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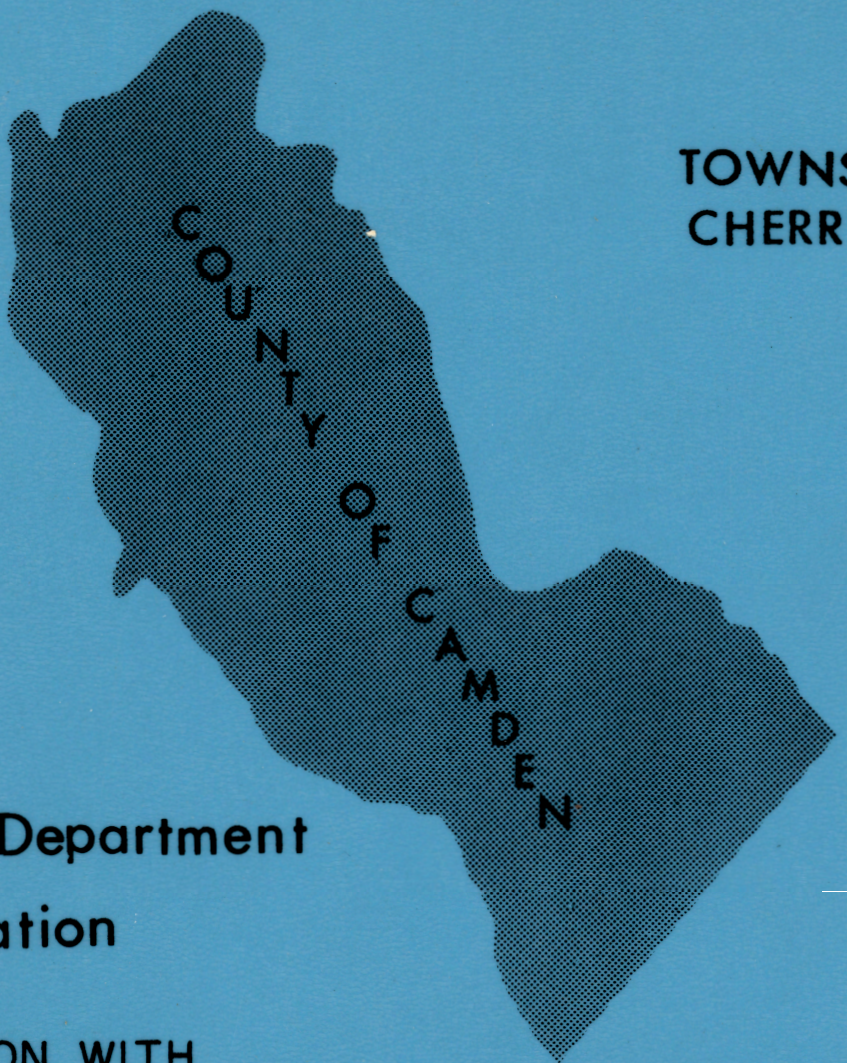
TOPICS STUDY



TOWNSHIP OF CHERRY HILL

T-4002(6)

PREPARED FOR

New Jersey Department of Transportation

IN COOPERATION WITH

U.S. Department of Transportation Federal Highway Administration

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

January 1974

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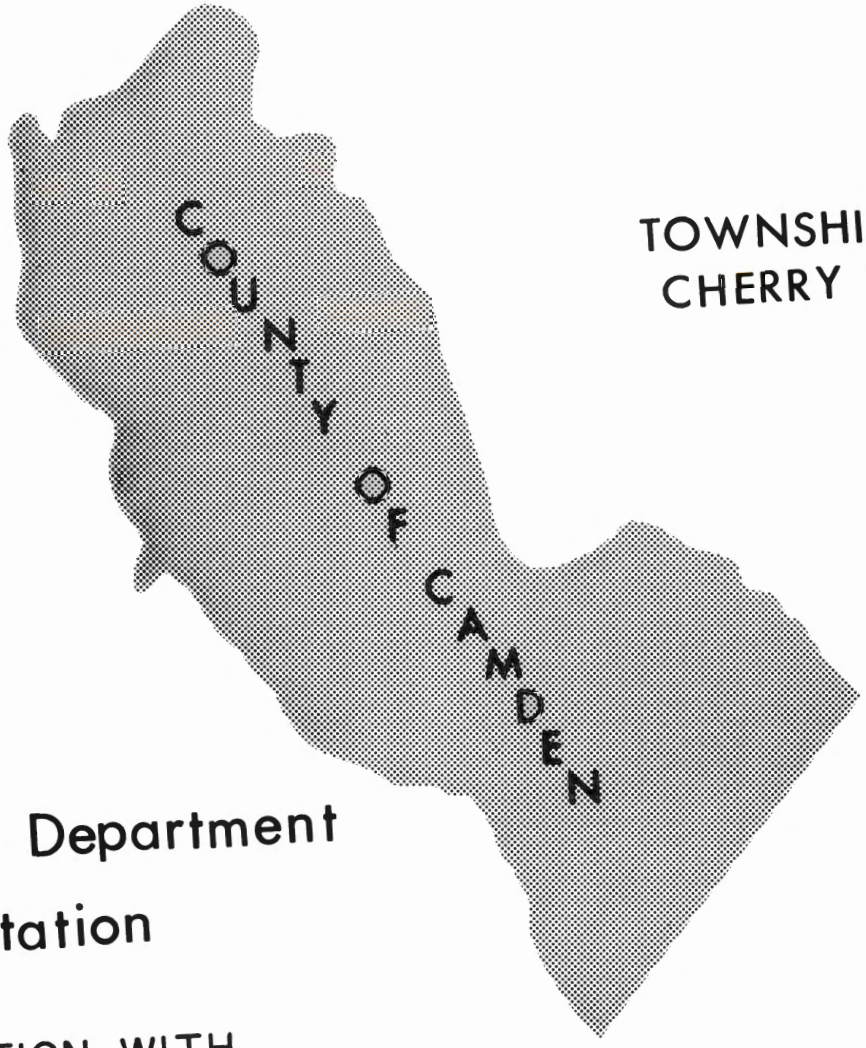
TOPICS STUDY



TOWNSHIP OF
CHERRY HILL

T-4002 (6)

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New Jersey Department of Transportation

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U.S. Department of Transportation
Federal Highway Administration

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

January 1974

2.106

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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 municipality 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.
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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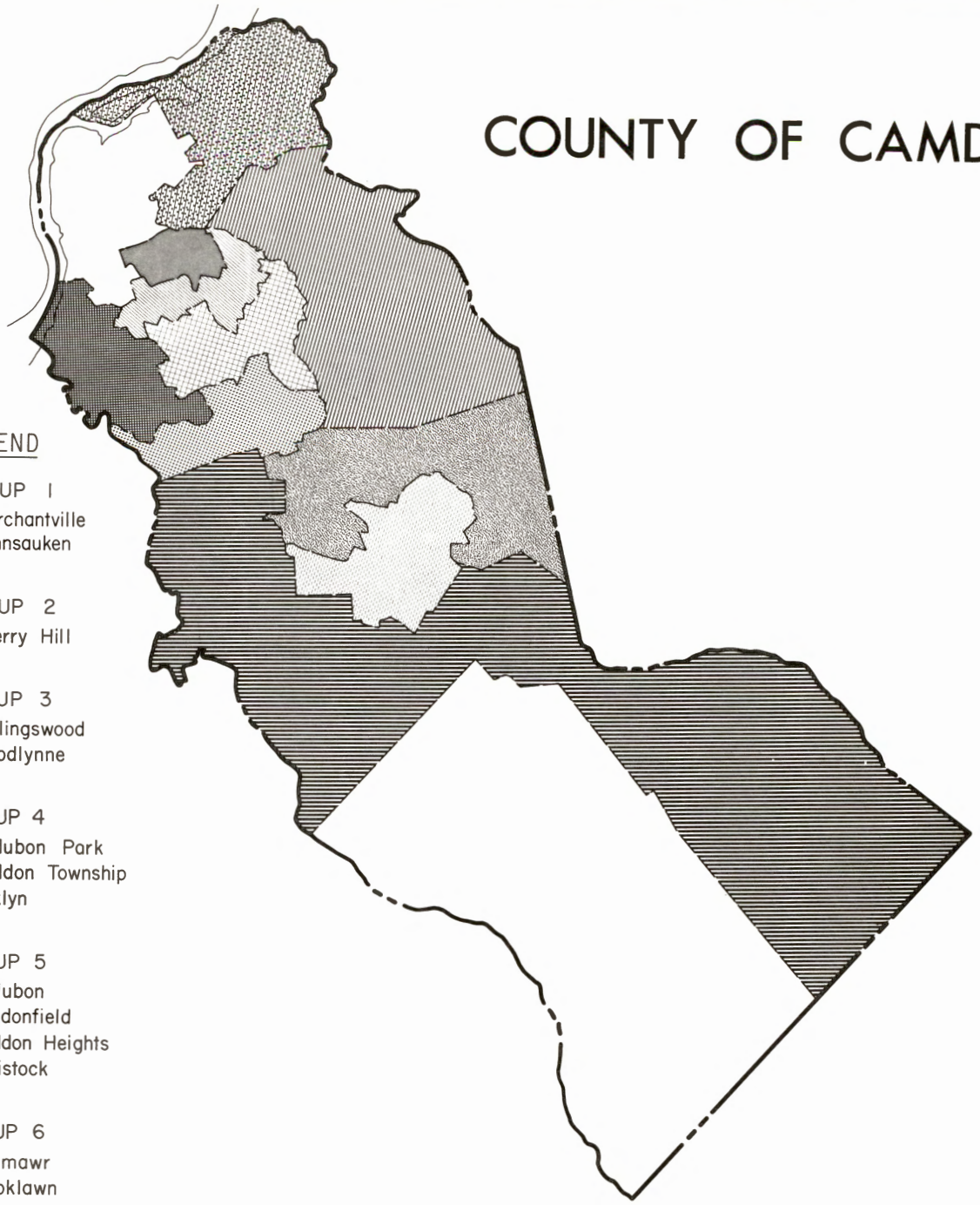
COUNTY OF CAMDEN



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 Cherry Hill Township, 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

Many of the existing signalized intersections within the Township are overloaded during the early morning and evening rush hours and during the heavy evening shopping hours. All of the signalized intersections are equipped with semi-actuated signals with the exception of the signal located at Haddonfield-Sorrell Horse Road and Maple Avenue, which is fixed time. Recommendations to provide additional turning lanes and adjustment to the signal phasing are also included in this report. New traffic signals have been proposed at the intersection of Cuthbert Boulevard and North Park Drive and at the intersection of Church Road, Lenape Road and Cherry Hill Mall Drive. Recommended projects are included in Chapter 13 of this report for the reconstruction and or modification of traffic signals at the following locations:

a. Route 154 and Haddonfield-Berlin Road

b. Route 154 and Kresson Road

c. Burnt Mill Road and Haddonfield-Berlin Road

d. Chapel Avenue and Coles Avenue

e. Haddonfield-Sorrell Horse Road and Chapel Avenue

f. Haddonfield-Sorrell Horse Road and Church Road.

g. Route 38 and Chapel 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 around the Garden State Race Track and are detailed in Chapter 13, of this report.

The smooth flow of traffic along Route 70 is hampered by heavy volumes and congestion at the Ellisburg Circle and the Grove Street Circle. These problems, however, can only be corrected by major revisions and are currently being studied by the New Jersey Department of Transportation. See Chapter 12 of this report.

PARKING CONTROLS

Restriction of parking in certain areas of the Township 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. Burnt Mill Road

b. Chapel Avenue

c. Church Road

d. Coles Avenue

e. Cuthbert Boulevard

f. Edison Avenue

g. Georgia Avenue

h. Green Tree Road

i. Haddonfield-Berlin Road

j. Kresson Road

k. North Park Drive

l. Pearl Croft Road

m. Springdale Road

n. Wisteria Avenue

o. Route 70

p. Route 154

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 Cherry Hill Township indicates that they cover the requirements of the Township. However, the analysis of the enforcement of existing regulations indicates that greater emphasis should be placed on the enforcement of parking, 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. In this regard, restrictions should be placed on the development of remaining land adjacent to existing roads to insure that adequate right of way is available for future expansion. This can be accomplished through the local Planning and Zoning Boards.

The Camden County Planning Department has prepared a report entitled "Master Plan for Highways", amended May, 1971, which provides a guide for developing an improved highway system.

CHAPTER 3

STUDY DESCRIPTION

STUDY AREA - COUNTY OF CAMDEN - TOWNSHIP OF CHERRY HILL

Cherry Hill Township is a mixed industrial, commercial, agricultural and residential community located in the north-eastern part of Camden County with the Burlington County Line serving as the eastern border of the community. The 1970 population of sixty-four thousand, four hundred (64,400) people shows an increase of thirty-two thousand, eight hundred (32,800) or one hundred four (104) percent over the 1960 population of thirty-one thousand, six hundred (31,600) people.

The Township's several collector roads feed the major arterial State Routes 38, 41 and 70 which, in turn, feed traffic into and away from Interstate Route 295 and the New Jersey Turnpike. Route 70 is normally congested because it is a direct access to many shore points. *(See Exhibit Nos. 2 and 3).*

Cherry Hill Township covers an area of twenty-four (24) square miles. It is the third largest municipality in Camden County and contains one (1) major industrial park and several smaller ones all of which contribute to the heavy volumes of traffic. The road and highway volumes are heavily affected by the traffic attracted to the Cherry Hill Mall, several popular restaurants, the Garden State Race Track and a number of individual business enterprises. *(See Exhibit No. 2).*

The terrain, generally flat to gently rolling, has no serious effect on the traffic within the study area. The traffic within the Township is generated by local and commuter usage to and from the industrial areas, shopping centers and the Garden State Race Track and is subject to additional heavy burdens during holiday and vacation periods when the shore going traffic has a strong influence.

STUDY ROADWAY SYSTEM

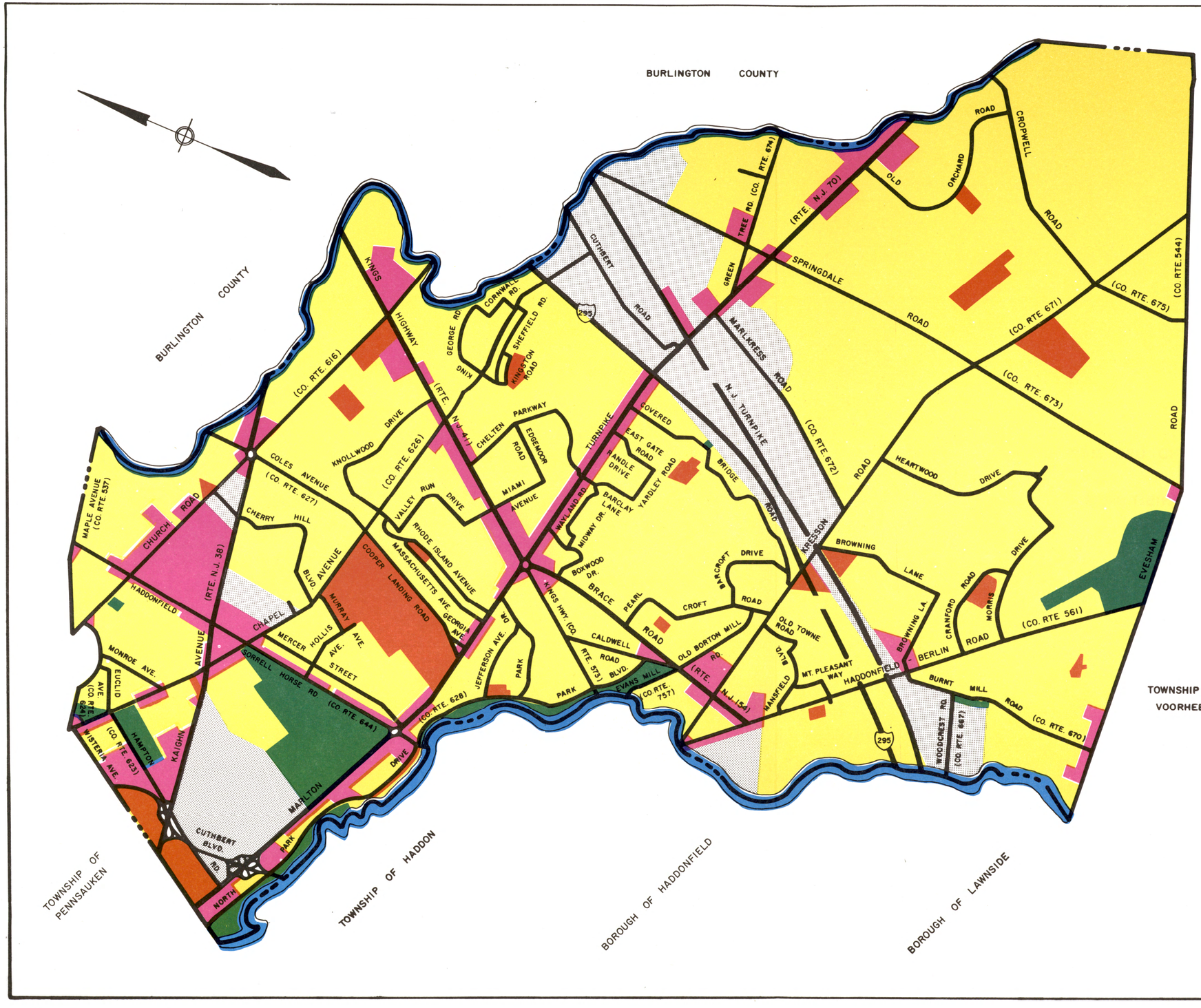
The roadways and intersections included in the initial study system were developed through field inspections by the Consultant and meetings with Municipal, County and State Officials.

The study system was composed of existing Federal-Aid Urban, Federal-Aid Primary and Secondary routes and major connector and collector streets within the 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 Township. Road mileage for each system is included on *Exhibit No. 3.*

LAND USE MAP

EXHIBIT NO. 2



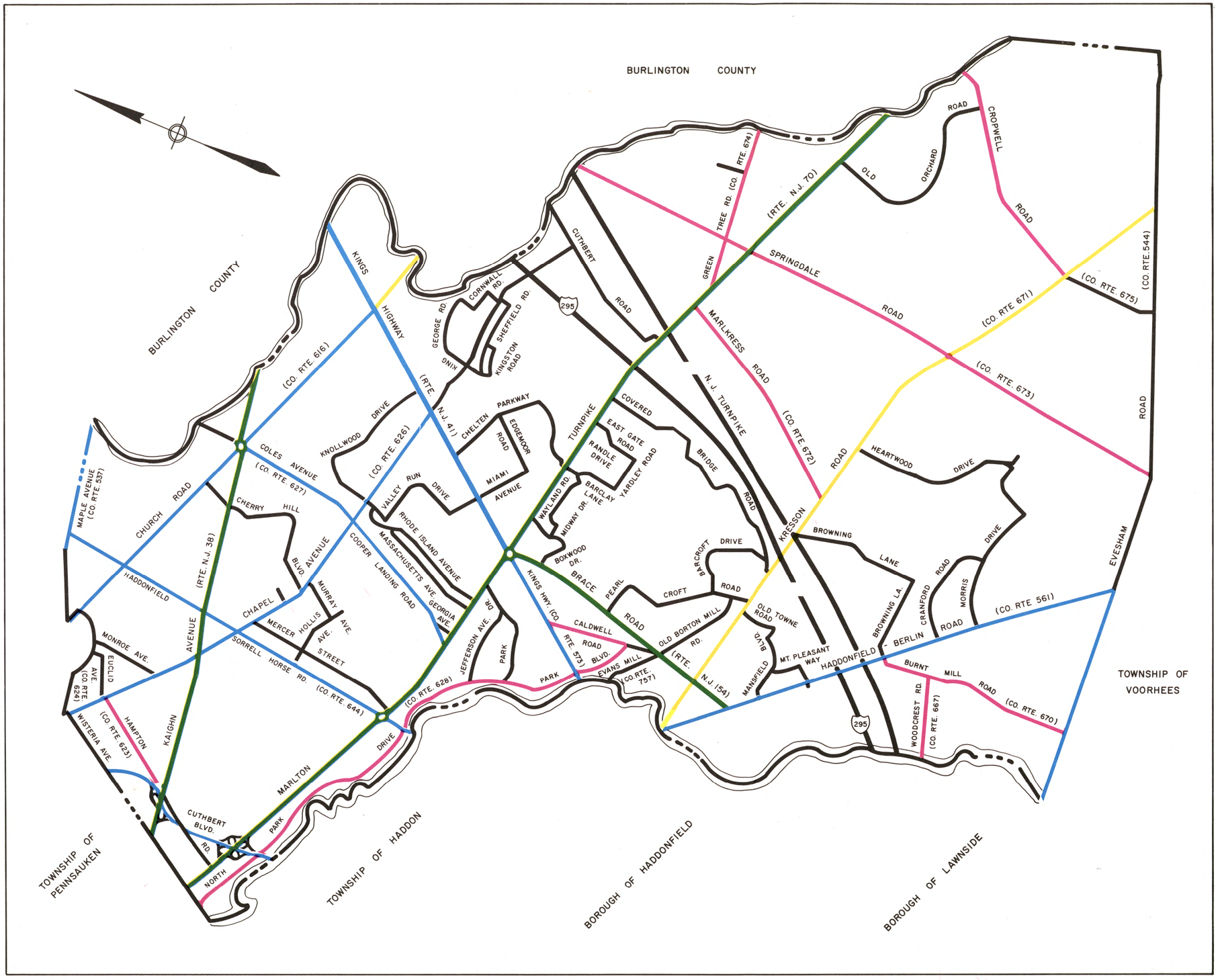
LAND USE MAP

EXHIBIT NO. 2

Kammerer, Symes & Assoc.
Consulting Engineers

INITIAL STUDY SYSTEM &
RECOMMENDED FEDERAL AID SYSTEM MAP

EXHIBIT NO. 3



SCALE

800' 0 1600' 3200'

Streets in the Initial Study System		
Primary Type I (State Highways)	10.91	miles
Secondary - F.A.S. (County Roads)	5.60	miles
Primary Type II (Proposed)	14.62	miles
Federal Aid Urban System	19.23	miles

INITIAL STUDY SYSTEM &
RECOMMENDED FEDERAL AID SYSTEM MAP

EXHIBIT NO. 3

Kammerer, Symes & Assoc.
Consulting Engineers

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 Department 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.

In the Township of Cherry Hill, thirty-nine (39) of the forty-four (44) intersections which can be classed as accident breeding had accident experience of five (5) or more accidents per year. Of these, twenty-one (21) repeated in each of the three (3) reporting years, eleven (11) repeated twice and seven (7) only once each.

CAUSES

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.

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. Other (Accidents with insufficient details for classification)
6. Pedestrian

Table No. 4 lists all accidents that were identifiable by type. Most significant were those classified as same direction. These accounted for fifty-one point seven (51.7) 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 sixty-one (61) 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. 5* presents 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. 4

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

TYPE	TOT. NO.	NIGHT	DAY	ROAD CONDITION			INJURIES	FATALITIES	% TOTAL ACCIDENTS
				WET	DRY	ICE			
RIGHT ANGLE (R.A.)	355	129	226	93	252	10	115	0	25.1
LEFT TURN (L.T.)	148	62	86	39	106	3	48	0	10.4
SAME DIRECTION (S.D.)	733	275	458	168	541	24	155	1	51.7
FIXED OBJECT (F.O.)	114	67	47	61	47	6	28	0	8.0
PEDESTRIAN (PED.)	12	2	10	0	11	1	10	1	0.8
OTHER	55	30	25	21	34	0	20	0	4.0
TOTAL	1,417	565	852	382	991	44	376	2	100.0

TABLE NO. 5

SUMMARY OF ACCIDENTS AT REPORTING LOCATIONS

INTERSECTION	YEAR	TOTAL	RIGHT ANGLE	LEFT TURN	SAME DIRECT.	FIXED OBJECT	PEDEST.	OTHER
ROUTE 154 & HADDONFIELD-BERLIN ROAD	1968	17	5	2	6	3	0	1
	1969	11	1	1	6	3	0	0
	1970	5	1	0	3	1	0	0
ROUTE 154 & BORTON MILL ROAD	1968	3	0	1	1	1	0	0
	1969	6	2	1	3	0	0	0
	1970	5	1	1	2	0	0	1
ROUTE 154 & KRESSON ROAD	1968	7	2	1	2	1	0	1
	1969	12	2	3	5	0	0	2
	1970	3	0	2	0	0	0	1
BURNT MILL ROAD & HADDONFIELD-BERLIN ROAD	1968	9	2	1	5	1	0	0
	1969	10	0	1	8	0	0	1
	1970	5	2	2	1	0	0	0
BURNT MILL ROAD & EVESHAM ROAD	1968	12	9	2	1	0	0	0
	1969	10	4	3	2	1	0	0
	1970	13	6	3	4	0	0	0
CHAPEL AVENUE & COLES AVENUE	1968	11	1	0	9	0	0	1
	1969	11	3	1	7	0	0	0
	1970	8	1	2	5	0	0	0
CHURCH ROAD CIRCLE	1968	43	5	0	32	5	0	1
	1969	64	5	0	43	14	0	2
	1970	46	3	0	35	7	0	1
CHURCH ROAD & ROUTE 41	1968	12	2	4	6	0	0	0
	1969	5	2	1	2	0	0	0
	1970	8	2	2	4	0	0	0
CHURCH ROAD & LENAPE ROAD	1968	7	0	1	5	1	0	0
	1969	7	2	0	4	0	0	1
	1970	8	3	0	4	0	0	1
COOPER LANDING ROAD & GEORGIA AVENUE	1968	6	5	0	0	0	0	1
	1969	1	0	1	0	0	0	0
	1970	3	1	0	2	0	0	0
CUTHBERT BOULEVARD & HAMPTON ROAD	1968	6	4	0	2	0	0	0
	1969	8	8	0	0	0	0	0
	1970	10	9	0	1	0	0	0
CUTHBERT BOULEVARD & NORTH PARK DRIVE	1968	20	12	2	3	2	0	1
	1969	11	4	1	3	3	0	0
	1970	32	17	3	9	3	0	0
CUTHBERT BOULEVARD & WISTERIA AVENUE	1968	0	0	0	0	0	0	0
	1969	4	0	0	4	0	0	0
	1970	6	0	1	5	0	0	0
GROVE STREET CIRCLE (ROUTE 70, HADDONFIELD-SORRELL HORSE ROAD & GROVE STREET)	1968	50	16	0	28	3	0	3
	1969	84	13	0	58	6	0	7
	1970	66	9	0	51	4	0	2
HADDONFIELD-SORRELL HORSE ROAD & CHAPEL AVENUE	1968	27	4	7	15	0	0	1
	1969	41	7	9	24	0	0	1
	1970	20	1	6	9	3	0	1
HADDONFIELD-SORRELL HORSE ROAD & CHURCH ROAD	1968	15	2	10	3	0	0	0
	1969	25	3	11	9	1	0	1
	1970	32	2	14	15	1	0	0
HADDONFIELD-SORRELL HORSE ROAD & DUDLEY AVENUE	1968	6	1	2	2	0	0	1
	1969	0	0	0	0	0	0	0
	1970	1	0	0	1	0	0	0
HADDONFIELD-SORRELL HORSE ROAD & MAPLE AVENUE	1968	24	7	5	10	0	1	1
	1969	15	6	2	7	0	0	0
	1970	13	2	6	5	0	0	0
ROUTE 41 & CHAPEL AVENUE	1968	17	3	1	10	0	1	2
	1969	3	0	1	0	0	0	2
	1970	9	1	4	3	0	0	1

TABLE NO. 5 (CONTINUED)

INTERSECTION	YEAR	TOTAL	RIGHT ANGLE	LEFT TURN	SAME DIRECT.	FIXED OBJECT	PEDEST.	OTHER
KRESSON ROAD & PEARL CROFT ROAD	1968	8	3	0	3	1	0	1
	1969	3	2	0	0	1	0	0
	1970	3	1	0	1	0	0	1
KRESSON ROAD & SPRINGDALE ROAD	1968	3	2	0	1	0	0	0
	1969	6	4	0	1	0	0	1
	1970	4	3	0	1	0	0	0
ROUTE 38 & CHAPEL AVENUE	1968	22	6	2	10	2	1	1
	1969	21	3	2	14	0	0	2
	1970	7	2	1	4	0	0	0
ROUTE 38 & CUTHBERT BOULEVARD	1968	3	1	0	1	0	0	1
	1969	6	2	0	2	2	0	0
	1970	13	3	0	7	3	0	0
ROUTE 38 & LONGWOOD AVENUE	1968	16	4	0	12	0	0	0
	1969	13	2	1	8	1	1	0
	1970	6	0	0	6	0	0	0
ROUTE 38 & MILL ROAD	1968	8	3	0	5	0	0	0
	1969	8	4	0	4	0	0	0
	1970	12	6	0	5	0	0	1
ROUTE 70 & COOPER LANDING ROAD	1968	9	2	1	3	2	0	1
	1969	5	1	0	4	0	0	0
	1970	7	3	0	4	0	0	0
ROUTE 70 & CORNELL AVENUE	1968	23	2	2	18	0	1	0
	1969	20	5	2	10	2	1	0
	1970	6	2	1	2	0	1	0
ROUTE 70 & COVERED BRIDGE ROAD	1968	10	2	0	7	1	0	0
	1969	2	0	0	1	0	0	1
	1970	3	1	0	2	0	0	0
ROUTE 70 & CUTHBERT BOULEVARD	1968	13	0	0	2	11	0	0
	1969	14	1	0	4	9	0	0
	1970	6	1	0	1	4	0	0
ROUTE 70 & DELAWARE AVENUE	1968	5	2	0	3	0	0	0
	1969	4	3	0	0	1	0	0
	1970	6	2	0	4	0	0	0
ROUTE 70 & FULTON AVENUE	1968	11	5	0	5	0	0	1
	1969	16	6	0	6	3	0	1
	1970	3	0	0	2	0	0	1
ROUTE 70, GEORGIA AVENUE & EDISON AVENUE	1968	16	3	1	9	0	3	0
	1969	9	4	0	5	0	0	0
	1970	3	0	0	3	0	0	0
ROUTE 70 & GREEN TREE ROAD	1968	10	3	0	7	0	0	0
	1969	4	1	0	1	1	0	1
	1970	13	4	0	8	0	0	1
ROUTE 70 & KINGSTON DRIVE	1968	5	1	1	3	0	0	0
	1969	13	2	3	7	1	0	0
	1970	10	3	2	5	0	0	0
ROUTE 70 & MARLKRESS ROAD	1968	3	1	0	2	0	0	0
	1969	7	6	0	1	0	0	0
	1970	6	5	0	1	0	0	0
ROUTE 70 & OLD ORCHARD ROAD	1968	0	0	0	0	0	0	0
	1969	7	5	0	2	0	0	0
	1970	7	7	0	0	0	0	0
ROUTE 70 & SAWMILL ROAD	1968	2	0	0	2	0	0	0
	1969	5	2	0	2	0	1	0
	1970	0	0	0	0	0	0	0
ROUTE 70 & SPRINGDALE ROAD	1968	16	3	5	7	1	0	0
	1969	13	4	0	6	2	0	1
	1970	13	2	3	7	1	0	0
ROUTE 295 & HADDONFIELD-BERLIN ROAD	1968	1	1	0	0	0	0	0
	1969	7	2	0	5	0	0	0
	1970	9	4	0	3	1	1	0

CHAPTER 6

TRAFFIC VOLUMES

Data for projection of traffic volumes and the conversion of traffic counts to Annual Average 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 due, in part, to the monthly variations. *Chart No. 6* indicates traffic variations by months for Route 41 in Cherry Hill. The A.A.D.T. volume for Route 41 is eighty-eight (88) percent of the volume of traffic recorded on an average June day. This chart confirms the uniform traffic volumes experienced during the year in an urbanized area such as the Township of Cherry Hill.

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 7:15 a.m. and 8:30 a.m.; declines slightly, then increases again between 12:15 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. 7*. Cuthbert Boulevard, Haddonfield-Berlin Road, Haddonfield-Sorrell Horse Road and Routes 38, 41 and 70 carry the heaviest traffic volumes in the study area. Routes 38, 41 and 70 serve as the main arterial roads for the Township. They carry heavy commuter traffic and intersect with the collector and feeder streets from the residential areas.

The volumes on Evesham Road, Haddonfield-Berlin Road, Kresson Road and Springdale Road will increase at a somewhat greater rate due to the Echelon Mall and new housing development in the Cherry Hill-Voorhees Township area.

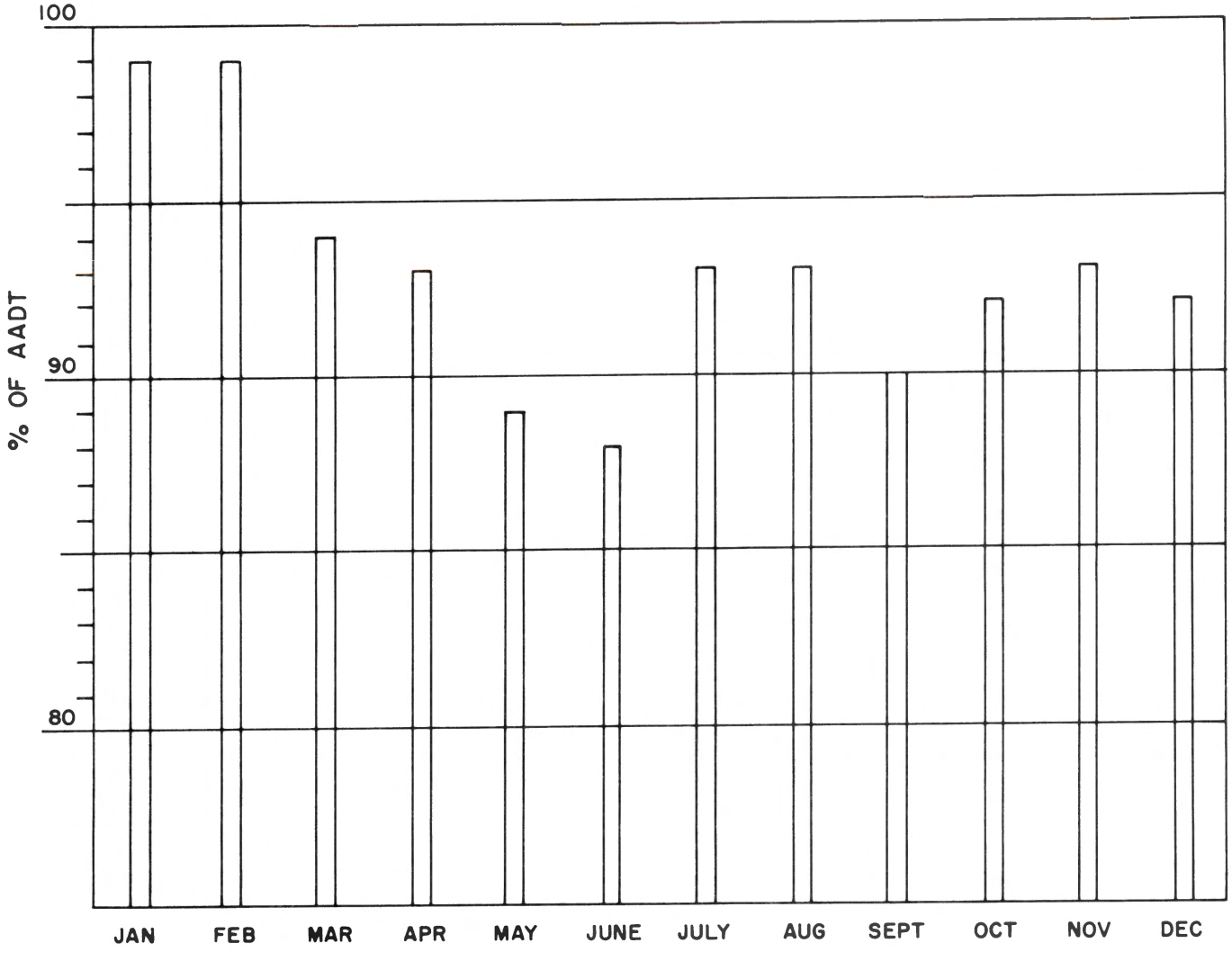
SYSTEM CAPACITY

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.

CHART NO. 6

MONTHLY TRAFFIC VARIATION OF A TYPICAL WEEKDAY ON ROUTE 41 AS % OF AADT



1970 A.A.D.T. VOLUMES

EXHIBIT NO. 7



1970 A.A.D.T. VOLUMES

EXHIBIT NO. 7

Kammerer, Symes & Assoc.
Consulting Engineers

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

a. Chapel Avenue and Coles Avenue

b. Haddonfield-Berlin Road and Route 154

c. Haddonfield-Berlin Road and Burnt Mill Road

d. Haddonfield-Sorrell Horse Road and Chapel Avenue

e. Haddonfield-Sorrell Horse Road and Church Road

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

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 at the Cherry Hill Mall and at various neighborhood shopping centers located throughout the community. In most of these areas there is ample off-street parking.

Some parking problems which are of concern are generated by the collector residential streets. Parking is permitted on both sides of these streets in many areas of the community and causes hazardous driving conditions due to the narrow roadways (thirty (30) to thirty-six (36) feet) and the curvilinear design. Those residential collector streets which the Consultant believes should have restricted parking are listed under the recommendations in this report.

TRAFFIC CONTROL DEVICES

Traffic signals are located and operating at the following intersections:

LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
a. Chapel Ave. and Coles Ave.	Semi-Actuated	1	Approved
b. Burnt Mill Rd. and Evesham Rd.	Semi-Actuated	6	Approved
c. Burnt Mill Rd. and Haddonfield-Berlin Rd.	Semi-Actuated	1	*
d. Haddonfield-Berlin Rd. and Cranford Rd.	Semi-Actuated	2	*
e. Haddonfield-Berlin Rd. and Route 295	Semi-Actuated	2	*
f. Haddonfield-Berlin Rd. and Evesham Rd.	Semi-Actuated	1	Approved
g. Haddonfield-Berlin Rd. and Morris Dr.	Semi-Actuated	2	*
h. Haddonfield-Berlin Rd. and Valleybrook Rd.	Semi-Actuated	2	*
i. Haddonfield-Sorrell Horse Rd. and Chapel Ave.	Semi-Actuated	1	*

LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
j. Haddonfield-Sorrell Horse Rd. and Cherry Hill Mall Entrance	Semi-Actuated	2	*
k. Haddonfield-Sorrell Horse Rd. and Church Rd.	Semi-Actuated	1	Approved
l. Haddonfield-Sorrell Horse Rd. and Maple Ave.	Fixed Time	1	*
m. Kresson Rd. and Springdale Rd.	Semi-Actuated	7	*
n. Route N.J. 38 and Chapel Ave.	Semi-Actuated	1	Approved
o. Route N.J. 38 and Cherry Hill Mall Entrance	Semi-Actuated	1	Approved
p. Route N.J. 38 and Church Rd.	Semi-Actuated	1	Approved
q. Route N.J. 38 and Longwood Ave.	Semi-Actuated	1	Approved
r. Route N.J. 38 and Mill Rd.	Semi-Actuated	1	Approved
s. Route N.J. 41 and Chapel Ave.	Semi-Actuated	1	Approved
t. Route N.J. 41 and Church Rd.	Semi-Actuated	1	Approved
u. Route N.J. 70 and Cornell Ave.	Semi-Actuated	1	Approved
v. Route N.J. 70 and Covered Bridge Rd.	Semi-Actuated	1	Approved
w. Route N.J. 70 and Donahue Ave.	Semi-Actuated	1	Approved
x. Route N.J. 70 and Edison Ave.	Semi-Actuated	1	Approved
y. Route N.J. 70 and Lexington Ave.	Semi-Actuated	1	Approved
z. Route N.J. 70 and Marlkress Rd.	Semi-Actuated	1	Approved
aa. Route N.J. 70 and Old Marlton Pike	Semi-Actuated	1	*
bb. Route N.J. 70 and Springdale Rd.	Semi-Actuated	1	Approved
cc. Route N.J. 70 and West Gate Dr.	Semi-Actuated	1	Approved

	LOCATION	TYPE	WARRANT SATISFIED	SIGNAL APPROVAL
dd.	Route N.J. 154 and Haddonfield-Berlin Rd.	Semi-Actuated	1	*
ee.	Route N.J. 154 and Kresson Rd.	Semi-Actuated	1	Approved

* Denotes signals where approvals could not be found.

Exhibit No. 8 shows the existing traffic signal locations in the Township. 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 ninety (90) seconds to seventy (70) seconds for most of the signals within the Township.

PEDESTRIAN MOVEMENTS

Pedestrian traffic is heaviest at Route 38 and Chapel Avenue, Chapel Avenue and Coles Avenue and the Haddonfield-Berlin Road and Valleybrook Road. During the beginning and ending of school hours there is heavy pedestrian traffic at all schools, which is controlled by crossing guards. At those schools where signalized intersections are close, it is the practice for the children to walk to the intersection, for guidance by the crossing guard. The crossing guards have little or no adverse effect on traffic.

There is also a heavy concentration of pedestrian traffic at Route 70 near the Garden State Race Track during the racing season. However, this is controlled by both the Township Police and State Police.

ROADWAY LIGHTING

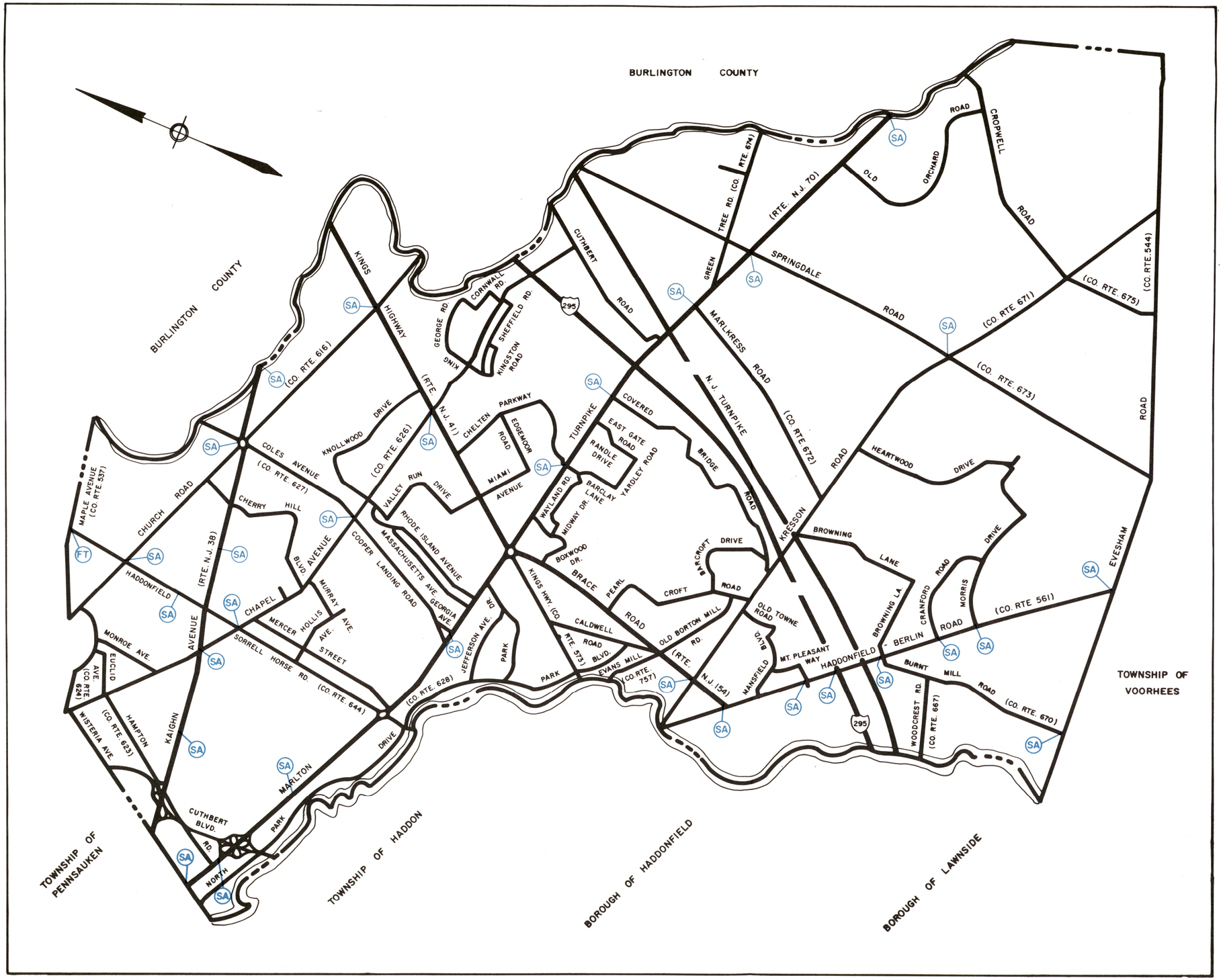
Most of the Township roadways appear to be adequately lighted, but lighting on the County Roads is, in general, confined to intersections. Even though many of the County Roads will be reconstructed in the near future, there is a present need for additional lighting due to the existing poor condition of these roadways.

ROADWAY GEOMETRY

Geometry on most of the roadways is good. Some of the collector streets have cartways varying from thirty-six (36) to forty (40) feet. These roads are suitable for two (2) lane but not four (4) lane operation. In many cases where separate turning lanes have been provided, their effectiveness has been reduced due to inadequate width and length.

LOCATIONS OF EXISTING
TRAFFIC SIGNALS

EXHIBIT NO. 8



SA Semi - Actuated

FT Fixed Time

Flashing

Flashing - Manually Operated During School Hours

LOCATIONS OF EXISTING TRAFFIC SIGNALS

EXHIBIT No. 8

Kammerer, Symes & Assoc.
Consulting Engineers

CHAPTER 8

BUS AND TRUCK OPERATIONS

BUS SERVICE

There are three (3) public transit agencies operating throughout the Township of Cherry Hill without presenting any major traffic problems.

The three (3) agencies operating in the study area are:

a. Transport of New Jersey - Interstate

b. Red Arrow Bus Line - Interstate

c. Dial-a-Ride - Local

Transport of New Jersey operates eight (8) routes throughout the Township, providing transportation to Philadelphia in addition to many southern New Jersey communities. These routes serve the areas along Routes 38 and 70, Chapel Avenue, Maple Avenue, Haddonfield-Sorrel Horse Road, Haddonfield-Berlin Road, Burnt Mill Road and Kings Highway in the Kingsway Village section of Cherry Hill. Service is provided daily at half hour intervals and is augmented during the morning and evening peak hours of 6:00 - 8:30 a.m. and 3:30 - 6:00 p.m. During these hours, service is provided at approximately ten (10) minute intervals. The exceptions being Saturday and Sunday when service is somewhat abbreviated.

The Red Arrow Bus Line operates one (1) route which serves the areas along Route 70 and the Knollwood, Kingston Estates, Kingsway Village and Downs Farm sections of Cherry Hill. This route connects Cherry Hill with Philadelphia. Service is provided daily at one (1) hour intervals from 4:30 a.m. to 11:00 p.m. An abbreviated schedule is in effect on Saturday and the Line does not operate on Sunday.

It should be pointed out that Transport of New Jersey and the Red Arrow Bus Line are prohibited by law from operating the same route, thereby giving greater transportation coverage to the Township.

The Dial-A-Ride system is sponsored by both the Federal Urban Mass Transit Administration and the New Jersey Department of Transportation. This system somewhat follows a basic route pattern but deviates from it to accommodate the passengers. Transportation is obtained by telephone request and service is "door-to-door" twenty-four (24) hours per day, seven (7) days a week. Dial-A-Ride serves portions of the Township south of Route 70 between Grove Street and Route 154; south of Kresson Road and east of Route 295 and Burnt Mill Road, in addition to portions of surrounding communities. The system also provides transportation to and from the Cherry Hill Mall.

TRUCK OPERATIONS

There are seven (7) major trucking terminals located in Cherry Hill Township. The names and locations are as follows:

a.	B & B Trucking, Inc.	Kresson Road
b.	Bulifont Trucking Company	Beechwood Avenue
c.	Hawthorne Hauling, Inc.	Tanforan Drive
d.	Hussmann Refrigerator Co.	Burnt Mill Road
e.	Nelson Freightways, Inc.	Old Cuthbert Road
f.	Ryder Truck Rental	Haddonfield-Berlin Road
g.	Spector Transfer, Inc.	Spector Drive

In addition to the aforementioned trucking companies, additional truck traffic is generated on the Township's arterial and connector routes by numerous places of business located within the study area.

INFLUENCE ON TRAFFIC

The current traffic volumes of trucks have no adverse influence on the flow of traffic in Cherry Hill Township, with the exception of the Nelson Freightways, Inc. terminal which does cause some congestion at Route 70 and Old Cuthbert Road. Improvements to this area are discussed in Chapter 13 of this report.

The current traffic patterns and routes of buses have no adverse influence on the flow of traffic in Cherry Hill Township. The problem is the location of the bus stops within the Township. Recommendations for relocating existing bus stops are detailed in Chapter 13 of this report.

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 Commisioner of the New Jersey Department of Transportation.

The Township of Cherry Hill does not have a codification of all Township ordinances. The traffic laws and ordinances are listed by year and the number of the ordinance proposed in that year and are revised as needed.

In reviewing the Township of Cherry Hill's traffic laws and ordinances, both with the Township and the State, approvals were found for all but twenty-eight (28) of the total number of one hundred, eleven (111) traffic ordinances proposed by the Township. 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 parking and signal regulations appears to be generally satisfactory for Cherry Hill Township. Speed limits are not enforced as stringently as they should be mainly because many are unreasonably low for the volumes of traffic and type of roads covered. Note must also be made that many of these low speed limits have never been approved by the New Jersey Department of Transportation. Greater emphasis should also be placed on the enforcement of stop and yield controls.

Accident records indicate that twenty-five (25) percent of the occurrences were right angle accidents and nearly fifty-two (52) percent were 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 exercise safe driving habits. Improvement in enforcing these regulations and restricting the indiscriminate use of STOP signs, YIELD signs and speed limits on roads not included in the study system is definitely warranted.

EFFECTS ON TRAFFIC

Traffic would flow more freely on local streets if the enforcement of all Township and State parking regulations were improved. The Consultant believes that many serious accidents would 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 Township of Cherry Hill. 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 Traffic 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 Township to provide additional capacity and smoother traffic flow. Areas of consideration include widening of roadways, restricted turning lanes, jughandles, 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 Township 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

The curvilinear design used on much of the street system in the newer sections of the Township combined with the narrow width of many collector streets presents a major safety hazard. Many of the streets in the older sections of the Township are, for the most part, based on a grid type system. A large number of the homes located in these residential areas have no driveways thereby causing a tremendous amount of on street parking. Recommendations are made in this report restricting parking on certain streets within the Township.

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 Cherry Hill Township 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 1970 traffic volumes to the volumes expected in 1975 and 1980 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 - TOWNSHIP OF CHERRY HILL

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

Project No. CH-1 Haddonfield-Sorrell Horse Road and Church Road

Project No. CH-2 Burnt Mill Road and Haddonfield-Berlin Road

Project No. CH-3 Haddonfield-Sorrell Horse Road and Chapel Avenue

Project No. CH-4 Church Road, Lenape Road and Cherry Hill Mall Drive

Project No. CH-5 Route N.J. 38 and Chapel Avenue

Project No.	CH-6	Cuthbert Boulevard and North Park Drive
Project No.	CH-7	Kresson Road and Springdale Road
Project No.	CH-8	Route N.J. 70 - Between Marlkress Road and Covered Bridge Road
Project No.	CH-9	Route N.J. 70 and Green Tree Road
Project No.	CH-10	Chapel Avenue and Coles Avenue
Project No.	CH-11	Route N.J. 70, Georgia Avenue, Edison Avenue, Cooper Landing Road and Pennsylvania Avenue
Project No.	CH-12	Burnt Mill Road and Evesham Road
Project No.	CH-13	Route N.J. 154 and Haddonfield-Berlin Road
Project No.	CH-14	Haddonfield-Sorrell Horse Road and Maple Avenue
Project No.	CH-15	Route N.J. 70 and Delaware Avenue
Project No.	CH-16	Route N.J. 154 and Kresson Road
Project No.	CH-17	Cuthbert Boulevard and Hampton Road
Project No.	CH-18	Kresson Road and Pearl Croft Road
Project No.	CH-19	Cuthbert Boulevard and Wisteria Avenue
Project No.	CH-20	North Park Drive at Penn Central Reading Seashore Lines Railroad Crossing.

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 - TOWNSHIP OF CHERRY HILL

The following is a summary on the status of intersections involving State Highways in the Township of Cherry Hill, which were studied under the Camden County TOPICS Program. 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.

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

   a. Route N.J. 38 and Chapel Avenue

   b. Route N.J. 70, Georgia Avenue, Edison Avenue, Cooper Landing Road and Pennsylvania Avenue.

   c. Route N.J. 154 and Haddonfield-Berlin Road

   d. Route N.J. 154 and Kresson Road

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

   a. Cuthbert Boulevard and Hampton Road

   b. Route N.J. 70 between Marlkress Road and Covered Bridge Road

   c. Route N.J. 70 and Delaware Avenue

   d. Route N.J. 70 and Green Tree Road

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

   a. Route N.J. 38 and Cuthbert Boulevard

   b. Route N.J. 70 and Chelten Parkway, Kingston Drive and West Gate Drive.

4. PROBLEM LOCATIONS WHICH ARE CURRENTLY UNDER STUDY BY THE NEW JERSEY DEPARTMENT OF TRANSPORTATION

   a. Route N.J. 70 and Route 295

   b. Route N.J. 70 and Fulton Street

   c. Route N.J. 70 and Old Orchard Road

   d. Route N.J. 70 and Springdale Road

   e. Route N.J. 70 and Wexford Drive

   f. Route N.J. 41 and Chapel Avenue

g. Route N.J. 41 and Chelten Parkway

h. Route N.J. 41 and Church Road

* i. Route N.J. 41 from Ellisburg Circle North to Township Line

j. Route N.J. 154 and Borton Mill Road

* k. Grove Street Circle Complex

l. Church Road Circle Complex

* m. Ellisburg Circle Complex

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

a. Route N.J. 38 and Longwood Avenue

b. Route N.J. 38 and Mill Road

c. Route N.J. 70 and Cornell Avenue

d. Route N.J. 70 and Cuthbert Boulevard

e. Route N.J. 70 and Saw Mill Road

* Denotes projects which are included in the 1972 New Jersey Department of Transportation Master Plan.

CHAPTER 13

DETAILED RECOMMENDATIONS

The detailed recommendations 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.

Twenty-two (22) recommended projects for improvement are included in this report. Several projects are general and involve more than one (1) location within the Township. 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. 9* 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.

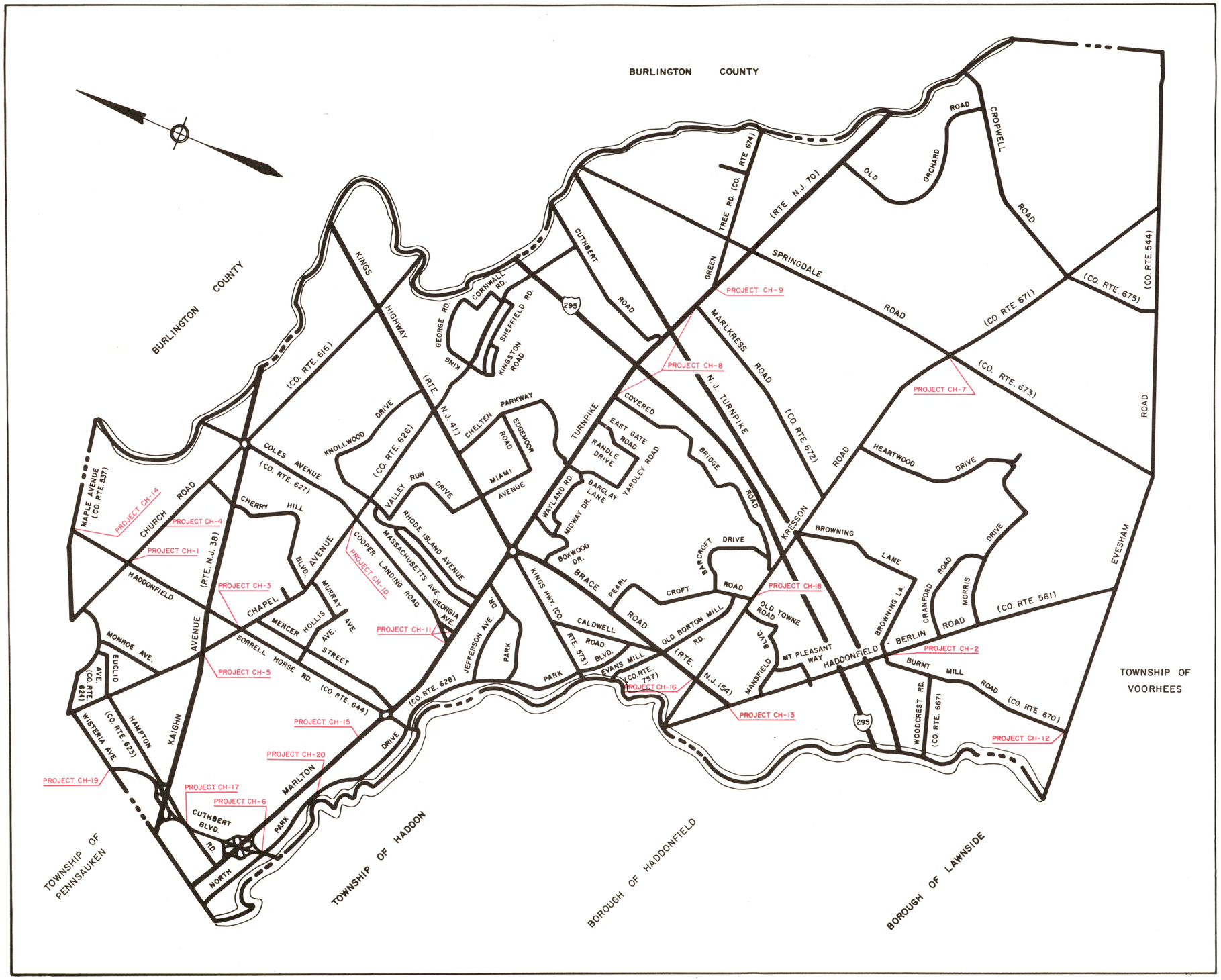
d. Existing topography and land use proposed for each location.

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 Township and County.

LOCATIONS OF
RECOMMENDED IMPROVEMENTS

EXHIBIT NO. 9



LOCATIONS OF
RECOMMENDED IMPROVEMENTS

EXHIBIT NO. 9

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-1 HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

d. ESTIMATED COSTS

(1) Engineering	$ 24,000.00
(2) Construction	123,300.00
(3) Signs and Markings	1,600.00
(4) Traffic Signals	20,000.00
(5) Right of Way	40,100.00
Total Estimated Cost	$209,000.00

c. BENEFITS

(1) The capacity and levels of service for left turns, through traffic and right turns, on all the approaches will be improved. Using the 1981 D.H.V., the levels of service, after reconstruction of this intersection, are compared with the 1971 levels of service as follows:

	1971 LEFT TURN LEVEL OF SERVICE	1981 LEFT TURN LEVEL OF SERVICE
Haddonfield-Sorrell Horse Road North Approach	F	E
Haddonfield-Sorrell Horse Road South Approach	F	F
Church Road East Approach	B	C
Church Road West Approach	C	C

	1971 THROUGH AND RIGHT TURN LEVEL OF SERVICE	1981 THROUGH AND RIGHT TURN LEVEL OF SERVICE
Haddonfield-Sorrell Horse Road North Approach	F	C
Haddonfield-Sorrell Horse Road South Approach	F	F
Church Road East Approach	E	C
Church Road West Approach	D	B

(2) High accident potential will be reduced.

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

(3) The number of accidents has increased during the three (3) year period from 1968 through 1970. Accident records show a total of seventy-two (72) accidents during this period. In 1968, there was a total of fifteen (15) accidents, in 1969, a total of twenty-five (25) accidents, and in 1970, a total of thirty-two (32). Of this total, thirty-five (35) were classified as left turn accidents, twenty-seven (27) were classified as same direction accidents, seven (7) were classified as right angle accidents, two (2) as collisions with fixed objects and one (1) was classified as an "other" type accident.

(4) Accident records indicate that the number of left turn and same direction accidents has increased during the three (3) year period, from 1968 through 1970. In 1968, there was a total of ten (10) left turn accidents and three (3) same direction accidents. In 1969, there was a total of eleven (11) left turn accidents and nine (9) same direction accidents. In 1970, there was a total of fourteen (14) left turn accidents and fifteen (15) same direction accidents.

(5) Insufficient clearance time is allocated for traffic moving through the intersection.

(6) With the opening of the new shopping area on Church Road, east of the intersection, future traffic volumes will exceed the existing capacity of the intersection.

(7) Pavement is in poor condition.

b. RECOMMENDATIONS

(1) Reconstruct all approaches of the intersection to allow two (2) through lanes and one (1) left turn lane with sufficient stacking space.

(2) Construct a median strip on both approaches of the Haddonfield-Sorrell Horse Road.

(3) Provide an advance green indication for the north approach of the Haddonfield-Sorrell Horse Road, and for the west approach of Church Road.

(4) Provide sufficient clearance time for traffic to move through the intersection.

(5) Future consideration should be given to the construction of far side jughandles on the northeast corner and on the southwest corner.

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

PROJECT NO. CH-1 HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

Project No. CH-1 covers the reconstruction of the intersection of the Haddonfield-Sorrell Horse Road and Church Road. *(Exhibit No. 10)*.

a. PROBLEMS

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

	1971 PEAK LEFT TURN VOLUME VEH./HR.	1971 AVERAGE LEFT TURN VOLUME VEH./HR.
Haddonfield-Sorrell Horse Road North Approach	116	90
Haddonfield-Sorrell Horse Road South Approach	90	80
Church Road East Approach	45	30
Church Road West Approach	109	86

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

	1971 PEAK THROUGH AND RIGHT TURN VOLUME VEH./HR.	1971 AVERAGE THROUGH AND RIGHT TURN VOLUME VEH./HR.
Haddonfield-Sorrell Horse Road North Approach	863	745
Haddonfield-Sorrell Horse Road South Approach	867	690
Church Road East Approach	493	373
Church Road West Approach	455	387

PROJECT NO. CH-1

HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

EXHIBIT NO. 10

PROJECT NO. CH-1

HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

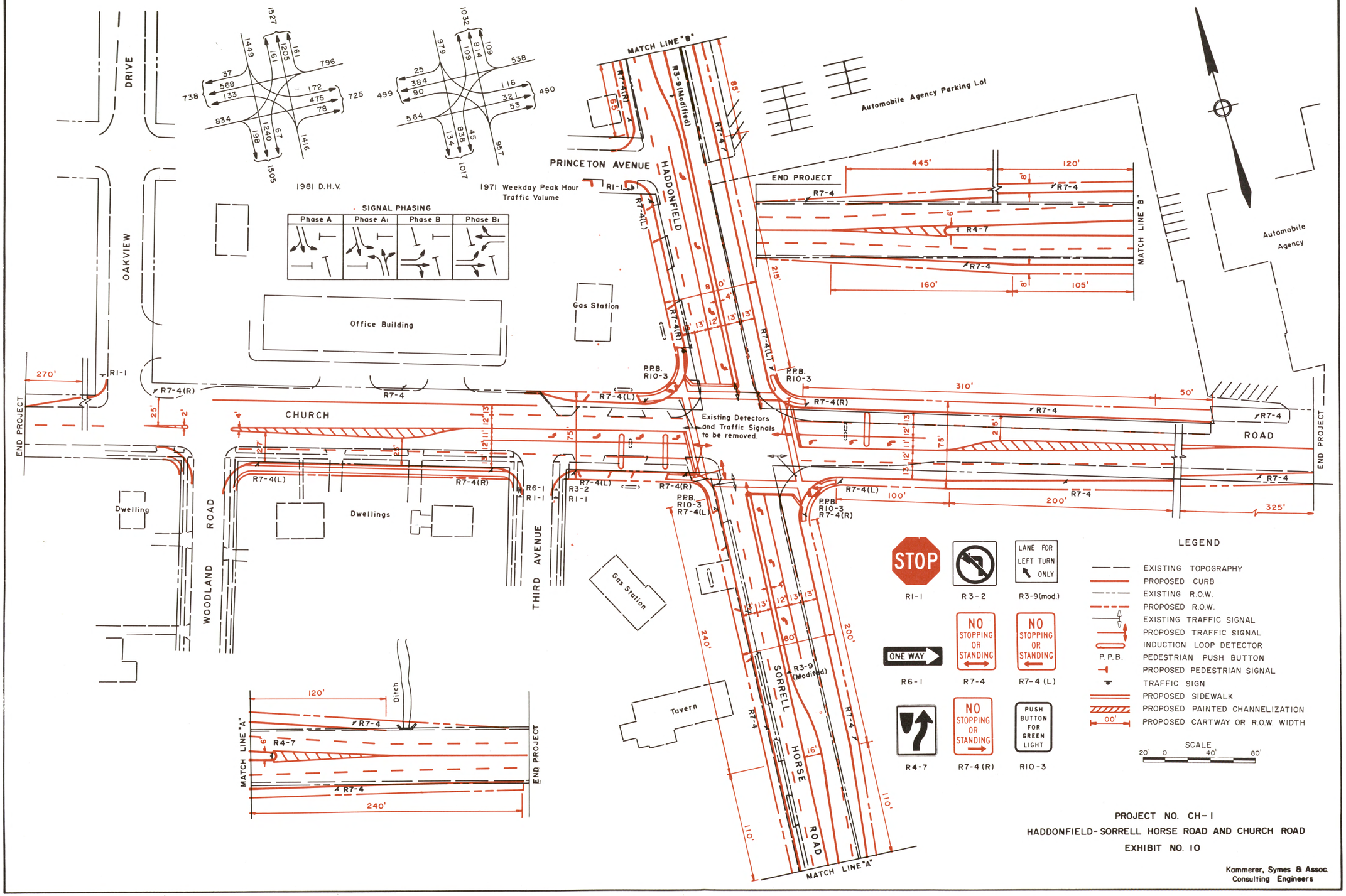
EXHIBIT NO. 10



PROJECT NO. CH-1

HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

EXHIBIT NO. 10



PROJECT NO. CH-1

HADDONFIELD-SORRELL HORSE ROAD AND CHURCH ROAD

EXHIBIT NO. 10

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-2 BURNT MILL ROAD AND HADDONFIELD-BERLIN ROAD

Project No. CH-2 covers the reconstruction of the intersection of Burnt Mill Road and Haddonfield-Berlin Road. *(Exhibit No. 11)*

a. PROBLEMS

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

	1972 PEAK LEFT TURN VOLUME VEH./HR.	1972 AVERAGE LEFT TURN VOLUME VEH./HR.
Burnt Mill Road North Approach	75	64
Burnt Mill Road South Approach	250	246
Haddonfield-Berlin Road West Approach	230	187

(2) The approach roadways, on Burnt Mill Road, are too narrow for safe turning movements. The percentage of turning movements are as follows:

	% LEFT TURNS	% RIGHT TURNS
Burnt Mill Road North Approach	19	47
Burnt Mill Road South Approach	71	1

(3) Existing channelization at the southwest corner is unable to safely accommodate right turn movements.

(4) Existing channelization at the southwest corner restricts the flow of through traffic due to the lack of adequate stacking space for the heavy right turn movements.

(5) The 1972 peak right turn volume for the west approach of the Haddonfield-Berlin Road compared to the 1972 average is as follows:

	1972 PEAK RIGHT TURN VOLUME VEH./HR.	1972 AVERAGE RIGHT TURN VOLUME VEH./HR.
Haddonfield-Berlin Road West Approach	676	504

(6) Accident records show a total of twenty-four (24) accidents for the three (3) year period from 1968 to 1970. Of this total, fourteen (14) were classified as same direction accidents, four (4) were classified as right angle accidents, four (4) were classified as left turn accidents, one (1) was a collision with a fixed object and one (1) was classified as an "other" type accident.

(7) Fifty (50) percent of the accidents involved vehicles traveling on the west approach.

b. RECOMMENDATIONS

(1) Widen the north and south approaches.

(2) Provide a restricted left turn lane for the north approach of Burnt Mill Road with sufficient stacking space for the left turn movements.

(3) Provide two (2) restricted left turn lanes for the south approach of Burnt Mill Road with sufficient stacking space for the left turn movements in addition to a right lane for right turn and through traffic.

(4) Provide an advance green indication for the west approach of Haddonfield-Berlin Road and a separate signal phase for each of the approaches of Burnt Mill Road.

(5) Widen the west approach of Haddonfield-Berlin Road to provide a deceleration lane for the right turn movements onto Burnt Mill Road.

(6) Reconstruct the channelization at the southwest corner.

(7) The right turn movement from the west approach of Haddonfield-Berlin Road onto Burnt Mill Road should be allowed at all times and controlled by a YIELD sign.

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

PROJECT NO. CH-2 BURNT MILL ROAD AND HADDONFIELD-BERLIN ROAD

c. BENEFITS

(1) Capacity and level of service on all approaches will be improved.

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

(3) High accident potential will be reduced.

d. ESTIMATED COSTS

(1) Engineering	$ 15,000.00
(2) Construction	65,000.00
(3) Signs and Markings	1,500.00
(4) Traffic Signals	12,000.00
(5) Right of Way	10,150.00
Total Estimated Cost	$103,650.00

PROJECT NO. CH-2

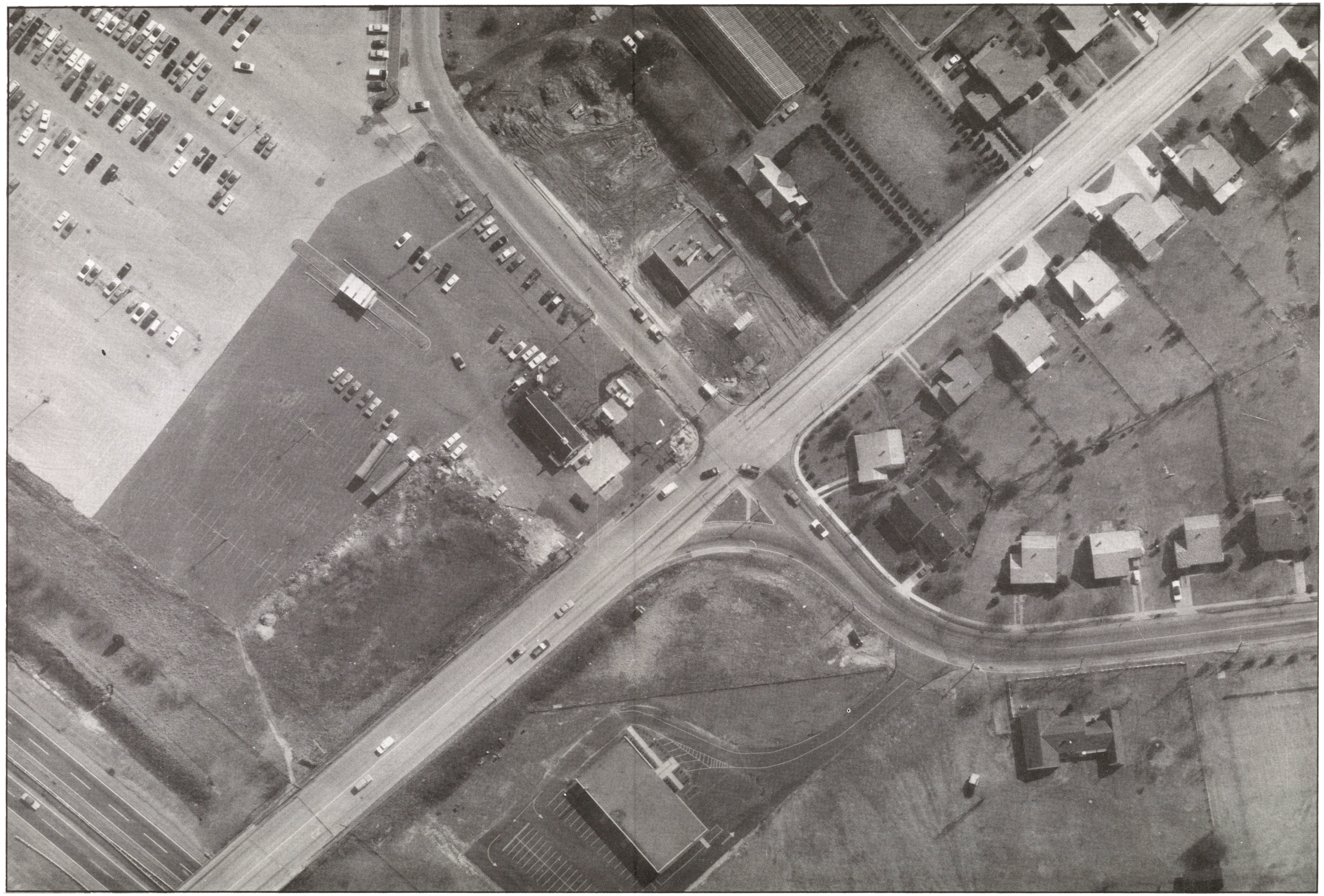
BURNT MILL ROAD AND HADDONFIELD BERLIN ROAD

EXHIBIT NO. 11

PROJECT NO. CH-2

BURNT MILL ROAD AND HADDONFIELD BERLIN ROAD

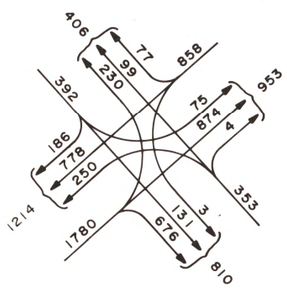
EXHIBIT NO. 11



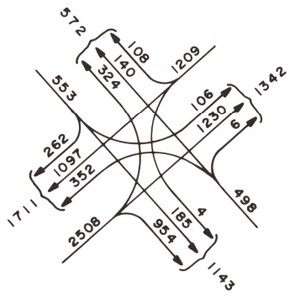
PROJECT NO. CH-2

BURNT MILL ROAD AND HADDONFIELD BERLIN ROAD

EXHIBIT NO. 11



1972 Weekday Peak Hour
Traffic Volume



1982 D.H.V.

SIGNAL PHASING

Phase A	Phase A1	Phase B	Phase C



R1-2



R3-7(L)



R3-7(R)



R3-8 Modified



R7-4



R7-4(L)



R7-4(R)



R10-3



W3-3

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. CH-2

BURNT MILL ROAD AND HADDONFIELD-BERLIN ROAD

EXHIBIT NO. 11

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-3 HADDONFIELD-SORRELL HORSE ROAD AND CHAPEL AVENUE

Project No. CH-3 covers the reconstruction of the intersection of Haddonfield-Sorrell Horse Road and Chapel Avenue. *(Exhibit No. 12).*

a. PROBLEMS

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

	1971 PEAK LEFT TURN VOLUME VEH./HR.	1971 AVERAGE LEFT TURN VOLUME VEH./HR.
Haddonfield-Sorrell Horse Road North Approach	125	109
Haddonfield-Sorrell Horse Road South Approach	65	46

(2) Future traffic volumes will exceed the capacity of the north and east approaches. The capacity of each approach compared to the 1981 D.H.V. peak hour volumes is summarized below:

	APPROACH CAPACITY VEH./HR.	1981 D.H.V. PEAK VOLUME VEH./HR.
Haddonfield-Sorrell Horse Road North Approach	1,140	1,260
Haddonfield-Sorrell Horse Road South Approach	1,300	1,043
Chapel Avenue East Approach	525	618
Chapel Avenue West Approach	690	646

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

(4) In the three (3) year period 1968 through 1970, a total of eighty-eight (88) accidents occurred at this intersection. Of this total, forty-eight (48) were classified as same direction accidents, twenty-two (22) were classified as left turn accidents, twelve (12) were classified as right angle accidents, three (3) were classified as collisions with fixed objects and three (3) were classified as "other" type accidents.

(5) The high number of same direction accidents, forty-eight (48), represents fifty-four (54) percent of the total number of accidents, which occurred at this intersection during the three (3) year period.

(6) Forty-six (46) percent of the same direction accidents involved vehicles traveling on the north approach.

(7) The high number of same direction accidents, forty-eight (48) was principally caused by the poor visibility of the eight (8) inch signal lenses.

(8) The Garden State Race Track, a major generator of traffic, is located on the southwest corner of this intersection and along the west side of the Haddonfield-Sorrell Horse Road.

(9) A private road located south of the intersection and across from the Garden State Race Track is used during the racing season by traffic entering and exiting from the Race Track. Traffic at this location is usually controlled by the Cherry Hill Police Department. On occasion, however, the intersection is not controlled by the Police.

b. RECOMMENDATIONS

(1) Reconstruct the north, south and east approaches of the intersection to provide two (2) lanes of through traffic and one (1) lane for left turns with sufficient stacking space.

(2) Widen the west approach as shown on the plan.

(3) Provide an advance green indication for the north approach of the Haddonfield-Sorrell Horse Road, and for the east approach of Chapel Avenue.

(4) Reconstruct the channelization at the southeast corner.

(5) Traffic signals at this intersection are to be manually operated during the racing season only.

(6) Consideration should be given in the future to the construction of far side jughandles on the northeast and southwest corners.

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

c. BENEFITS

(1) Capacity of intersection will be increased.

(2) High accident potential will be reduced.

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

PROJECT NO. CH-3 HADDONFIELD-SORRELL HORSE ROAD AND CHAPEL AVENUE

d. ESTIMATED COSTS

(1) Engineering	$ 29,000.00
(2) Construction	130,000.00
(3) Signs and Markings	2,400.00
(4) Traffic Signals	20,000.00
(5) Right of Way	269,400.00
Total Estimated Cost	$450,800.00

PROJECT NO. CH-3

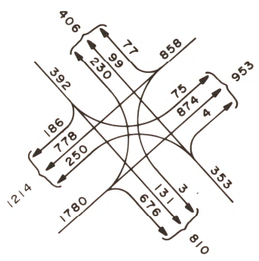
HADDONFIELD - SORRELL HORSE ROAD AND CHAPEL AVENUE

EXHIBIT NO. 12

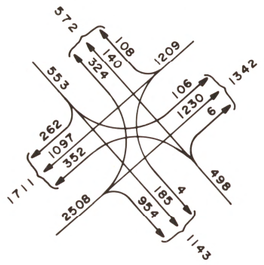
PROJECT NO. CH-3

HADDONFIELD - SORRELL HORSE ROAD AND CHAPEL AVENUE

EXHIBIT NO. 12



1972 Weekday Peak Hour
Traffic Volume



1982 D.H.V.

SIGNAL PHASING

Phase A	Phase A1	Phase B	Phase C



R1-2



R3-7(L)



R3-7(R)



R3-8 Modified



R7-4



R7-4(L)



R7-4(R)



R10-3



W3-3

NOTE:
Existing Detectors and
Traffic Signals to be
removed.

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. CH-2
BURNT MILL ROAD AND HADDONFIELD-BERLIN ROAD
EXHIBIT NO. 11

Kammerer, Symes & Assoc.
Consulting Engineers



PROJECT NO. CH-3

HADDONFIELD - SORRELL HORSE ROAD AND CHAPEL AVENUE

EXHIBIT NO. 12

MATCH LINE "A"

HADDONFIELD

R3-7(L)

R7-4

100'

80'

235'

130'

12' 11' 12' 13'

R7-4(R)

R7-4(L)

R3-7(L) P.P.B. R10-3

SIGNAL PHASING

Phase A	Phase A1	Phase B	Phase B1

Office Building

AVENUE

END PROJECT

70'

330'

R7-4

CHAPEL

30'

70'

12' 13'

50'

230'

Race Track Driveway

P.P.B. R10-3

THIRD

836 940 31 232 65 328 483 166 658 12 462 125 379 55 559 778 64 784 92 940

1971 Weekday Peak Hour Traffic Volume

1120 1260 42 310 87 439 646 222 882 16 618 168 507 74 749 1043 86 1050 123 1259

1981 D.H.V.

MATCH LINE "A"

Cinellis Driveway

R7-4(L) R7-4(R)

END PROJECT

R7-4(R) R7-4(L)

220'

Cherry Hill Inn Driveway

210' 100'

R3-7(L) R7-4(R)

R7-4

R7-4(L) R3-7(L)

AVENUE

END PROJECT

13' 12' 11' 20'

70'

P.P.B. R10-3

R3-7(L)

R7-4(L)

255'

R7-4

R7-4(R)

105'

Gas Station

Store

Private Road used during Race Track Season

R7-4(R)

R7-4(L)

80'

SORREL HORSE ROAD

250'

R7-4(R)

Garden State Race Track Driveway

Restaurant

100'

R7-4(L)

R3-7(L)

180'

R7-4

MATCH LINE "B"

MATCH LINE "B"

R7-4(R)

R7-4

END PROJECT

270'

NO STOPPING OR STANDING ⟷ R7-4

NO STOPPING OR STANDING ← R7-4(L)

NO STOPPING OR STANDING → R7-4(R)

LEFT LANE MUST TURN LEFT R3-7(L)

PUSH BUTTON FOR GREEN LIGHT R10-3

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. CH-3

HADDONFIELD-SORRELL HORSE ROAD AND CHAPEL AVENUE

EXHIBIT NO. 12

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-4 CHURCH ROAD, LENAPE ROAD AND CHERRY HILL MALL DRIVE

Project No. CH-4 covers the reconstruction and installation of a traffic signal at the intersection of Church Road, Lenape Road and Cherry Hill Mall Drive. *(Exhibit No. 13)*

a. PROBLEMS

(1) With the development of new shopping center areas on the northeast and northwest sides of this intersection the volumes of traffic have increased.

(2) High volumes of traffic on Church Road restrict and cause excessive delays to traffic turning left onto the Cherry Hill Mall Drive and to traffic exiting from the Mall Drive onto Church Road. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Church Road East Approach	22	12
Church Road West Approach	4	22
Cherry Hill Mall Drive South Approach	43	26
Lenape Road North Approach	47	14

(3) Accident records indicate a total of twenty-two (22) accidents occurred during the three (3) year period from 1968 through 1970. Of this total, thirteen (13) were classified as same direction accidents, five (5) were classified as right angle accidents, two (2) were classified as "other" type accidents, one (1) was classified as a left turn accident and one (1) was a collision with a fixed object.

b. RECOMMENDATIONS

(1) Reconstruct the Church Road approaches as shown on the plan.

(2) Realign the Cherry Hill Mall Drive and Lenape Road as shown on the plan.

(3) Install a semi-actuated traffic signal with pedestrian push buttons at the intersection of Church Road and the Cherry Hill Mall Drive. Warrant No. 2, Interruption of Continuous Traffic, is satisfied.

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

PROJECT NO. CH-4 CHURCH ROAD, LENAPE ROAD AND CHERRY HILL MALL DRIVE

c. BENEFITS

(1) Accident potential will be reduced.

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

d. ESTIMATED COSTS

(1) Engineering	$ 9,700.00
(2) Construction	32,800.00
(3) Signs and Markings	900.00
(4) Traffic Signals	15,000.00
(5) Right of Way	16,800.00
Total Estimated Cost	$75,200.00

PROJECT NO. CH-4
CHURCH ROAD, LENAPE ROAD AND
CHERRY HILL MALL DRIVE
EXHIBIT NO. 13

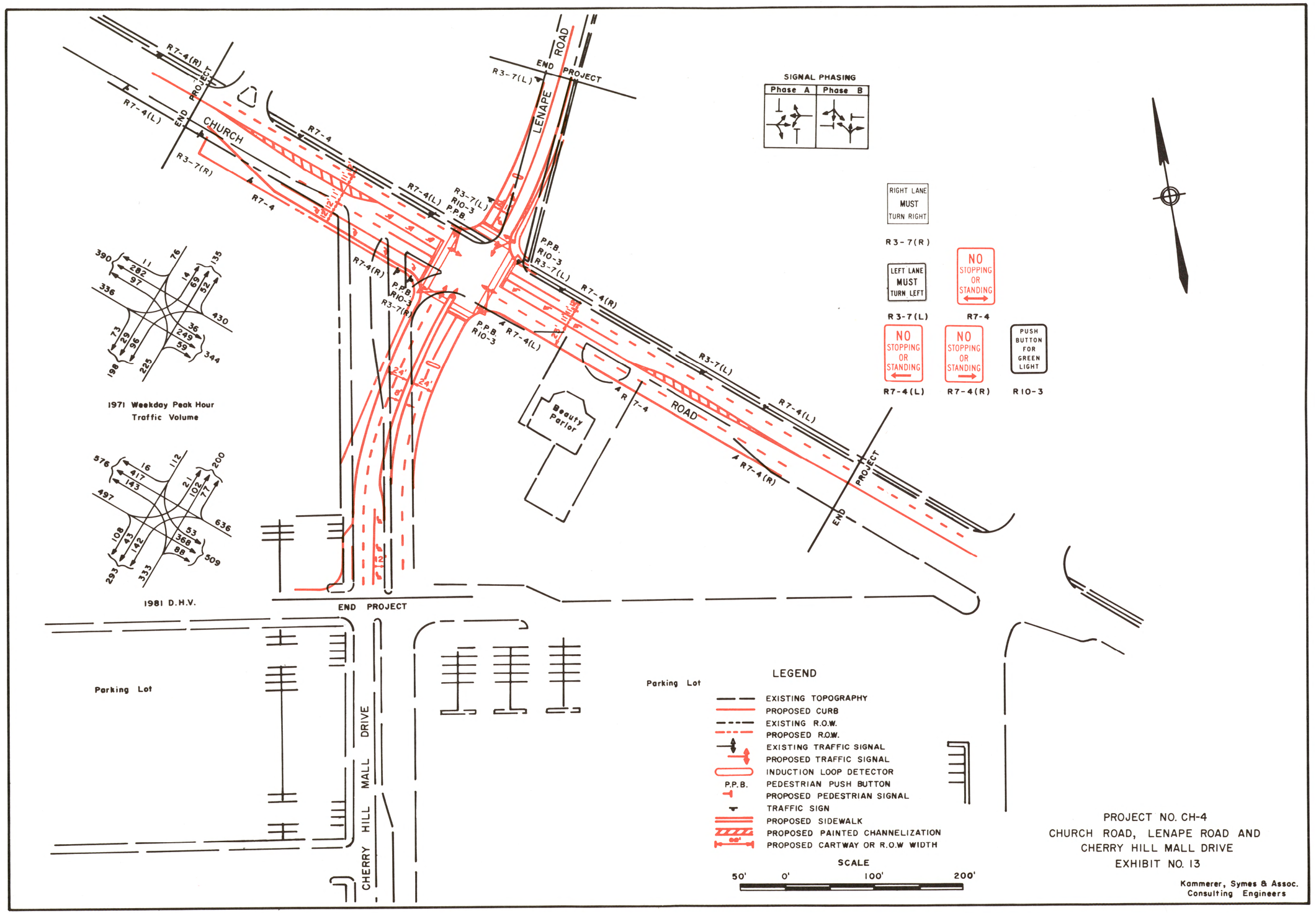
PROJECT NO. CH-4
CHURCH ROAD, LENAPE ROAD AND
CHERRY HILL MALL DRIVE
EXHIBIT NO. 13



PROJECT NO. CH-4

CHURCH ROAD, LENAPE ROAD AND
CHERRY HILL MALL DRIVE

EXHIBIT NO. 13



PROJECT NO. CH-4

CHURCH ROAD, LENAPE ROAD AND CHERRY HILL MALL DRIVE

EXHIBIT NO. 13

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-5 ROUTE N.J. 38 AND CHAPEL AVENUE

Project No. CH-5 covers the reconstruction of the intersection of Route 38 and Chapel Avenue. *(Exhibit No. 14)*

a. PROBLEMS

(1) The approach roadways on Chapel Avenue are too narrow for safe left turn movements into the jughandle at the intersections of Hollywood Avenue and Woodland Avenue with Chapel Avenue.

(2) The percentage of northbound traffic on Chapel Avenue desiring to turn left onto Hollywood Avenue and the percentage of southbound traffic on Chapel Avenue desiring to turn left onto Woodland Avenue is as follows:

	% LEFT TURNS
Chapel Avenue Northbound	36
Chapel Avenue Southbound	14

(3) Present level of service for northbound traffic on Chapel Avenue desiring to turn left onto Hollywood Avenue is "F" and for southbound traffic on Chapel Avenue desiring to turn left onto Woodland Avenue is "D". The 1972 peak left turn volumes for these locations compared to the 1972 average left turn volumes are summarized below:

	1972 PEAK LEFT TURN VOLUME VEH./HR.	1972 AVERAGE LEFT TURN VOLUME VEH./HR.
Chapel Avenue Northbound	153	121
Chapel Avenue Southbound	102	44

(4) Through traffic on Chapel Avenue blocks the intersections of both Hollywood Avenue and Woodland Avenue.

(5) Drivers on Chapel Avenue desiring to turn left onto Route 38 must use the existing jughandles located east and west of the intersection. Drivers must then stop to allow through traffic on Chapel Avenue to clear before making a left turn off Chapel Avenue into the jughandles thereby preventing the flow of through traffic on Chapel Avenue.

(6) Highland Avenue located on the southwest corner, exits into Chapel Avenue and is used by traffic coming out of the Garden State Race Track, which is located southwest of the intersection. This traffic is controlled by a STOP sign.

(7) Highland Avenue traffic crosses Chapel Avenue and enters Route 38 without any traffic signal control, thereby creating a hazardous condition.

(8) Accident records indicate a total of fifty (50) accidents during the three (3) year period from 1968 through 1970. Of this total, twenty-eight (28) were classified as same direction accidents, eleven (11) were classified as right angle accidents, five (5) were classified as left turn accidents, three (3) were classified as "other" type accidents, two (2) were classified as collisions with fixed objects and one (1) accident involved a pedestrian.

(9) The same direction accidents which represent fifty-six (56) percent of the total number of accidents during the three (3) year period were principally caused by the poor visibility of the eight (8) inch lenses of the traffic signals on Route 38.

(10) The Hinchman Elementary School is located on Chapel Avenue northwest of the intersection. Children going to or coming from school must cross Route 38.

b. RECOMMENDATIONS

(1) Reconstruct both approaches of Chapel Avenue.

(2) Make Highland Avenue one way southbound from Chapel Avenue to Linden Avenue.

(3) Divert traffic normally using Highland Avenue to Woodland Avenue.

(4) Provide the proper signs to prevent through traffic on Chapel Avenue from blocking the intersections of Hollywood Avenue and Woodland Avenue.

(5) Restrict left turns from Harvard Avenue onto Chapel Avenue.

(6) Reconstruct the traffic signals to provide for pedestrian signals in addition to twelve (12) inch lenses on all signals over the roadway.

(7) Provide a pedestrian interval timer to allow sufficient time for pedestrians to cross Route 38.

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

c. BENEFITS

(1) Capacity and level of service of Chapel Avenue will be increased.

(2) High accident potential will be reduced.

(3) Number of same direction accidents will be reduced.

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

(5) Safer pedestrian movements will be provided.

(6) Safer and more efficient use of jughandles will be achieved.

(7) Unprotected crossing at Highland Avenue will be eliminated.

d. ESTIMATED COSTS

(1) Engineering	$ 24,500.00
(2) Construction	101,800.00
(3) Signs and Markings	1,000.00
(4) Traffic Signals	20,000.00
(5) Right of Way	56,000.00
Total Estimated Cost	$203,300.00

PROJECT NO. CH-5

ROUTE N.J. 38 AND CHAPEL AVENUE

EXHIBIT NO. 14

PROJECT NO. CH-5

ROUTE N.J. 38 AND CHAPEL AVENUE

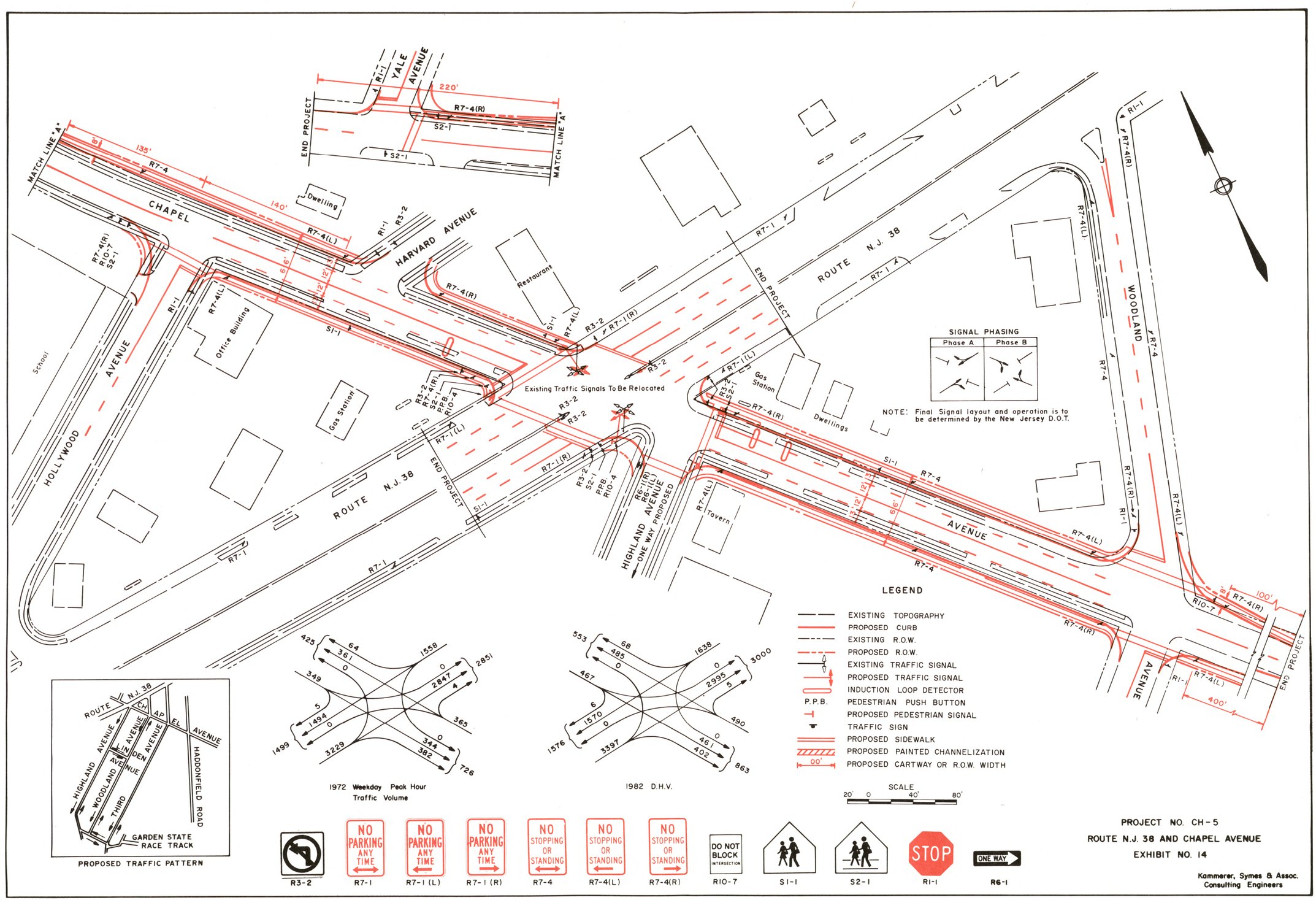
EXHIBIT NO. 14



PROJECT NO. CH-5

ROUTE N.J. 38 AND CHAPEL AVENUE

EXHIBIT NO. 14



PROJECT NO. CH-5
ROUTE N.J. 38 AND CHAPEL AVENUE
EXHIBIT NO. 14

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-6 CUTHBERT BOULEVARD AND NORTH PARK DRIVE

Project No. CH-6 covers the installation of a traffic signal and reconstruction at the intersection of Cuthbert Boulevard and North Park Drive. *(Exhibit No. 15)*

a. PROBLEMS

(1) High traffic volumes on Cuthbert Boulevard make it difficult for traffic exiting both approaches of North Park Drive and cause excessive delays.

(2) The 1971 peak volumes for the north and south approaches compared to the 1971 average volumes are summarized below:

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Cuthbert Boulevard North Approach	1,969	1,007
Cuthbert Boulevard South Approach	1,091	814

(3) Safe left turn movements from Cuthbert Boulevard onto North Park Drive are difficult to make due to the heavy volume of opposing traffic.

(4) The unprotected left turn lanes on Cuthbert Boulevard create a hazardous condition.

(5) High rates of speed on Cuthbert Boulevard in addition to the restricted sight distance, on the west approach of North Park Drive create a hazardous condition.

(6) Accident records indicate a high number of accidents, sixty-three (63), during the three (3) year period from 1968 through 1970. Of this total, thirty-three (33) were classified as right angle accidents, fifteen (15) were classified as same direction accidents, eight (8) were classified as collisions with fixed objects, six (6) were classified as left turn accidents and one (1) was classified as an "other" type accident.

(7) The high number of right angle accidents, thirty-three (33), represents fifty-two (52) percent of the total number of accidents occurring at this location during the three (3) year period.

b. RECOMMENDATIONS

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

(2) Traffic detectors are to be located on the North Park Drive approaches.

(3) Provide twelve (12) inch lenses for all signals over the roadway and on the median.

(4) Reconstruct the north and south approaches of the intersection to provide one (1) lane for left turns with sufficient stacking space.

(5) Right turns from the north approach of Cuthbert Boulevard are to be controlled by a YIELD sign.

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

c. BENEFITS

(1) High accident potential will be reduced.

(2) Smoother flow of traffic will be achieved.

(3) Safer left turn movements will be provided.

d. ESTIMATED COSTS

(1) Engineering	$ 7,100.00
(2) Construction	19,900.00
(3) Signs and Markings	625.00
(4) Traffic Signals	15,000.00
Total Estimated Cost	$42,625.00



PROJECT NO. CH-6

CUTHBERT BOULEVARD AND NORTH PARK DRIVE

EXHIBIT NO. 15

PROJECT NO. CH-6

CUTHBERT BOULEVARD AND NORTH PARK DRIVE

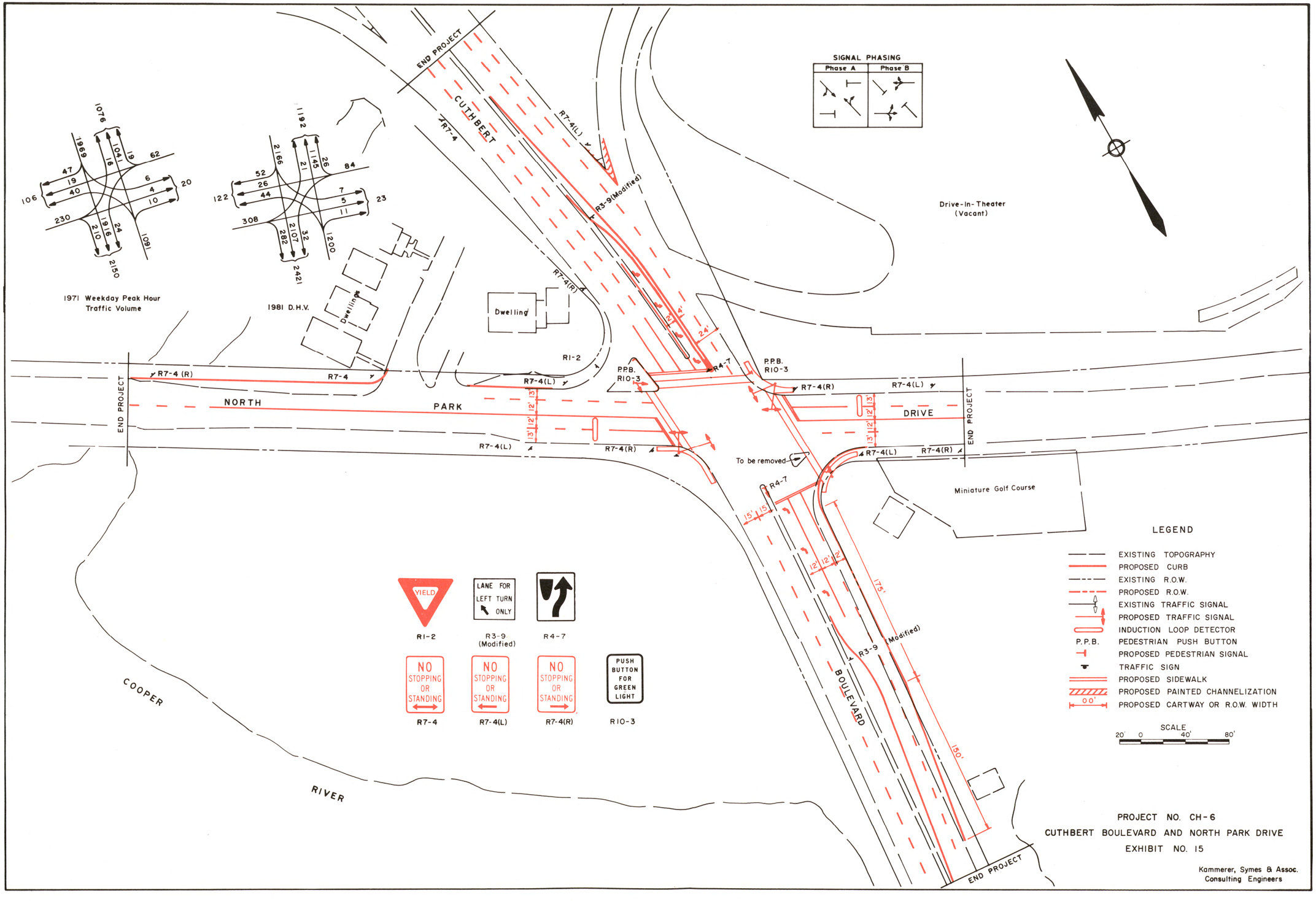
EXHIBIT NO. 15



PROJECT NO. CH-6

CUTHBERT BOULEVARD AND NORTH PARK DRIVE

EXHIBIT NO. 15


SIGNAL PHASING
Phase A
Phase B
END PROJECT
CUTHBERT
R7-4
R7-4(L)
R3-9(Modified)
Drive-In-Theater
(Vacant)
1971 Weekday Peak Hour
Traffic Volume
1981 D.H.V.
Dwelling
Dwelling
R7-4(R)
R1-2
P.P.B.
R10-3
R4-7
R7-4 (R)
R7-4
R7-4(L)
NORTH
PARK
DRIVE
END PROJECT
R7-4(L)
R7-4(R)
To be removed
Miniature Golf Course
R4-7
R3-9 (Modified)
BOULEVARD
COOPER
RIVER
END PROJECT
YIELD
R1-2
LANE FOR LEFT TURN ONLY
R3-9 (Modified)
R4-7
NO STOPPING OR STANDING
R7-4
NO STOPPING OR STANDING
R7-4(L)
NO STOPPING OR STANDING
R7-4(R)
PUSH BUTTON FOR GREEN LIGHT
R10-3
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. CH-6
CUTHBERT BOULEVARD AND NORTH PARK DRIVE
EXHIBIT NO. 15
Kammerer, Symes & Assoc.
Consulting Engineers


SPRINGDALE
ROAD
KRESSON
ROAD
N

PROJECT NO. CH-7 KRESSON ROAD AND SPRINGDALE ROAD

Project No. CH-7 covers the reconstruction of the intersection of Kresson Road and Springdale Road.

a. PROBLEMS

(1) Present level of service for left turn movements on the north approach is "F". The 1972 peak left turn volume compared to the 1972 left turn capacity is summarized below:

	1972 PEAK LEFT TURN VOLUME VEH./HR.	1972 LEFT TURN CAPACITY VEH./HR.
Springdale Road North Approach	120	83

(2) Future traffic demands will exceed the capacity of the south and east approaches. The 1972 peak hour volumes and the 1982 D.H.V. compared to the capacity of each approach is summarized below:

	1972 PEAK VOLUMES VEH./HR.	1982 D.H.V. VEH./HR.	APPROACH CAPACITY VEH./HR.
*Springdale Road North Approach	*201	*297	*350
Springdale Road South Approach	585	866	710
Kresson Road East Approach	531	786	680
Kresson Road West Approach	445	659	670

*Through and right turn movements.

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

(4) Lack of stop lines and lane lines on the approaches of Kresson Road cause confusion to drivers traveling on this road.

b. RECOMMENDATIONS

(1) Widen all four (4) approaches to forty-six (46) feet.

(2) Increase all corner radii.

(3) Provide an advance green indication for the north approach of Springdale Road.

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

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

c. BENEFITS

(1) The capacity and level of service of the intersection will be increased.

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

d. ESTIMATED COSTS

(1) Engineering	$1,500.00
(2) Construction	6,900.00
(3) Signs and Markings	300.00
Total Estimated Cost	$8,700.00

PROJECT NO. CH - 8

ROUTE N.J. 70 — BETWEEN

MARLKRESS ROAD AND COVERED BRIDGE ROAD

EXHIBIT NO. 16


COVERED BRIDGE RD.
ROUTE
INTERSTATE
295
N.J.
N.J.
TURNPIKE
70
MARLKRESS
ROAD

PROJECT NO. CH-8 ROUTE N.J. 70 - BETWEEN MARLKRESS ROAD AND COVERED BRIDGE ROAD

Project No. CH-8 covers improvements to Route 70 and intersections along Route 70 between Marlkress Road and Covered Bridge Road. *(Exhibit No. 16)*.

a. PROBLEMS

(1) Several Industrial Parks are located north and south of Route 70 between Marlkress Road and Covered Bridge Road.

(2) These Industrial Parks are major generators of traffic, and their continuous expansion will increase the volumes of traffic in this area.

(3) A hazardous condition exists at the intersection of Route 70 and Cuthbert Road. This condition is principally caused by a sight distance problem on the northeast corner of the intersection, due to the grade of Route 70 as it passes over the New Jersey Turnpike in addition to heavy volumes of traffic encountered all along Route 70.

(4) The south approach of Marlkress Road and the north approach of Cuthbert Road are too narrow to accommodate future traffic demands.

(5) Traffic exiting Route 295 traveling eastbound on Route 70 and desiring to turn left onto Cuthbert Road encounters difficulty due to the short distance between the exit and the left turn slot.

(6) Three (3) median openings exist on Route 70 between Marlkress Road and Covered Bridge Road and cause a hazardous condition for drivers entering or exiting the Industrial Parks.

b. RECOMMENDATIONS

(1) Close all the median openings on Route 70 between Marlkress Road and Covered Bridge Road.

(2) Construct a far side jughandle on the southeast corner of Marlkress Road and Route 70.

(3) Left turn and U turn traffic can use the existing jughandle on Covered Bridge Road and the proposed jughandle on Marlkress Road.

(4) Reconstruct Marlkress Road to fifty (50) feet between the jughandle exit and Route 70.

c. BENEFITS

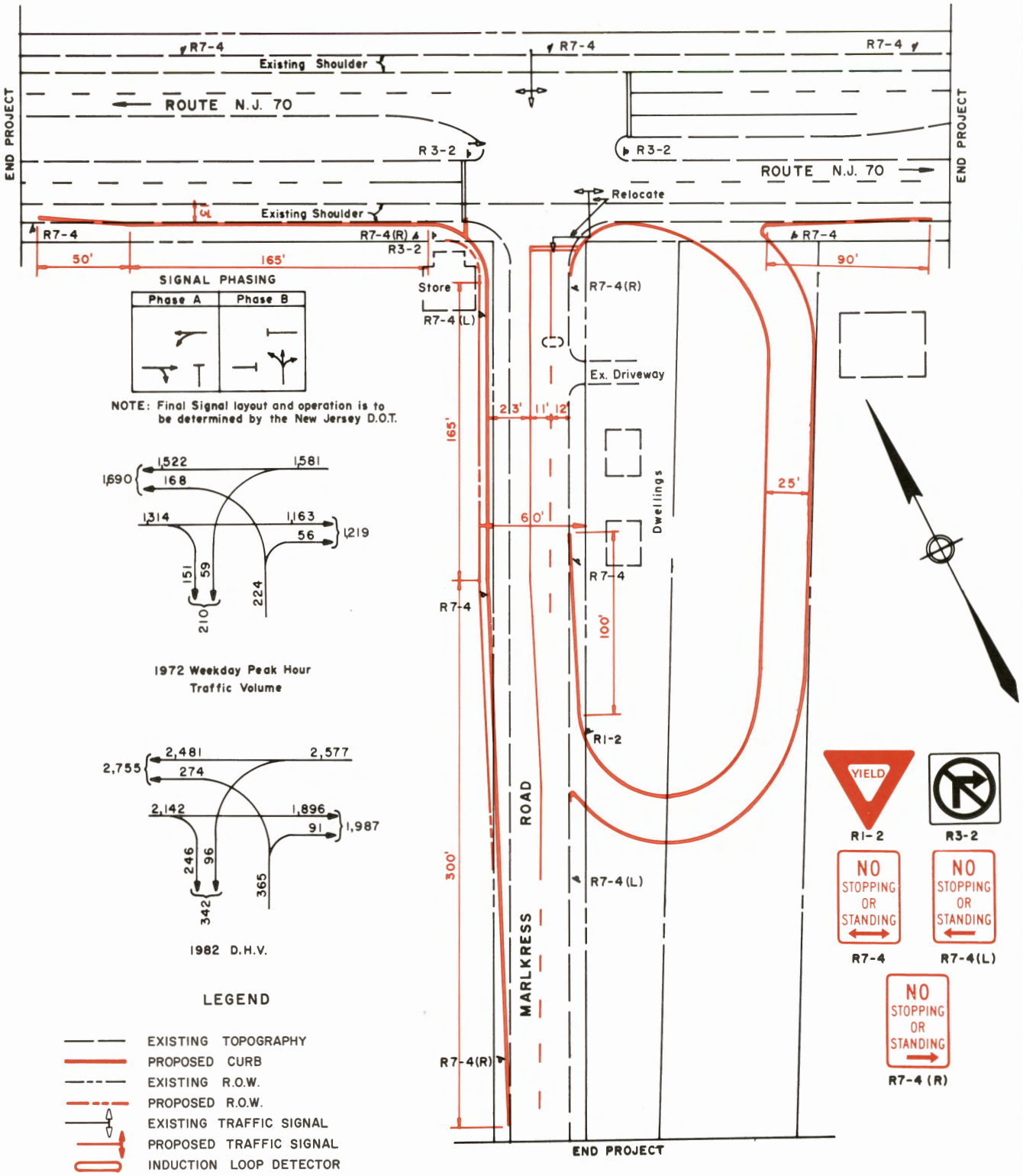
(1) Safer flow of traffic along Route 70 will be achieved.

(2) Left turn and U turn problems will be eliminated.

PROJECT NO. CH-8 ROUTE N.J. 70 - BETWEEN MARLKRESS ROAD AND COVERED BRIDGE ROAD

d. ESTIMATED COSTS

(1) Engineering	$ 28,000.00
(2) Construction	140,000.00
(3) Signs and Markings	900.00
(4) Right of Way	34,000.00
Total Estimated Cost	$202,900.00



PROJECT NO. CH-8

ROUTE N.J. 70 AND MARLKRESS ROAD

EXHIBIT NO. 16

Kammerer, Symes & Assoc.
Consulting Engineers


N
ROUTE
GREEN
TREE
ROAD
N.J.
70

PROJECT NO. CH-9 ROUTE N.J. 70 AND GREEN TREE ROAD

Project No. CH-9 covers the reconstruction of the intersection of Route 70 and Green Tree Road.

a. PROBLEMS

(1) Vehicles making left turns from Green Tree Road onto Route 70 must cross heavy volumes of westbound traffic on Route 70.

(2) Green Tree Road intersects Route 70 at an extremely flat angle.

(3) Many drivers disregard the existing STOP sign located on Green Tree Road.

(4) Pavement markings are virtually non-existent on Green Tree Road.

(5) Traffic backing out of the tavern parking lot onto Green Tree Road, and the lack of curbs, cause a hazardous condition.

(6) In the three (3) year period 1968 through 1970, there was a total of twenty-seven (27) accidents at this location, sixteen (16) were classified as same direction accidents, eight (8) were classified as right angle accidents, one (1) was a collision with a fixed object and two (2) were classified as "other" type accidents.

b. RECOMMENDATIONS

(1) Replace the exiting STOP sign on Green Tree Road with a YIELD sign.

(2) Prohibit left turns from Green Tree Road onto Route 70.

(3) Provide an acceleration lane on the north side of Route 70 for vehicles turning right from Green Tree Road onto Route 70.

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

c. BENEFITS

(1) Accident potential will be reduced.

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

PROJECT NO. CH-9 ROUTE N.J. 70 AND GREEN TREE ROAD

d. ESTIMATED COSTS

(1) Engineering	$1,000.00
(2) Construction	5,100.00
(3) Signs and Markings	300.00
Total Estimated Cost	$6,400.00

PROJECT NO. CH-10 CHAPEL AVENUE AND COLES AVENUE

Project No. CH-10 covers the reconstruction of the intersection of Chapel Avenue and Coles Avenue. *(Exhibit No. 17)*

a. PROBLEMS

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

	1971 PEAK VOLUME VEH./HR.	1971 AVERAGE VOLUME VEH./HR.
Coles Avenue North Approach	402	290
Coles Avenue South Approach	508	319

(2) The west approach of Chapel Avenue is offset creating a hazardous condition for traffic traveling east.

(3) Accident records show a total of thirty (30) accidents for the three (3) year period from 1968 to 1970. Of this total, twenty-one (21) were classified as same direction accidents, five (5) were classified as right angle accidents, three (3) were classified as left turn accidents and one (1) as an "other" type accident.

(4) Forty (40) percent of the accidents involved vehicles traveling on the west approach.

(5) The high number of same direction accidents, twenty-one (21), was principally caused by the poor visibility of the eight (8) inch signal lenses.

(6) The Cherry Hill West High School, located west of this intersection on Chapel Avenue, and the Cherry Hill Hospital, located on the southwest corner of the intersection, are major generators of vehicular and pedestrian traffic.

(7) Lack of stop lines on all four (4) approaches, cross-walk lines on the north and south approaches of Coles Avenue and lane lines on the east and west approaches of Chapel Avenue causes driver confusion.

b. RECOMMENDATIONS

(1) Reconstruct the north and south approaches of Coles Avenue.

(2) Realign the west approach of Chapel Avenue.

(3) Reconstruct the traffic signals by changing the lenses to twelve (12) inches, and provide pedestrian indications on all four (4) corners of the intersection, in addition to pedestrian push buttons.

(4) Provide pavement markings in accordance with the Manual on Uniform Traffic Control Devices to safely direct pedestrian and vehicular traffic.

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

c. BENEFITS

(1) Capacity and level of service of the north and south approaches will be improved.

(2) Number of same direction accidents will be reduced.

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

d. ESTIMATED COSTS

(1) Engineering	$ 14,500.00
(2) Construction	59,500.00
(3) Signs and Markings	1,200.00
(4) Traffic Signals	11,500.00
(5) Right of Way	37,300.00
Total Estimated Cost	$124,000.00

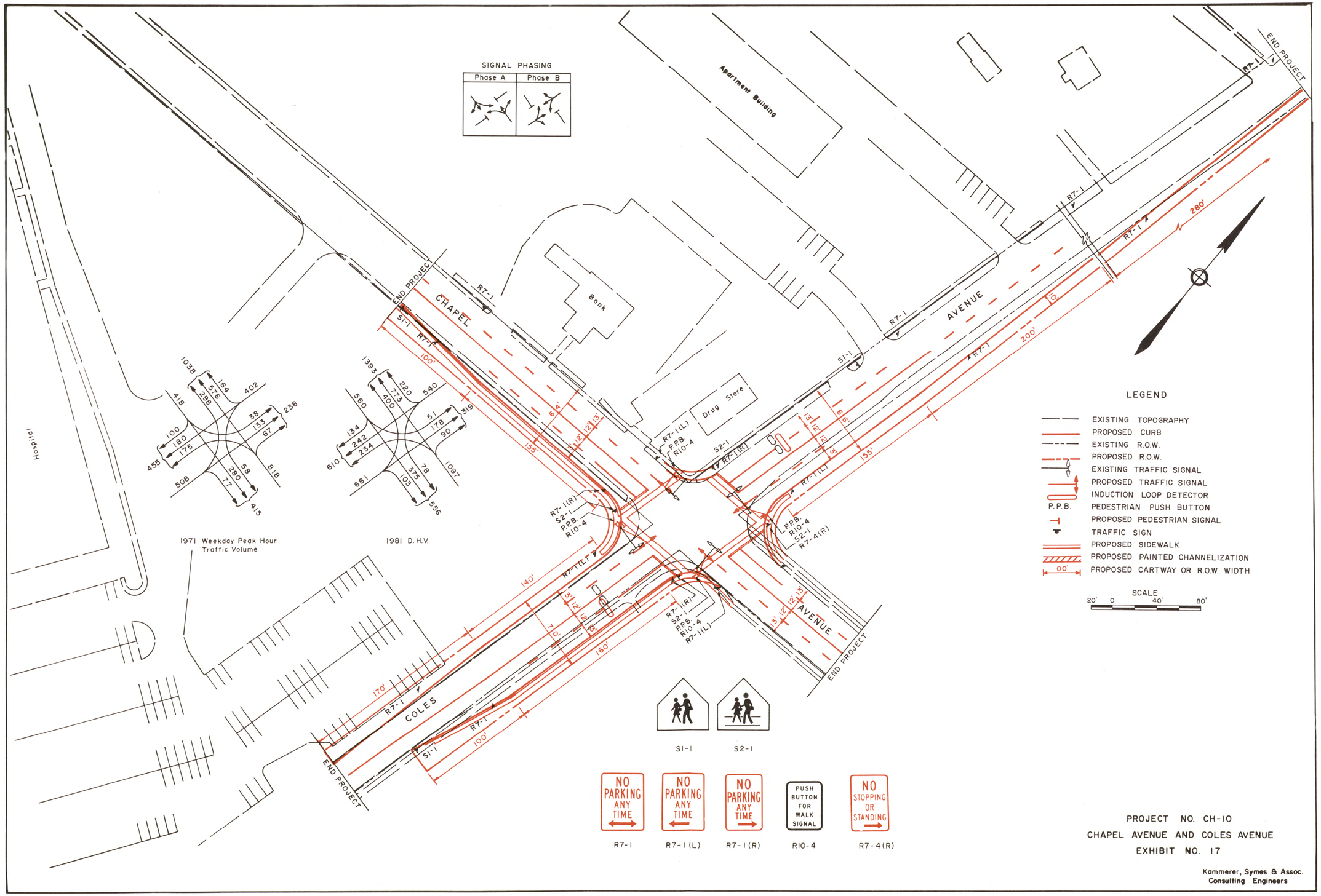
PROJECT NO. CH-10
CHAPEL AVENUE AND COLES AVENUE
EXHIBIT NO. 17

PROJECT NO. CH-10
CHAPEL AVENUE AND COLES AVENUE
EXHIBIT NO. 17

PROJECT NO. CH-10

CHAPEL AVENUE AND COLES AVENUE

EXHIBIT NO. 17



PROJECT NO. CH-10
CHAPEL AVENUE AND COLES AVENUE
EXHIBIT NO. 17

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-11 ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

Project No. CH-11 covers the reconstruction of the following intersections: Route 70 and Georgia Avenue; Route 70 and Cooper Landing Road; and Cooper Landing Road, Georgia Avenue and Pennsylvania Avenue. *(Exhibit No. 18)*

ROUTE 70, GEORGIA AVENUE AND EDISON AVENUE

a. PROBLEMS

(1) Present levels of service are "B" on the south and west approaches, "D" on the north approach and "E" on the east 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 70 East Approach	2,118	1,520
Route 70 West Approach	958	760
Georgia Avenue North Approach	225	165
Edison Avenue South Approach	103	63

(2) Present levels of service, for left turn movements, on Georgia Avenue, are "F" on the north approach and "B" on the south approach. The 1971 peak left turn volumes for these approaches compared to the 1971 average left turn volumes are summarized below:

	1971 PEAK LEFT TURN VOLUME VEH./HR.	1971 AVERAGE LEFT TURN VOLUME VEH./HR.
Georgia Avenue North Approach	173	127
Edison Avenue South Approach	38	22

(3) Corner radii are not large enough to safely accommodate right turn movements from both approaches of Route 70 onto Georgia Avenue and Edison Avenue.

(4) The offset of the west side, south approach of Edison Avenue is a hazard for through southbound traffic from Georgia Avenue.

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

PROJECT NO. CH-11 ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

b. RECOMMENDATIONS

(1) Reconstruct the north approach of Georgia Avenue to provide two (2) lanes of traffic entering Route 70.

(2) Realign and increase the southwest corner radius on the south approach of Edison Avenue.

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

(4) Reconstruct the old municipal parking lot on Georgia Avenue north of this intersection to provide for public parking.

c. BENEFITS

(1) Capacity and level of service on the north approach will be improved.

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

COOPER LANDING ROAD, GEORGIA AVENUE AND PENNSYLVANIA AVENUE

a. PROBLEMS

(1) The north approach of Cooper Landing Road is located near a curve with no advance warning sign for the southbound traffic of the approaching intersection.

(2) Corner radii are not large enough to safely accommodate right turn movements from the south approaches of Cooper Landing Road and Georgia Avenue and from the east approach of Pennsylvania Avenue.

(3) The existing cartway width, thirty (30) feet, on the north approach of Cooper Landing Road is not wide enough for three (3) lanes of traffic.

b. RECOMMENDATIONS

(1) Install a warning sign north of the intersection to inform drivers of the intersection ahead, in addition to a lane use control sign.

(2) Increase all corner radii.

(3) Widen the north approach of Cooper Landing Road to provide for two (2) lanes of southbound traffic and one (1) lane of northbound traffic.

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

c. BENEFITS

(1) Safer right turn movements will be achieved.

(2) Smoother flow of traffic will be provided.

ROUTE 70 AND COOPER LANDING ROAD

a. PROBLEMS

(1) The sight distance for traffic exiting from Cooper Landing Road onto Route 70 is restricted by a diner sign and vehicles parked in the diner parking lot located on the northeast corner of this intersection.

(2) Southbound traffic on Cooper Landing Road approaching Route 70 has no advance warning of the STOP sign located at this intersection.

(3) Physical dimensions of existing STOP sign are not large enough, thereby causing a visibility problem.

(4) Accident records indicate a total of twenty-one (21) accidents during the three (3) year period from 1968 through 1970. Of this total, eleven (11) were classified as same direction accidents, six (6) were classified as right angle accidents, two (2) were classified as collisions with fixed objects, one (1) was classified as a left turn accident and one (1) was classified as an "other" type accident.

(5) The same direction accidents represent fifty-two (52) percent of the total number of accidents during the three (3) year period.

(6) The high percentage of same direction accidents was principally caused by the poor visibility of the STOP sign and the restricted sight distance on the northeast corner.

(7) The high volumes of westbound traffic on Route 70 and the flat angle of intersection create a hazardous condition for vehicles desiring to turn left from Cooper Landing Road onto Route 70.

b. RECOMMENDATIONS

(1) Relocate the diner sign on the northeast corner.

(2) Prohibit vehicles from parking in the diner parking lot too close to the northeast corner.

(3) Install a larger STOP sign in addition to a STOP AHEAD sign on Cooper Landing Road.

(4) Prohibit left turns from Cooper Landing Road onto Route 70.

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

PROJECT NO. CH-11 ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

c. BENEFITS

(1) Sight distance will be improved.

(2) Accident potential will be reduced.

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

d. ESTIMATED COSTS

(1) Engineering	$ 11,100.00
(2) Construction	46,100.00
(3) Signs and Markings	1,200.00
(4) Traffic Signals	5,000.00
(5) Reconstruction of Parking Lot	3,000.00
(6) Right of Way	85,000.00
Total Estimated Cost	$151,400.00

PROJECT NO. CH-11

ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE,

COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

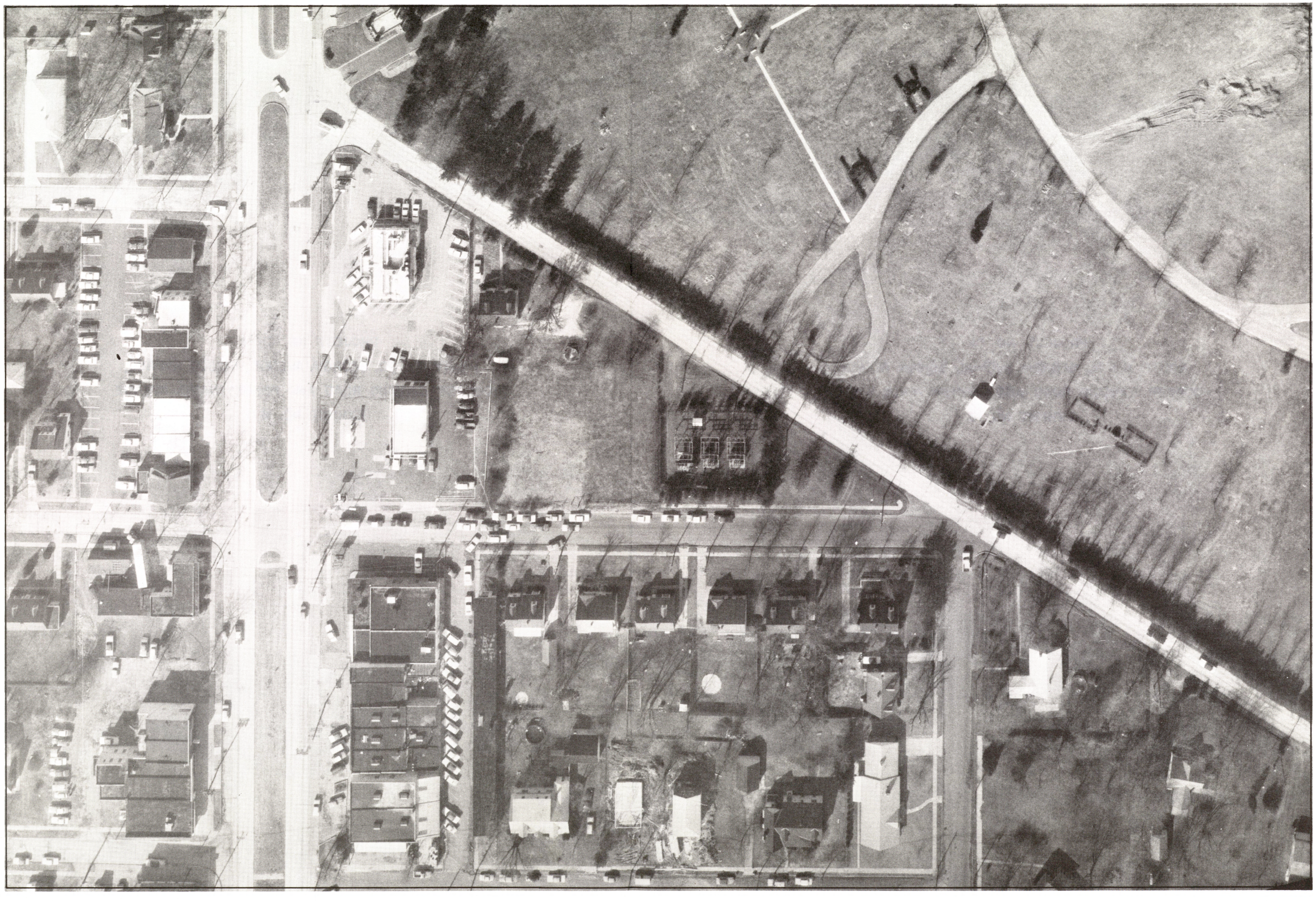
EXHIBIT NO. 18

PROJECT NO. CH-11

ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE,

COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

EXHIBIT NO. 18



PROJECT NO. CH-11

ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE,

COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

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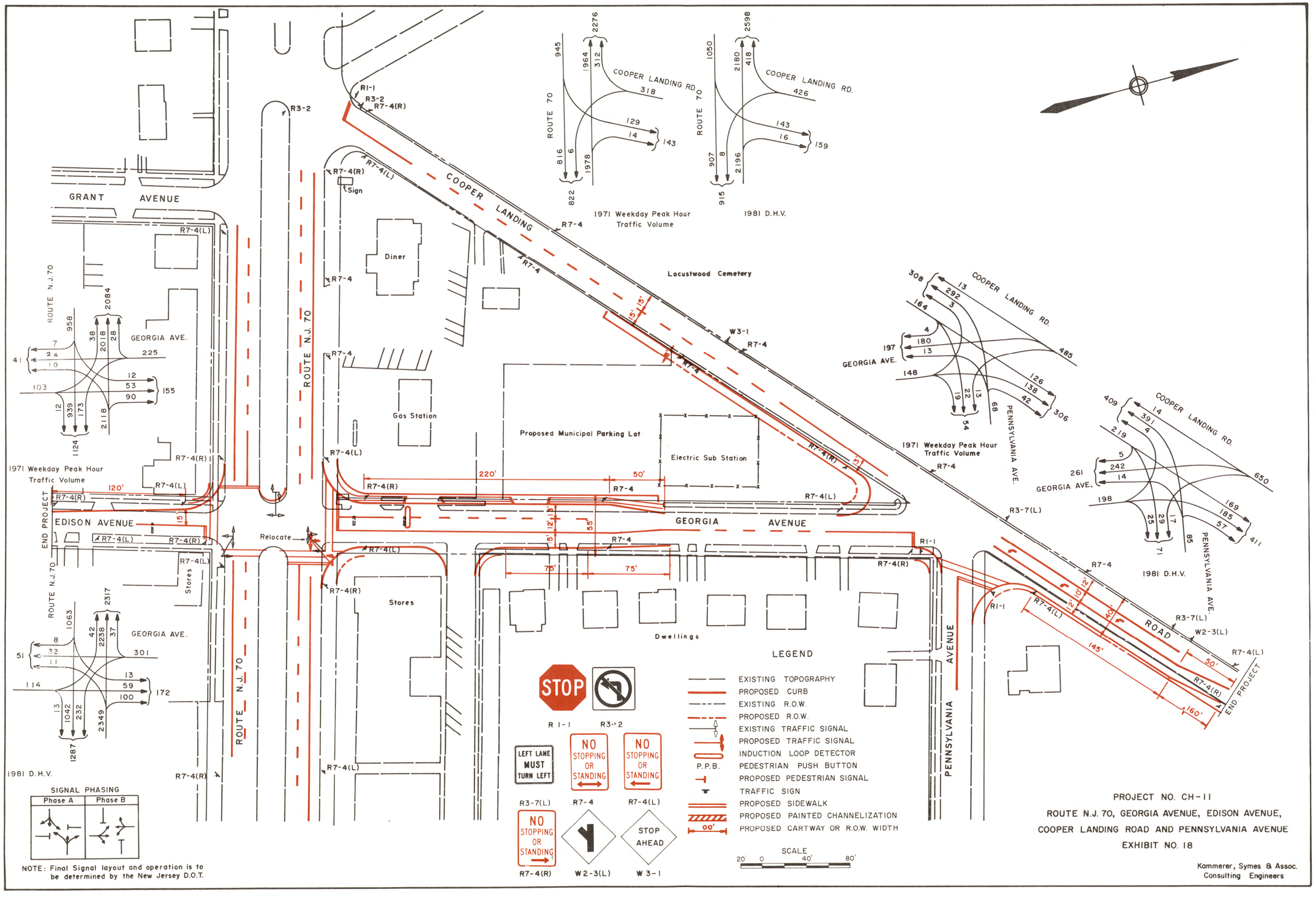


PROJECT NO. CH-11

ROUTE N.J. 70, GEORGIA AVENUE, EDISON AVENUE, COOPER LANDING ROAD AND PENNSYLVANIA AVENUE

EXHIBIT NO. 18

Kammerer, Symes & Assoc.
Consulting Engineers

PROJECT NO. CH-13 ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD

d. ESTIMATED COSTS

(1) Engineering	$ 9,300.00
(2) Construction	35,700.00
(3) Signs and Markings	1,000.00
(4) Traffic Signals	10,000.00
Total Estimated Cost	$56,000.00

PROJECT NO. CH-13 ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD

Project No. CH-13 covers the reconstruction of the intersection of Route 154 and Haddonfield-Berlin Road. *(Exhibit No. 19)*

a. PROBLEMS

(1) Present levels of service are "D" on both the Route 154 approach and the west approach of the Haddonfield-Berlin Road and "B" on the east approach of the Haddonfield-Berlin Road. 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 154 North Approach	680	463
Haddonfield-Berlin Road East Approach	1,224	923
Haddonfield-Berlin Road West Approach	778	474

(2) Accident records indicate a total of thirty-three (33) accidents during the three (3) year period from 1968 through 1970. Of this total, fifteen (15) were classified as same direction accidents, seven (7) were classified as right angle accidents, seven (7) were classified as collisions with fixed objects, three (3) were classified as left turn accidents and one (1) was classified as an "other" type accident.

(3) The fifteen (15) same direction accidents represent forty-five (45) percent of the total number of accidents occurring at this location during the period from 1968 through 1970.

b. RECOMMENDATIONS

(1) Reconstruct all the approaches to provide fifty (50) foot wide cartways.

(2) Provide an advance green indication for the west approach of the Haddonfield-Berlin Road.

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

c. BENEFITS

(1) Capacity and level of service will be improved.

(2) High accident potential will be reduced.

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

PROJECT NO. CH-12 BURNT MILL ROAD AND EVESHAM ROAD

Project No. CH-12 covers the reconstruction of the intersection of Burnt Mill Road and Evesham Road.

a. PROBLEMS

(1) The north, south and east approach roadways are too narrow for safe turning movements. The percentage of turning movements is as follows:

	% LEFT TURNS	% RIGHT TURNS
Burnt Mill Road North Approach	5	20
Burnt Mill Road South Approach	20	25
Evesham Road East Approach	9	14
Evesham Road West Approach	20	21

(2) Corner radii are not large enough to safely accommodate right turn movements.

(3) A hazardous condition exists on the south side of the east approach of Evesham Road due to the abrupt narrowing of the cartway width.

b. RECOMMENDATIONS

(1) This intersection should be reconstructed in accordance with the plan and report submitted on October 10, 1969, by Kammerer, Symes and King, of Cherry Hill, New Jersey and approved by the New Jersey Department of Transportation.

c. BENEFITS

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

d. ESTIMATED COSTS

(1) Engineering	$ 8,900.00
(2) Construction	44,000.00
(3) Signs and Markings	500.00
(4) Right of Way	42,300.00
Total Estimated Cost	$95,700.00

NOTE: This intersection is shared with Pennsauken Township.

EVESHAM
BURNT
MILL
ROAD
ROAD
N

PROJECT NO. CH-13
ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD
EXHIBIT NO. 19

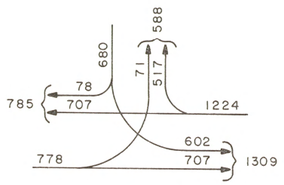
PROJECT NO. CH-13
ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD
EXHIBIT NO. 19



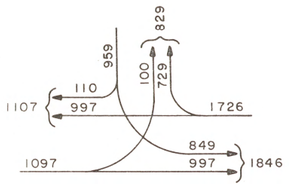
PROJECT NO. CH-13

ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD

EXHIBIT NO. 19



1971 Weekday Peak Hour
Traffic Volume



1981 D.H.V.

SIGNAL PHASING

Phase A	Phase A1	Phase B

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

Gas Station

Gas Station

R7-4 R7-4(L) R7-4(R)

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. CH-13

ROUTE N.J. 154 AND HADDONFIELD-BERLIN ROAD

EXHIBIT NO. 19

Kammerer, Symes & Assoc.
Consulting Engineers

N
HORSE ROAD
MAPLE
AVENUE
SORRELL
HADDONFIELD
WAYNE
ROAD
OVERBROOK DRIVE

PROJECT NO. CH-14 HADDONFIELD-SORRELL HORSE ROAD AND MAPLE AVENUE

Project No. CH-14 covers the reconstruction of the intersection of the Haddonfield-Sorrell Horse Road and Maple Avenue.

a. PROBLEMS

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

	1971 PEAK THROUGH AND RIGHT TURN VOLUME VEH./HR.	1971 AVERAGE THROUGH AND RIGHT TURN VOLUME VEH./HR.
Haddonfield-Sorrell Horse Road North Approach	713	378
Haddonfield-Sorrell Horse Road South Approach	635	408
Maple Avenue East Approach	686	421
Maple Avenue West Approach	667	407

*Each approach of this intersection includes a restricted left turn lane with a level of service "B", therefore left turn movements have been excluded in this analysis.

(2) The corner radii are not large enough to safely accommodate right turn movements.

(3) Wayne Road and Overbrook Drive intersect on the east side of the Haddonfield-Sorrell Horse Road approximately three hundred (300) feet south of the intersection of Maple Avenue and the Haddonfield-Sorrell Horse Road.

(4) There is a bad dip on the south side of Maple Avenue, making it hazardous for southbound traffic traveling through a green light.

b. RECOMMENDATIONS

(1) Remove the left turn pavement markings from both approaches of the Haddonfield-Sorrell Horse Road to provide two (2) lanes of traffic for the northbound and southbound approaches.

(2) Restrict left turn movements from the southbound direction of the Haddonfield-Sorrell Horse Road onto Wayne Road and Overbrook Drive by reducing the roadway opening, thereby permitting right turns only from the northbound direction of the Haddonfield-Sorrell Horse Road.

NOTE: This intersection is shared with Pennsauken Township.

(3) Increase all corner radii.

(4) Eliminate the dip on the south side of Maple Avenue.

c. BENEFITS

(1) Capacity and level of service of the Haddonfield-Sorrell Horse Road will be improved.

(2) Smoother flow of traffic will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$ 3,100.00
(2) Construction	14,900.00
(3) Signs and Markings	500.00
Total Estimated Cost	$18,500.00

N
ROUTE
N.J.
70
DELAWARE
AVENUE

PROJECT NO. CH-15 ROUTE N.J. 70 AND DELAWARE AVENUE

Project No. CH-15 covers the improvements to the intersection of Route 70 and Delaware Avenue.

a. PROBLEMS

(1) Accident records indicate a total of fifteen (15) accidents during the three (3) year period from 1968 through 1970. Of this total, seven (7) were classified as right angle accidents, seven (7) were classified as same direction accidents and one (1) was a collision with a fixed object.

(2) The number of right angle and same direction accidents each represents forty-seven (47) percent of the total number of accidents for the three (3) year period and were principally caused by traffic using the median opening on Route 70.

b. RECOMMENDATIONS

(1) Close the median opening on Route 70.

c. BENEFITS

(1) Accident potential will be reduced.

(2) Safer flow of traffic will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$ 350.00
(2) Construction	1,750.00
Total Estimated Cost	$2,100.00

PROJECT NO. CH-16 ROUTE N.J. 154 AND KRESSON ROAD

Project No. CH-16 covers the reconstruction of the intersection of Route 154 and Kresson Road. *(Exhibit No. 20).*

a. PROBLEMS

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

	1971 PEAK LEFT TURN VOLUME VEH./HR.	1971 AVERAGE LEFT TURN VOLUME VEH./HR.
Kresson Road West Approach	117	101

(2) Future traffic volumes will exceed the capacity of the east and west approaches. The capacity of each approach compared to the 1981 D.H.V. peak hour volume is summarized below:

	APPROACH CAPACITY VEH./HR.	1981 D.H.V. PEAK VOLUME VEH./HR.
Route 154 North Approach	930	812
Route 154 South Approach	1,200	758
Kresson Road East Approach	550	760
Kresson Road West Approach	420	467

(3) The capacity of the north approach for left turn movements will be exceeded by future traffic demands. The capacity for left turns on the north approach compared to the 1981 D.H.V. peak hour volume for left turns is summarized below:

	LEFT TURN CAPACITY VEH./HR.	1981 D.H.V. LEFT TURN PEAK VOLUME VEH./HR.
Route 154 North Approach	65	89

(4) Accident records indicate a total of twenty-two (22) accidents during the three (3) year period from 1968 through 1970. Of this total, seven (7) were classified as same direction accidents, six (6) were classified as left turn accidents, four (4) were classified as right angle accidents, four (4) were classified as "other" type accidents and one (1) was classified as a collision with a fixed object.

(5) Lack of pavement markings causes driver confusion.

b. RECOMMENDATIONS

(1) Widen both approaches of Kresson Road to forty-six (46) feet.

(2) Provide an advance green indication for the north approach of Route 154 and the west approach of Kresson Road.

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

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

c. BENEFITS

(1) Capacity and levels of service for both approaches of Kresson Road will be improved.

(2) Driver confusion will be reduced.

(3) Capacity for left turns on the north approach of Route 154 will be improved.

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

d. ESTIMATED COSTS

(1) Engineering	$10,200.00
(2) Construction	38,000.00
(3) Signs and Markings	1,000.00
(4) Traffic Signals	12,000.00
(5) Right of Way	8,000.00
Total Estimated Cost	$69,200.00

PROJECT NO. CH-16

ROUTE N.J. 154 AND KRESSON ROAD

EXHIBIT NO. 20

PROJECT NO. CH-16

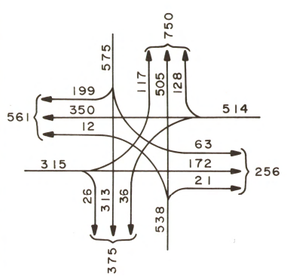
ROUTE N.J. 154 AND KRESSON ROAD

EXHIBIT NO. 20

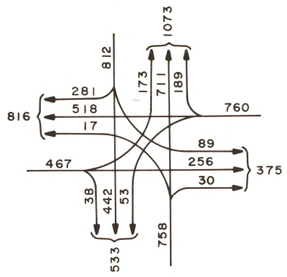
PROJECT NO. CH-16

ROUTE N.J. 154 AND KRESSON ROAD

EXHIBIT NO. 20

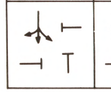
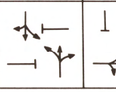
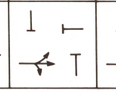
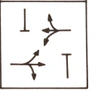


1971 Weekday Peak Hour
Traffic Volume



1981 D.H.V.

SIGNAL PHASING

Phase A	Phase A1	Phase B	Phase B1
			

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

R7-4 (L) R7-4 (R) R10-3

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. CH-16
ROUTE N.J. 154 AND KRESSON ROAD
EXHIBIT NO. 20

Kammerer, Symes & Assoc.
Consulting Engineers

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

GENERAL RECOMMENDATIONS

PROJECT NO. CH-20 NORTH PARK DRIVE AT PENN CENTRAL READING SEASHORE LINES RAILROAD CROSSING

Project No. CH-20 covers the construction of an underpass at North Park Drive and the Penn Central Reading Seashore Lines Railroad Crossing, and the reconstruction of North Park Drive east of the railroad to Kings Highway.

a. PROBLEMS

(1) Extremely heavy volumes of traffic use Route 70, which is the main east-west arterial roadway in the Township.

(2) The heavy volumes of traffic on Route 70 cause excessive delays and congestion at the Grove Street Circle and the Ellisburg Circle.

(3) North Park Drive parallels Route 70 but is not a through road because of the Penn Central Reading Seashore Lines Railroad.

b. RECOMMENDATIONS

(1) Reconstruct North Park Drive to provide an underpass at the Penn Central Reading Seashore Lines Railroad Crossing.

(2) An integral part of the proposed underpass would be the reconstruction and signalization at the intersections of Grove Street and North Park Drive and Kings Highway and North Park Drive.

c. BENEFITS

(1) North Park Drive can be used for local traffic and provides an emergency by-pass route to Route 70.

(2) Some traffic will be removed from the Grove Street Circle and the Ellisburg Circle.

(3) An additional uninterrupted east-west route from the Cherry Hill Township Line to Caldwell Avenue will be provided.

d. ESTIMATED COSTS

(1) Engineering	$124,000.00
(2) Construction	563,500.00
(3) Signs and Markings	1,500.00
(4) Traffic Signals	30,000.00
(5) Right of Way	25,000.00
Total Estimated Cost	$744,000.00


N
DRIVE
PENN CENTRAL READING
SEASHORE LINES
NORTH PARK

PROJECT NO. CH-19 CUTHBERT BOULEVARD AND WISTERIA AVENUE

Project No. CH-19 covers the improvements to the intersection of Cuthbert Boulevard and Wisteria Avenue.

a. PROBLEMS

(1) Accident records indicate a total of ten (10) accidents for the three (3) year period from 1968 through 1970. Of this total, nine (9) were classified as same direction accidents and one (1) was classified as a left turn accident.

(2) The high number of same direction accidents, which represents ninety (90) percent of the total number of accidents for the three (3) year period involved vehicles traveling on the Wisteria Avenue approach.

(3) Many drivers disregard the existing STOP sign located on Wisteria Avenue.

(4) The flat angle of the intersection and the high volumes of traffic on Cuthbert Boulevard represent a hazardous condition for the left turn movement from Wisteria Avenue onto Cuthbert Boulevard.

b. RECOMMENDATIONS

(1) Replace the existing STOP sign on Wisteria Avenue with a YIELD sign.

(2) Provide an acceleration lane on Cuthbert Boulevard for the right turn movement from Wisteria Avenue onto Cuthbert Boulevard.

(3) Prohibit left turns from Wisteria Avenue onto Cuthbert Boulevard.

c. BENEFITS

(1) Accident potential will be reduced.

(2) Safer flow of traffic will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$1,600.00
(2) Construction	6,700.00
(3) Signs and Markings	800.00
Total Estimated Cost	$9,100.00

WISTERIA
AVENUE
CUTHBERT
BOULEVARD
N

PROJECT NO. CH-18 KRESSON ROAD AND PEARL CROFT ROAD

Project No. CH-18 covers the improvements to the intersection of Kresson Road and Pearl Croft Road.

a. PROBLEMS

(1) Trees and shrubs on the northeast corner restrict the sight distance thereby creating a hazardous condition for traffic exiting Pearl Croft Road into Kresson Road.

(2) Children attending the Johnson Elementary School, located east of the intersection on Kresson Road cross at this intersection.

(3) Crosswalk lines and stop lines are faded.

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

b. RECOMMENDATIONS

(1) Remove trees and shrubs from the northeast corner to provide a minimum sight distance of two hundred (200) feet.

(2) Repaint the crosswalk lines and stop lines.

(3) Provide school crossing signs for all approaches.

(4) Prohibit parking for one hundred fifty (150) feet on the Pearl Croft Road approach and for two hundred (200) feet on the Kresson Road approaches.

c. BENEFITS

(1) Sight distance will be improved.

(2) Safer crossing of intersection will be achieved.

d. ESTIMATED COSTS

(1) Engineering	$ 200.00
(2) Construction	500.00
(3) Signs and Markings	350.00
Total Estimated Cost	$1,050.00

N
PEARL
CROFT
ROAD
KRESSON
ROAD

PROJECT NO. CH-17 CUTHBERT BOULEVARD AND HAMPTON ROAD

Project No. CH-17 covers improvements to the intersection of Cuthbert Boulevard and Hampton Road.

a. PROBLEMS

(1) Hampton Road intersects Cuthbert Boulevard at an extremely flat angle.

(2) Traffic exiting from both approaches of Hampton Road desiring to cross or turn left onto Cuthbert Boulevard encounters heavy volumes of traffic and high speeds on Cuthbert Boulevard.

(3) A hazardous condition exists at the intersection of Cuthbert Boulevard and Hampton Road. This condition is caused by the poor sight distance at the intersection, due to the grade of the Cuthbert Boulevard overpass at Route 38.

(4) The number of accidents has increased during the three (3) year period from 1968 through 1970. In 1968, six (6) accidents were reported, in 1969 eight (8) accidents were reported, and in 1970, ten (10) accidents were reported for a three (3) year total of twenty-four (24).

(5) Of this total, twenty-one (21) were classified as right angle accidents and three (3) were classified as same direction accidents.

(6) The narrow width of the median on Cuthbert Boulevard causes an unsafe condition for vehicles crossing or desiring to turn left from Hampton Road.

b. RECOMMENDATIONS

(1) Close the median strip opening on Cuthbert Boulevard.

(2) Make the east approach of Hampton Road one-way eastbound from Cuthbert Boulevard to the southeast ramp of Route 38.

(3) Make the west approach of Hampton Road one-way westbound from Cuthbert Boulevard to the right turn slot southwest of the intersection.

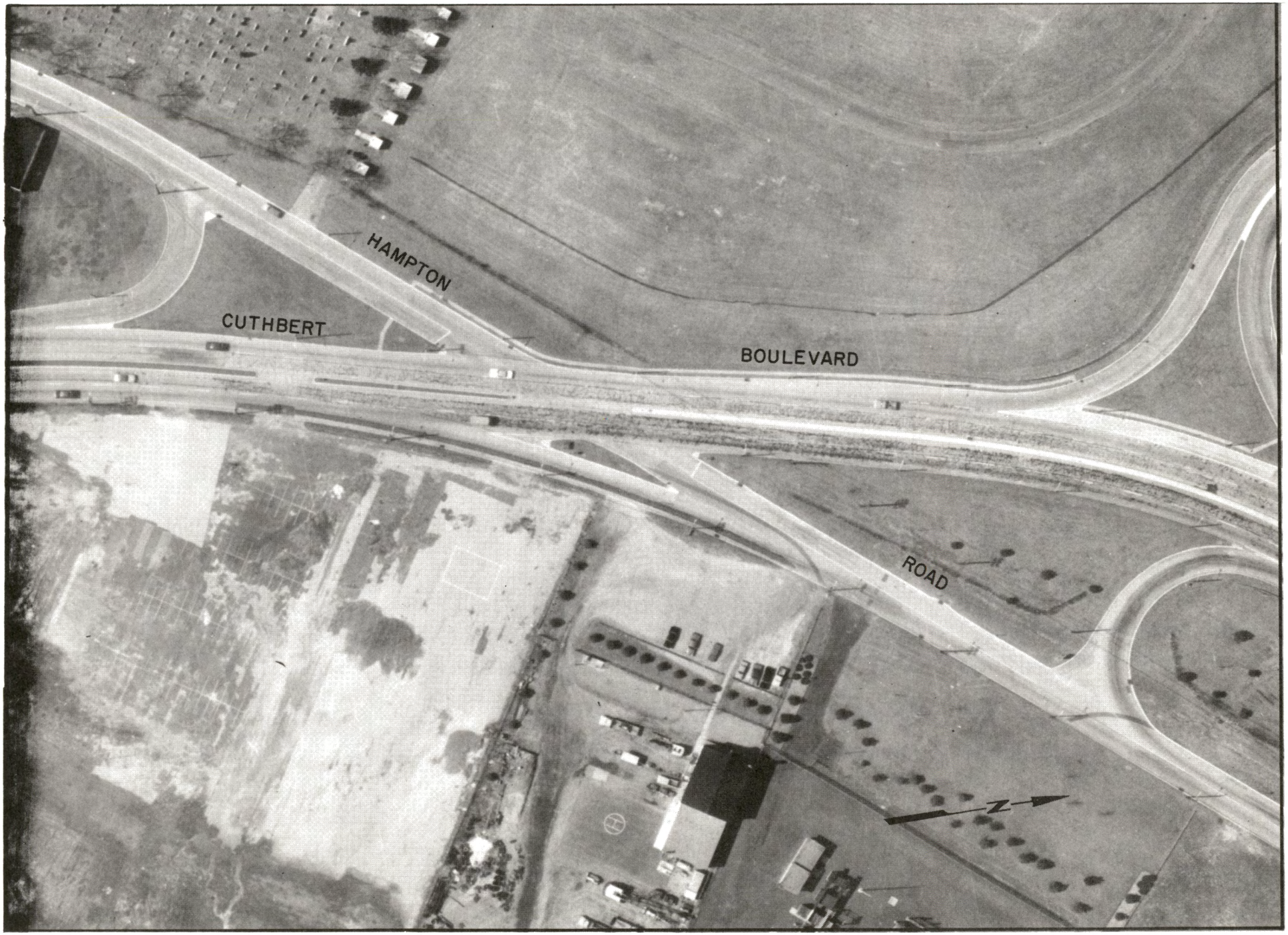
c. BENEFITS

(1) High accident potential will be reduced.

(2) Safer flow of traffic will be achieved.

d. ESTIMATED COSTS

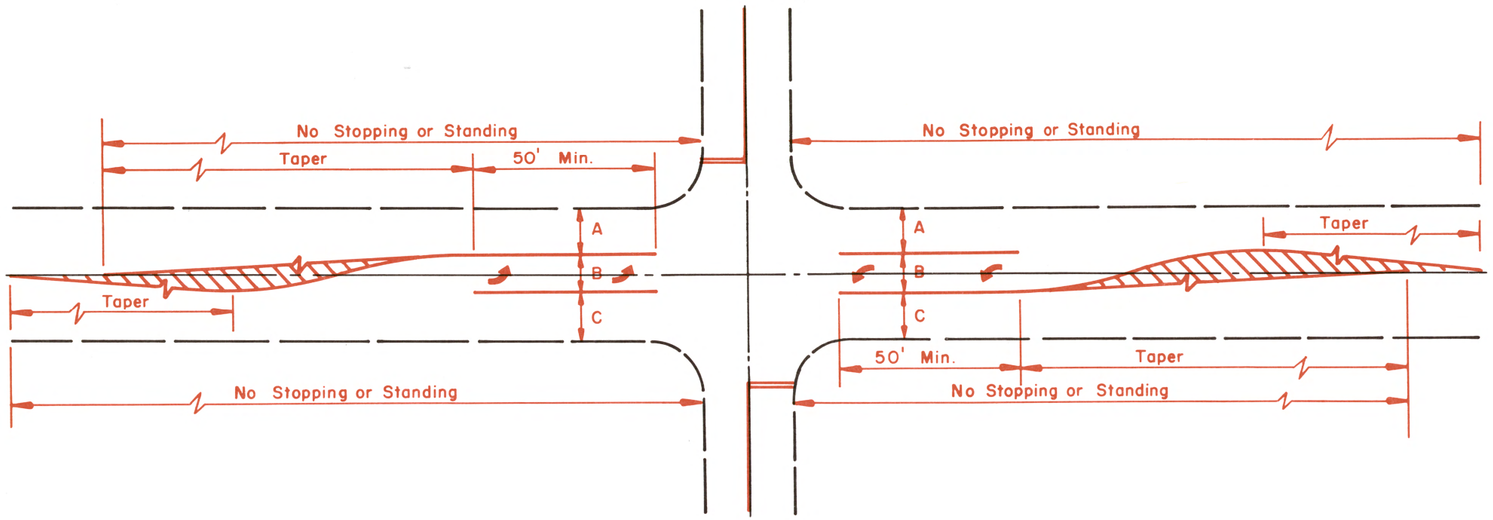
(1) Engineering	$ 400.00
(2) Construction	1,600.00
(3) Signs and Markings	300.00
Total Estimated Cost	$2,300.00


HAMPTON
CUTHBERT
BOULEVARD
ROAD
N

PROJECT NO. G-1

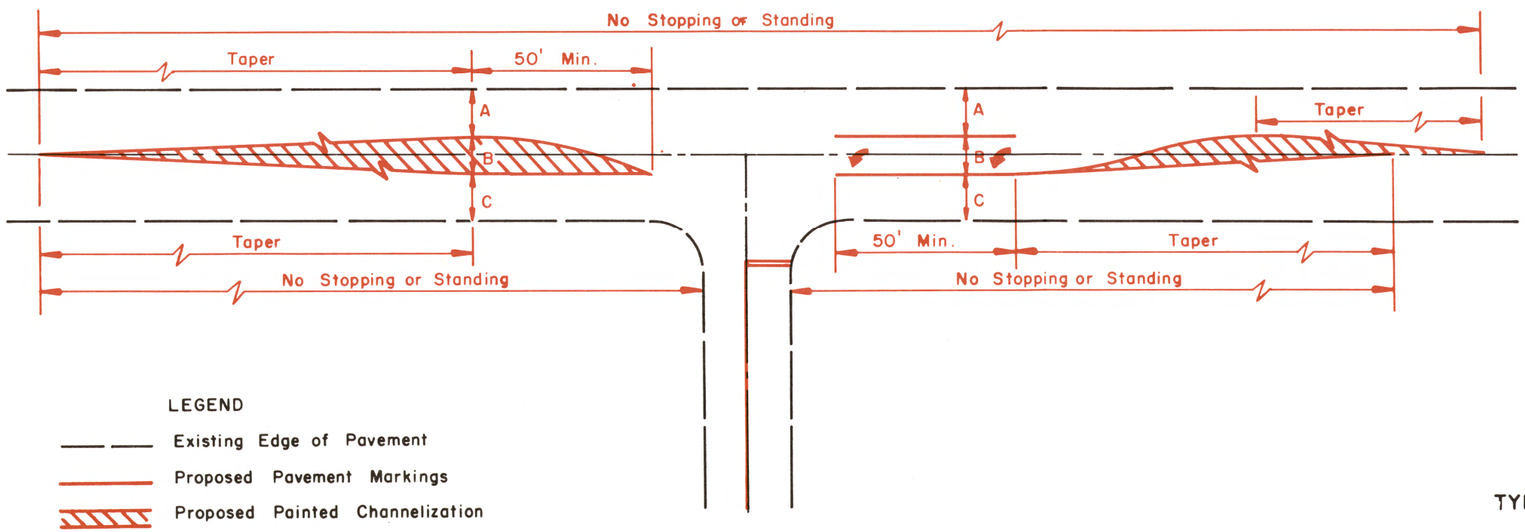
TYPICAL LEFT TURN LANE PAVEMENT MARKINGS

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'



LEGEND

Existing Edge of Pavement

Proposed Pavement Markings

Proposed Painted Channelization

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 Township of Cherry Hill significantly. Two (2) new signals have been added to the system, one at the intersection of Cuthbert Boulevard and North Park Drive and one at the intersection of Church Road, Lenape Road and Cherry Hill Mall Drive, in addition to the renovation of several existing signals.

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 cost for the recommended changes would be two thousand ($2,000.00) dollars which would increase the current maintenance budget to twelve thousand ($12,000.00) dollars annually.

TRAFFIC SIGNALS

Traffic signals on municipal and county roads are currently maintained by the Township. 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 two (2) new signals have been recommended in this report estimates for maintenance of signals within the Township should be increased slightly.

SIGNS AND PAVEMENT MARKINGS

Provisions should be made in the Township Budget 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