN LANE PAVEMENT MARKINGS

EXHIBIT NO. G-1



TYPICAL FOUR WAY INTERSECTION

TRAFFIC LANE	CARTWAY WIDTH		
	36'	38'	40'
A	13'	13'	14'
B	10'	12'	12'
C	13'	13'	14'
TAPER	200'	240'	240'



TYPICAL THREE WAY INTERSECTION

TRAFFIC LANE	CARTWAY WIDTH		
	36'	38'	40'
A	13'	13'	14'
B	10'	12'	12'
C	13'	13'	14'
TAPER	200'	240'	240'

PROJECT NO. G-1

TYPICAL LEFT TURN LANE PAVEMENT MARKINGS

EXHIBIT NO. G-1

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. G-2 GENERAL SPEED LIMITS

Project No. G-2 covers general speed limits within the study area.

a. PROBLEMS

(1) Unrealistically low speed limits are in force on many roads within the study area.

(2) Unrealistic speed limits result in driver disrespect for speed limit signs.

(3) Drivers who obey these speed limits actually create a hazardous condition.

b. RECOMMENDATIONS

(1) Arterial roadways should be speed zoned in accordance with the Manual on Uniform Traffic Control Devices.

c. BENEFITS

(1) A safer and smoother flow of traffic will be achieved.

(2) Greater respect for traffic control measures will be gained.

CHAPTER 14

IMPLEMENTATION

The basis for the selection of Projects for proposed improvements as stated previously was the increase of intersection and roadway capacities, improvement of the quality of travel and the reduction of accident potential.

The requirements of the TOPICS Program for the Study Area referred to in this report states that a feasible schedule of time and costs be established to implement the projects within a five (5) year period, 1973 - 1978. This Chapter presents a summary of the parameters used for implementation.

RIGHT OF WAY

Several of the Projects will require the acquisition of additional right of way. While these projects may not be scheduled for construction in the early phases, the acquisition of right of way should proceed as scheduled to restrict development of vacant land and take advantage of the lowest possible price. The acquisition of right of way by a governmental agency is a complex process which involves many functions from the time the right of way plans are completed by the engineers until the right of way personnel can begin their job of acquisition. Right of way estimates given in this report have been escalated at an annual rate of six (6) percent per year. It should be noted that acquisition for rights-of-way on all highway projects must comply with the following statutes:

a. STATE - Chapter 361, Laws of New Jersey 1971.
Assembly Bill No. 504, approved December 21, 1971.
"Eminent Domain Act of 1971".

b. STATE - Chapter 47, Laws of New Jersey 1972.
Senate Bill No. 987, approved June 1, 1972.
"Uniform Transportation Replacement Housing and Relocation Act".

c. FEDERAL- Public Law 91-646, 91st Congress.
Senate Bill No. 1, approved January 2, 1971.
"Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970".

CONSTRUCTION COSTS

The estimated costs for recommended projects are based on the experience of the Consultant and the cost of similar work.

In recent years, the "Engineering News Record" Construction Cost Index has increased an average of five (5) percent per year; however, in 1968, the increase in the index was ten (10) percent. The costs shown in the schedules in this Chapter have been escalated at the rate of eight (8) percent per year.

ENGINEERING

In addition to the early acquisition of right of way, early preparation of plans and specifications is essential to the orderly completion of the projected schedule.

A minimum period of one (1) year should be scheduled to obtain project approvals, obtain right of way and prepare engineering drawings for each project. On more complex and expensive projects, the period will be considerably longer.

Estimated engineering fees include the preparation of right of way plans, preliminary design, final design, construction layout and construction inspection. A factor of twenty (20) percent of the estimated construction cost was used to estimate the engineering fees. The fees estimated in this schedule have been escalated at the rate of six (6) percent per year.

CHAPTER 15

SYSTEMS MAINTENANCE AND EVALUATION

The projects recommended in this report do not increase the road mileage within the study area. The only new signal added to the system is located in Haddon Township at the intersection of Haddon Avenue, Maple Avenue and Stoy Avenue.

Signals, signs and pavement markings on State Highways are maintained by the State. The changes recommended with the exception of initial cost would have an insignificant change in the maintenance budget. The estimated maintenance increase for the recommended changes will be approximately twenty (20) percent of the current maintenance budget for all three (3) municipalities.

TRAFFIC SIGNALS

Traffic signals on municipal and County roads are currently maintained by the individual municipalities. It is the recommendation of this report that the County of Camden take a more active part in the design and installation of traffic signals on County roads. More specifically it is felt that the County should review and approve the design, participate financially in the construction cost and take the responsibility for maintaining the signal after installation.

Since only one (1) new signal has been recommended in this report estimates for maintenance of signals within the Township of Haddon should be increased slightly.

SIGNS AND PAVEMENT MARKINGS

Provisions should be made in the Municipal Budgets for annual repainting of pavement markings on a pre-determined schedule. The schedule should be based on past experience of traffic volumes. Additional monies should be budgeted for signs to cover the cost of painting, cleaning, replacement, vandalism and placement of new signs as changes in traffic volumes and experience require.

EVALUATION

The improvements recommended should be evaluated by a qualified traffic engineer as to their effectiveness. Through such a study, the effectiveness of each project can be evaluated in eliminating the problem areas outlined in the report.

APPENDIX

DEFINITIONS

ACTUATED SIGNALS: A type of traffic control signal in which the intervals are varied in accordance with the demands of traffic as registered by the actuation of detectors.

AVERAGE ANNUAL DAILY TRAFFIC: The total yearly volume divided by the number of days in the year, commonly abbreviated as A.A.D.T.

CAPACITY: The maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or a roadway in one direction (or in both directions for a two-lane or a three-lane highway) during a given time period under prevailing roadway and traffic conditions.

CARTWAY WIDTHS: Widths of roadways between curbs or travel way including shoulders.

CENTRAL BUSINESS DISTRICT (C.B.D.): That portion of a municipality in which the dominant land use is for intense business activity.

CHANNELIZATION OF TRAFFIC: The separation or regulation of conflicting traffic movements into definite paths of travel by use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movement of traffic, both vehicular and pedestrian.

COLLECTOR STREETS: Streets providing through movements between major arterials and local streets and having direct access to abutting property.

CORNER RADII: The radius, in feet, for curb or edge of paving joining intersecting roadways.

DESIGN HOUR VOLUME (D.H.V.): The future hourly volume used for design (two-way unless otherwise specified), usually the thirtieth (30th) highest hourly volume of the design year.

FIXED TIME SIGNALS: A type of traffic control signal which directs traffic to stop and permits it to proceed in accordance with predetermined time schedules.

GEOMETRY: Engineering data, which defines the alinement of roadways and intersections, consisting of curve radii, angles and distances.

GREEN TIME: The actual time that a green traffic light is on for a given approach during one cycle.

INTERSECTION CAPACITY: The computed maximum number of vehicles per hour that can be handled by an intersection.

JUGHANDLE: A separate lane turning off of a roadway expressly for accommodating turning movements, frequently used to eliminate left turn movements from the main roadway.

LEVEL OF SERVICE: A qualitative measure of the effect of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience and operating costs.

PEAK-HOUR TRAFFIC: The highest number of vehicles found to be passing over a section of a lane or a roadway during sixty (60) consecutive minutes.

PROGRESSIVE TIMING SYSTEM: A signal system in which the successive signal faces controlling a given street give "go" indications in accordance with a time schedule to permit (as nearly as possible) continuous operation of groups of vehicles along the street at a planned rate of speed, which may vary in different parts of the system.

RIGHT OF WAY: An easement giving the right to pass across land; as that portion of land dedicated for use as a travel way and within which roadways are constructed.

SPOT SPEED CHECKS: A method used to measure the instantaneous speed of a vehicle at a specified location.

THE THIRTIETH (30TH) HIGHEST HOUR VOLUME: The hourly volume on a given roadway that is exceeded by twenty-nine (29) hourly volumes during a designated year.

TIME DELAY STUDIES: Studies to determine the average travel time on an arterial or highway and the points of, duration and cause of delays.

TOPICS: Traffic Operations Program to Increase Capacity and Safety.

TRAFFIC VOLUME: The number of vehicles that pass over a given section of a lane or a roadway during a time period of one hour or more. Volume can be expressed in terms of daily traffic or annual traffic, as well as on an hourly basis.

VOLUME/CAPACITY RATIO: Ratio of actual vehicular volume or demand to the computed possible capacity for a given section of roadway.

WARRANTS FOR TRAFFIC SIGNAL INSTALLATION

Traffic control signals should not be installed unless one or more of the signal warrants in the Manual on Uniform Traffic Control Devices are met. Information should be obtained by means of engineering studies and compared with the requirements set forth in the warrants. If these requirements are not met, a traffic signal should neither be put into operation nor continued in operation (if already installed).

The warrants are as follows:

a. WARRANT NO. 1 - MINIMUM VEHICULAR VOLUME

b. WARRANT NO. 2 - INTERRUPTION OF CONTINUOUS TRAFFIC

c. WARRANT NO. 3 - MINIMUM PEDESTRIAN VOLUME

d. WARRANT NO. 4 - SCHOOL CROSSING

e. WARRANT NO. 5 - PROGRESSIVE MOVEMENT

f. WARRANT NO. 6 - ACCIDENT EXPERIENCE

g. WARRANT NO. 7 - SYSTEMS WARRANT

h. WARRANT NO. 8 - COMBINATION OF WARRANTS