VOLUME III

Hamilton Township

Mercer County

New Jersey

Areawide TOPICS Study

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PART A

Synopsis of the TOPICS Study

The Areawide TOPICS Study for the County of Mercer is aimed at providing relatively modest improvements in an effort to enhance traffic flow and minimize accidents on the existing roadway network. The Federal Aid Urban Area includes a total study network of 233 miles of streets and highways* which was subdivided for the purposes of the study as follows:

- Report Area I: Princeton Borough and a portion of Princeton Township surrounding the Borough.
- Report Area II: Ewing Township, a major portion of Lawrence Township, and the section of Hopewell Township immediately adjacent to Ewing Township.
- Report Area III: Hamilton Township.

The findings and recommendations of the study focus on intersection improvements - in particular, signalized intersections together with related signal systems. Other street and highway improvements are also recommended. Throughout the study, the emphasis has been on the specific problems and requirements of the local street network. Deficiencies on State highways and possible means of relief are also discussed, but, generally, proposed improvements on the State highway network have not been scheduled for implementation.

*The 233 miles of study roadways do not include streets and highways located in the City of Trenton, which were the subject of an independent study completed by others.

The total estimated cost for all proposed improvements is $2,998,300.00. It is anticipated that portions of the projects will be implemented annually and completed within a five-year program. Projects have been allocated within five priority groupings on the basis of functional need, proximity to related improvements, and effect on overall costs. The first priority is comprised of those improvements being completed under an Early Implementation program and are already under design as this report is being prepared.

Signalized Intersection and Signal System Improvements

Proposed improvements relative to the signalization of intersections comprise a major part of the study effort and estimated implementation costs. A total of 53 locations have been recommended for improvement, of which 33 relate to existing signalized intersections and 20 to proposed traffic signal control at non-signalized intersections. These proposals do not include signalization improvements contemplated in conjunction with the proposed arterial highway projects discussed below. The total cost of the scheduled signalized intersection improvements is estimated to be $1,077,100.00.*

*Thirty-seven of the 53 signalized intersection projects have been scheduled for improvement under the TOPICS program. Another 15 are located on State highways and are not considered eligible for improvement at this time under the Department's guidelines, and one intersection is to be improved by the County.

It is proposed to incorporate most of the signalized intersections in the study area (both existing and proposed) within one of several signal systems. The total cost of providing these systems is estimated at $51,000.00. Signalized intersection improvements, together with signal system improvements, result in a total estimated cost of $1,128,100.00.

Arterial Highway Improvements

Proposed improvements to portions of two major arterial highways comprise another major part of the study effort and estimated implementation costs. Proposed North Olden Avenue Extension and Princeton Avenue projects include improvements to two of the most heavily traveled and accident prone roadways within the study area. Proposed improvements include widening the highways, defining abutting driveways, and improving five existing signalized intersections and two proposed signalized intersections. The total cost of the projects is estimated at $723,900.00.

CBD Parking

Parking in the central business district of Princeton Borough was the subject of another major study effort. The removal of curb parking at specified locations has been recommended in conjunction with the construction of new off-street parking facilities at an estimated cost of $217,000.00.

Other Improvements

A total of 21 improvement projects have been recommended at non-signalized intersections and include proposed flashing signal control, channelization, and sight distance improvements for a total estimated cost of $69,100.00. Eight other locations between intersections also have been proposed for improvement and include reconstruction of a railroad grade crossing and the replacement of two bridges at a total estimated cost of $827,700.00.

Three additional scheduled projects relate to the regulation of traffic along sections of roadway and involve operation improvements through parking control, posting of speed limits, and upgrading of bus stops. The total cost of these projects is estimated at $32,500.00.

Proposed Federal Aid Roadways

The total system of existing Federal Aid roadways is estimated to be 118.1 miles within the study area. A new category of Federal Aid roadways is to be established and is to include selected major collector streets and connectors, arterial highways, and other facilities having particularly heavy concentrations of traffic. These roadways are to be designated as Primary Type II. As a result of the Areawide TOPICS Study, a total of 38.2 miles of Federal Aid, Primary Type II roadways have been recommended.

The Program

TOPICS is the acronym for Traffic Operations Program to Increase Capacity and Safety, a program provided by Section 10 of the Federal Highway Act of 1968. Its purpose is to encourage each state to maintain a continuing program designed to facilitate the flow of traffic and reduce the potential for accidents within designated urban areas. The program does not contemplate major construction or reconstruction, but is intended to maximize the efficiency of existing street systems.

The roadways to be evaluated within the context of the TOPICS program involve those presently aided by Federal funds, including Interstate, Primary Type I, Secondary, and Urban roadways.

In addition, a new category of Federal Aid roadways is to be established. These are to be designated as Primary Type II and include selected major collector streets and connectors, arterial highways, and other facilities having particularly heavy concentrations of traffic. The Primary Type II roadways, together with other Federal Aid roadways, are to form a logical, connected network of metropolitan areawide routes carrying the major portion of traffic in the area.

Figure A1 shows the roadways that were designated for study. Included are all existing Federal Aid roadways as well as all possible candidate roadways that might qualify for Primary Type II designation. The proposed network of Federal Aid roadways, including the recommended Type II roadways, are presented in a subsequent section of the report.

The Report Areas

The designated urban areas of Mercer County which form the boundaries of the study are shown in outline form in Figure A1. Report Area I includes Princeton Borough and a portion of Princeton Township surrounding the Borough. Report Area II includes Ewing Township, a major portion of Lawrence Township, and the section of Hopewell Township lying south of Washington Crossing Pennington Road. Report Area III is comprised of Hamilton Township.

The 1970 populations residing within the respective report areas are estimated at 21,500 in Report Area I, 52,000 in Report Area II, and 79,600 in Report Area III. The total estimated population of 153,100 within the study boundaries compares to a population of 104,600 for the City of Trenton and 304,000 for all of Mercer County.

The study network includes 233 miles of streets and highways within the study limits, of which 25 miles are located in Report Area I, 103 in Report Area II, and 105 in Report Area III. A total of 74 signalized intersections are located within the three report areas, most of which are located on existing Federal Aid roadways.

The Report

Three distinct reports have been prepared, one for each of the report areas. Part A of each of the reports is identical and treats the general aspects of the Areawide TOPICS Study including a summary of the findings, a description of the procedures that were used, and a summary of costs and priorities. Part B of each report is unique and gives detailed recommendations for each of the report areas respectively.

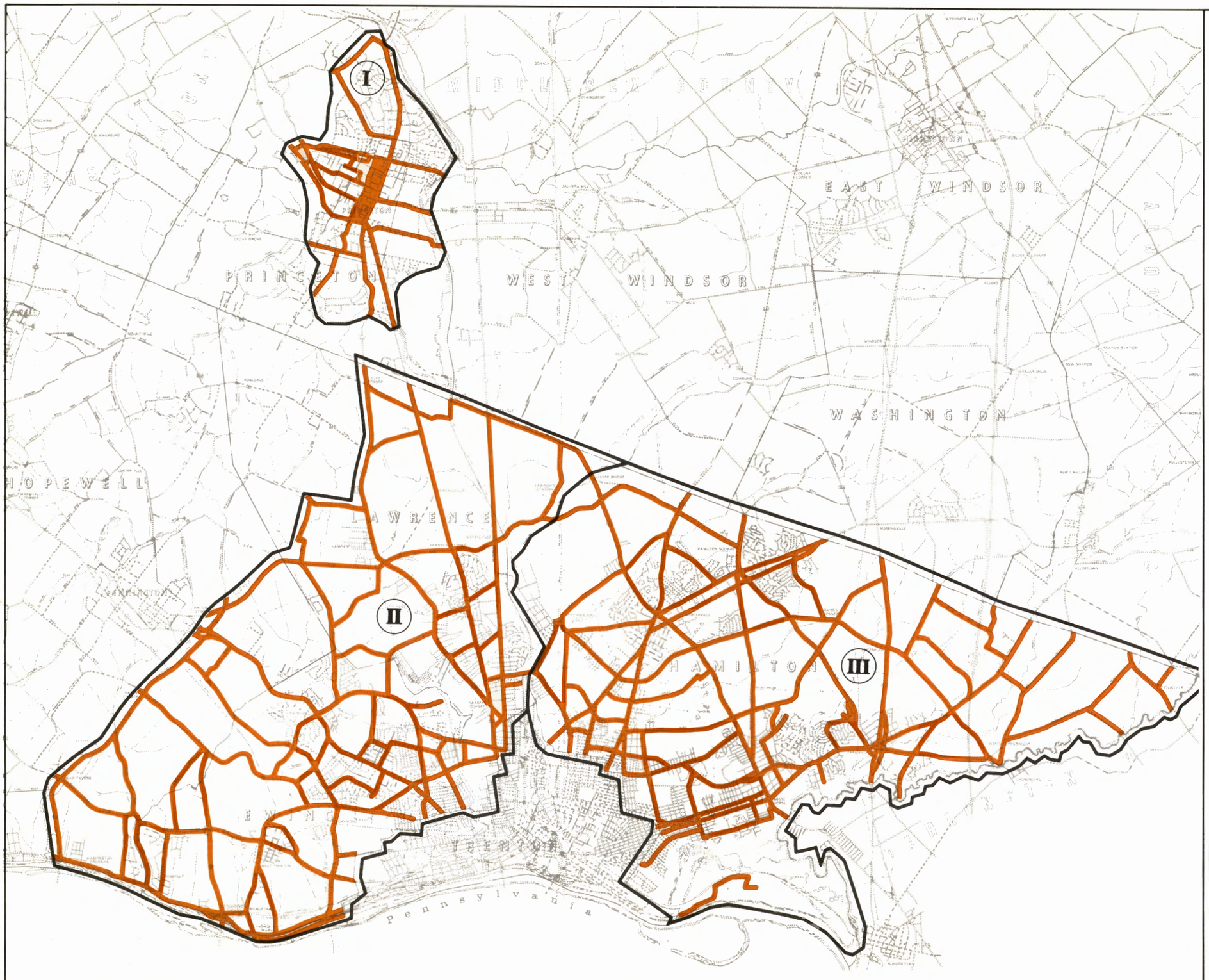
The recommendations presented herein are accompanied by existing conditions, deficiencies, proposed improvements, benefits, and estimates of costs. Functional design drawings have been prepared to illustrate the more complex improvements. Discussions relative to proposed improvements on State highways that have not been scheduled for implementation generally are not accompanied by cost estimates or illustration.

In accordance with the request of the Federal Highway Administration, the governing bodies of the respective areas involved in the study were advised of all improvement locations to determine possible conflict between the proposed improvement projects and other planned construction programs. Accordingly, it is not anticipated that the improvements recommended herein will be encroached upon by Urban Renewal, Model Cities, or similar programs.

Surveys and Data Collection

The collection of field data and the inventory of traffic control devices, regulations, and practices affecting roadway operation constituted approximately one-third of the study effort. Previously compiled data was made available by State, County, and municipal officials and included reports, vehicular volume counts, intersection plans, traffic ordinances, and related information. These data were updated and supplemented by comprehensive field checks. Additional traffic counts were made, speed-delay data recorded, and geometric roadway features measured where physical roadway improvements have been proposed. Accident records were transcribed for the three-year period of 1968 through 1970, and all parking facilities in the Princeton central business district were inventoried. Other work items completed in preparation for the engineering analysis included an inventory of public transportation routes and operations, a review of existing traffic ordinances, and the completion of speed surveys along selected roadways. Summaries of the data were completed and have been bound separately from the study report.

Figure A1



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SCALE IN FEET

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I STUDY AREA

STUDY AREA BOUNDARY

STUDY ROADWAYS

AREAWIDE TOPICS STUDY

Mercer County, N.J.

STUDY NETWORK

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

Accidents: Data relative to 5519 accidents at 312 locations were recorded for the three-year study period of 1968 through 1970. In each instance, the date of the accident, day of week, time of day, weather and roadway conditions, type of vehicle(s), severity, and manner of collision were recorded. In addition, a diagram of each accident was noted when the information was feasible to retrieve from the police files.

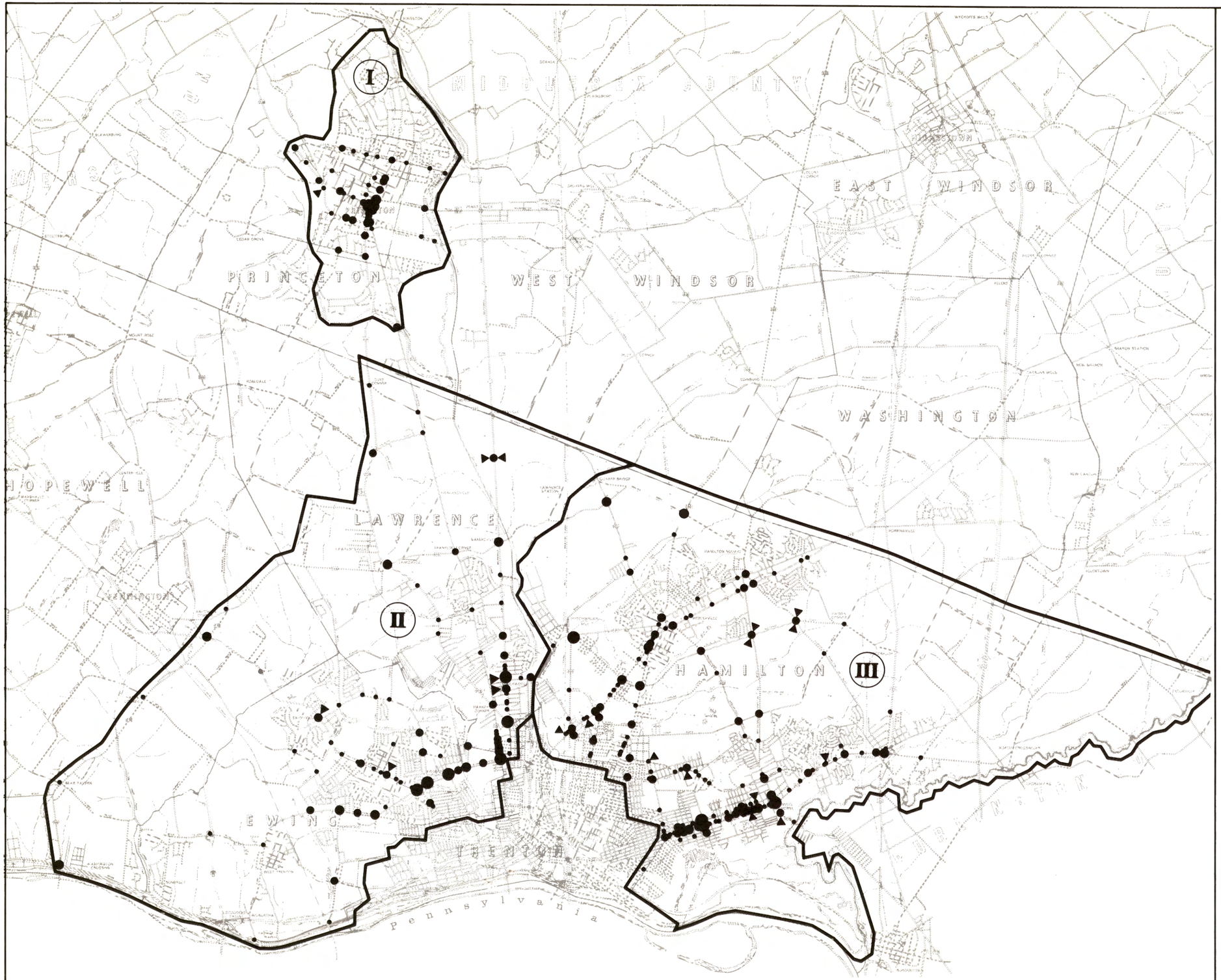
Accident data were recorded when a history of six or more accidents was noted at an intersection during the three-year study period. Figure A2 graphically illustrates the frequency and location of all intersection accidents and is summarized as follows:

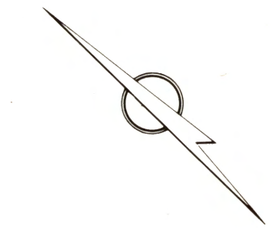
Accident Frequency 1968-1970	Number of Intersections Area I	Area II	Area III	Total
6-14	24	50	99	173
15-29	18	21	44	83
30-49	1	10	12	23
50 or more	1	6	4	11

With respect to between intersection accidents, data was recorded when a history of three or more accidents was noted at a particular location during the three-year study period. The total number of locations recorded, however, were few due to the much lower incidence of between intersection accidents as compared to the incidence of accidents at intersections, and because of the difficulty encountered in pinpointing specific between intersection accident locations.

Traffic Volumes: The characteristic of traffic flow most commonly referred to by traffic analysts is vehicle volume, the number of vehicles passing a particular point on a roadway during a specified period, generally expressed in terms of vehicles per hour. Accordingly, vehicle volume intersection counts completed during peak periods of traffic flow were a key element in the study analysis. Counts were conducted at 83 intersections, generally for periods of four or eight hours. Another 25 counts furnished by State and County officials were also utilized.

Figure A 2





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- 6 - 14 ACCIDENTS
- 15 - 29 ACCIDENTS
- 30 - 49 ACCIDENTS
- 50 OR MORE ACCIDENTS
- SINGLE FATAL ACCIDENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

ACCIDENT HISTORY AT INTERSECTIONS 1968-1970

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

A simplified growth factor method was employed in developing future traffic volume estimates. Utilizing historical traffic volume data furnished by the State, it was determined that a uniform growth rate of 3.5% per year for all three report areas was appropriate. Figure A3 graphically illustrates estimated 1975 daily traffic volumes and is based on applying the foregoing annual growth rate for a period of five years to the 1970 volumes. Similarly, 1980 traffic volumes can be estimated by applying a factor of 1.175 to the 1975 volumes.

In developing the traffic volumes shown in Figure A3, no attempt was made to modify the projected traffic flows as a result of new highway construction. At locations where improvements are proposed, however, possible reduction in future traffic levels as well as increases greater than normal were considered where new roadway facilities would be available in the near future and would appreciably affect traffic volumes on existing facilities.

Speed-Delay Studies: Speed-delay studies were conducted on all routes in order to obtain an overview of traffic operations throughout the study area. Survey runs were made in both directions on all arterial roads during the morning and evening peak periods of traffic flow as well as during the off-peak period. Runs on the minor roads were completed during the evening peak period only, unless operational problems were observed, in which case runs were then made during the morning peak and off-peak periods. In each instance, the cause of any delay was noted and the average speeds between principal intersections, or delay points, were computed. The speed-delay data was found to be of principal value in confirming points of traffic congestion initially identified through other sources, since, typically, the problem locations were major intersections already scheduled for detailed study. Identification of less obvious problem locations was difficult because of the short duration of the traffic peaks (less than one-half hour) when restricted traffic flow resulted in congested operation. The speed-delay data, however, did lead field investigators to locations where observations confirmed problem situations.

Figure A3

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ESTIMATED TRAFFIC VOLUMES
(VEHICLES PER DAY)

MULTIPLY 1975 VOLUMES BY FACTOR OF 1.175 TO OBTAIN ESTIMATED 1990 VOLUMES

AREAWIDE TOPICS STUDY
Mercer County, N.J.

1975 TRAFFIC VOLUMES

NEW JERSEY DEPARTMENT OF TRANSPORTATION
September 1972 Travers Associates Consultants

Study Procedure: During the course of the study, investigations were made of a total of 255 locations. These included intersections with an accident history averaging five or more per year, between intersection locations averaging one or more accidents per year, and all locations where a fatal accident occurred during the three-year study period. The studies also included all signalized intersections, locations where State, County, or municipal officials advised investigation was warranted, and at other locations where operational or other deficiencies were determined to exist. Field investigation generally involved noting the existing traffic controls, the travel speeds of approaching vehicles, the characteristics of pedestrian and vehicular activity, and physical deficiencies such as sight distance restrictions and roadway geometrics. Beyond the investigation of these problem spots, other areawide studies - such as the CBD parking and bus stop studies - were also made, as well as the operational studies involving speed-delay and speed limits.

Capacity studies were made for major segments of the roadway network and for principal intersections. These studies were based on study procedures specified in the 1965 edition of the Highway Capacity Manual. Capacity calculations for Level of Service C* formed the basis for determining the relationship of traffic demand to the traffic capacity limitations imposed by study roadways and intersection locations. Analyses included a determination of capacity under prevailing conditions and for proposed improved conditions. Where the analysis indicated that traffic volumes could not be accommodated at Level of Service C, alternate computations were made for Level of Service D.*

High frequency accident locations were analyzed to determine accident causes and possible preventive measures. The need for signal control at non-signalized intersections was determined on the basis of joint considerations of accident experience and traffic volumes, all in accordance with the "Manual on Uniform Traffic Control Devices for Streets and Highways." In other instances where it was determined that traffic volumes were not at a level that warranted traffic signal control, but that the accident history was significant, other traffic control measures and/or physical improvements were considered. At existing signalized intersections, physical features of the roadway, signal display, as well as signal operation were evaluated for conformity with accepted design criteria.

The study also included an examination of roadway improvements now in the planning, design, or construction stages. These projects will affect the improvements recommended in the TOPICS study in varying degrees depending upon their nature, timing, and location. The projects of particular significance are discussed in various sections of the report in the context of those specific locations considered for improvement which will be directly affected.

*Traffic volumes at Level of Service C are such that traffic flow is stable with some restrictions imposed on drivers relative to choice of speeds and maneuverability, and accompanied by occasional back-ups at intersections.

*Level of Service D encompasses traffic flows undergoing increasing restrictions approaching instability, and accompanied by substantial intersection delays for short periods during peak operations.

In accordance with a New Jersey Department of Transportation directive, no improvements on State highways have been scheduled for TOPICS implementation except where a proposed improvement would principally benefit local traffic. Thus, deficiencies on State roadways and possible means of relief are discussed in the report, but no cost estimates have been made, nor have the improvements been scheduled for implementation. It is the intent of the Department to implement improvements in other programs as funds become available.

Other Considerations

The completion of the improvements proposed herein does not necessarily assure that the benefits to be achieved initially will continue indefinitely. Often the quality of traffic operations depends upon the quality of maintenance, especially of the traffic control devices. Timing adjustments of the signals, replacement of missing signs and burned out signal lamps, and repainting of pavement markings will consistently provide motorists with the intended control. Undoubtedly, the most effective means of accomplishing such a goal is through an all-inclusive preventive maintenance program.

The traffic related functions of the County of Mercer are organized within the engineering department and are staffed by skilled technicians and a traffic engineer. Their expertise has enabled them to undertake traffic studies and complete the design and construction of traffic signal installations. Accordingly, it is anticipated that any new signals, or other traffic control devices that may be installed as a result of the Areawide TOPICS Study, will be properly maintained.

It has been also noted that the County has made significant progress relative to the replacement of traffic signs and pavement markings in conformance with the latest standards of the "Manual on Uniform Traffic Control Devices for Streets and Highways." In general, the municipalities are not as far advanced as the County. Accordingly, it is recommended that, where the replacement of nonconforming signs and markings has not been scheduled, programs be initiated to complete their installation in relation to their normal service life.

The principal public transit services available in Mercer County are provided by several bus lines as follows:

- Blue Bus Line operates four round trips daily between Trenton and Lambertville in Hunterdon County, New Jersey.
- Mercer Metro is the principal bus line in Mercer County and is discussed in greater detail below.
- Transport of New Jersey operates 23 round trips per day between Trenton and Philadelphia.
- Starr Transport Company operates one or two round trips per day between Trenton and Hightstown.
- Suburban Transit Company operates 18 round trips per day between Trenton and Princeton.

Mercer Metro provides the only areawide bus service in the County. Since 1968, the line has been operating as a publicly controlled facility under the jurisdiction of the Mercer County Improvement Authority, reflecting the results of declining patronage and dependence on financial subsidy originating from State and County sources. The bus line management has conducted advertising campaigns and also continually appraises existing bus service, modifying or extending routes or hours of operation in an attempt to attract riders.

Existing Service

Mercer Metro operates ten bus routes within the urbanized area of Mercer County and also provides service on an eleventh route between the City of Trenton and Fort Dix-McGuire Air Force Base. As shown in Figure A4, existing bus routes are widely distributed over major travel corridors serving principal concentrations of population. Most routes operate on minimum headways of half an hour, generally commencing operation between 5:00 and 6:00 A.M. The various bus routes begin their last trip as follows:

G, H, L, S, X	6:00- 7:00 P.M.
K, Q, R, T	8:40-10:30 P.M.
P	11:50 P.M.

Bus Stops

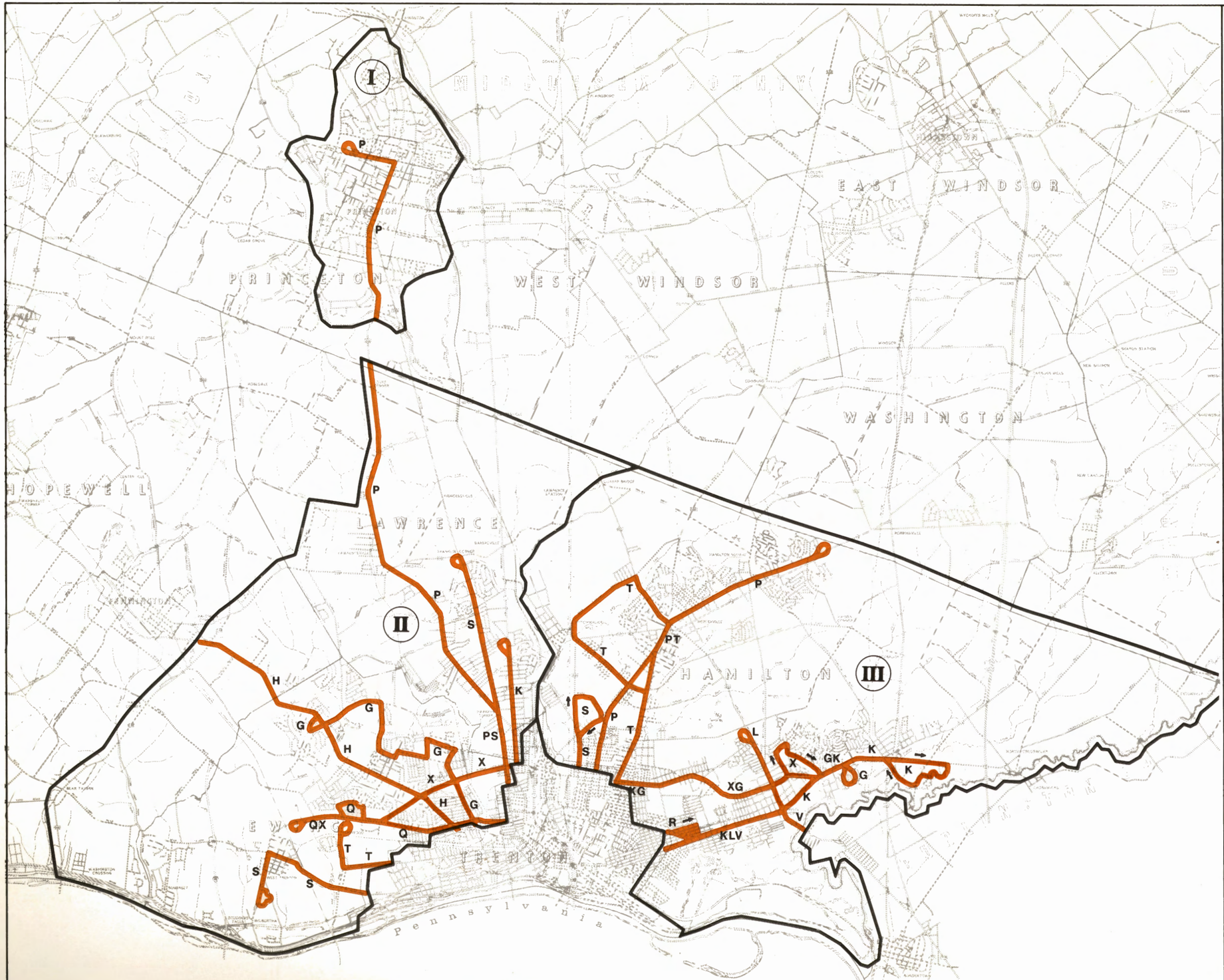
Field investigations indicated that most locations where buses stop are not identified, or are marked by signs that are worn with age. In many instances, maneuverability of buses is hampered due to insufficient length provided for the bus stop. The frictional effects of both bus operation and traffic in general were particularly evident on the more urbanized streets where curbing restricts the lateral movement of vehicles.

Conclusions

It is evident that Mercer Metro is providing rather broad coverage - eleven routes serving seven municipalities - in the face of deficit operations. The question of whether the bus line can continue to provide good service and possibly expand operations will depend upon the extent that subsidization plays in the future of Mercer Metro. There is evidence that as a nation we are recognizing the value of public transit facilities as important elements of our transportation systems. As a result, there has been increased interest in assisting the industry with subsidies and other programs to make public transit more attractive. Accordingly, there is reason to be optimistic toward the future of public transit in general and bus operation in Mercer County in particular.

The improvements recommended in Part B of the report relate principally to the bus stops and their relation to traffic operations. The proposed lengthening of existing bus stops will permit buses to pull out of the stream of traffic benefitting overall traffic flow, while reducing the potential for accidents and making it easier for patrons to board. The recommendation of far-side corner bus stops where practical will minimize conflicts between buses and right turning vehicles, and the proposed signing will serve to readily identify the bus stops to patrons and parking motorists.

Figure A4



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Notes

ALL ROUTES SHOWN ARE THOSE OF THE MERCER METRO BUS LINE.

AREAWIDE TOPICS STUDY

Mercer County, N.J.

EXISTING BUS ROUTES

NEW JERSEY DEPARTMENT OF TRANSPORTATION

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Estimated Costs

All costs summarized in this section include construction and engineering, and it is assumed that improvements will be accomplished over a period of five years. Accordingly, costs were summarized in five increments and identified as priorities 1 through 5. The total cost of all TOPICS improvements throughout the study area is estimated as follows:

Report Area I	$ 831,000.00
Report Area II	1,004,200.00
Report Area III	1,163,100.00
Total	$2,998,300.00

In addition, Figure A5 illustrates the location of the proposed improvements in relation to three cost categories: under $5,000.00, $5,000.00 to $30,000.00, and over $30,000.00. Two arterial projects are also shown and have been classified as costing over $200,000.00 and over $400,000.00 respectively.

Priorities

The prime considerations in establishing priorities related to the need for the relief of existing roadway traffic operations in terms of capacity and safety. Secondary considerations suggested the grouping of specific improvements to achieve the full potential of benefits of several projects in proximity to each other. While not directly related to functional urgency, costs nevertheless influence priority grouping in terms of providing a reasonable cost balance. The priorities outlined herein are at best a guide, and it is anticipated that they will be modified from time to time in response to opportunities which may develop in accordance with the availability of funds. It is noted that implementation of Priority 1 has already commenced as Early Implementation projects.

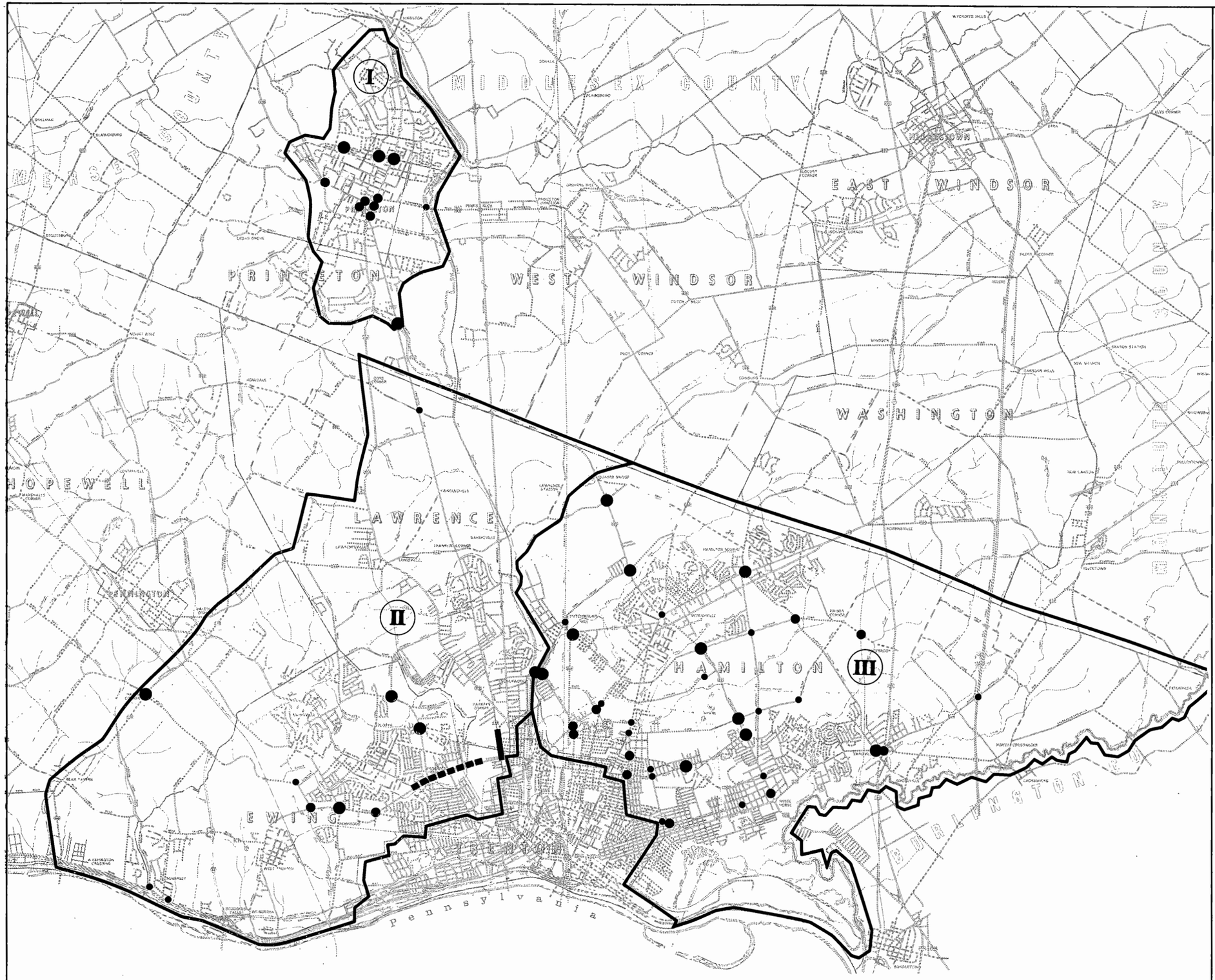
COST SUMMARY

Priority	Cost
Priority 1	$ 973,700.00
Priority 2	660,900.00
Priority 3	532,200.00
Priority 4	424,500.00
Priority 5	407,000.00
TOTAL ESTIMATED COST	$2,998,300.00

PRIORITY 1 (EARLY IMPLEMENTATION)

Improvement	Report Area	Estimated Cost
Arterial Improvements		
North Olden Avenue Extension	II	$499,000.00
Intersection Improvements		
Ewingville Road/Eggert Crossing Road	II	36,400.00
Parkway Avenue/Scotch Road	II	25,200.00
Washington Crossing Pennington Road/ Scotch Road	II	49,700.00
Mercerville Whitehorse Road/South Olden Avenue	III	35,400.00
Mercerville Whitehorse Road/Kuser Road	III	49,300.00
Mercerville Whitehorse Road/Klockner Road	III	65,500.00
Mercerville Quakerbridge Road/Sloane Avenue-Flock Road	III	49,500.00
Mercerville Quakerbridge Road/Youngs Road	III	46,000.00
Klockner Avenue/East State Street Extension	III	56,400.00
South Olden Avenue/Arena Drive	III	61,300.00
Subtotal		$474,700.00
Total Priority 1		$973,700.00

Figure A 5



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Notes

IMPROVEMENTS RELATED TO PARKING, SPEED LIMITS, AND BUS STOPS ARE NOT SHOWN.

Legend

- LESS THAN $5,000
- $5,000 TO $30,000
- OVER $30,000
- ARTERIAL IMPROVEMENT OVER $200,000
- ARTERIAL IMPROVEMENT OVER $400,000

AREAWIDE TOPICS STUDY

Mercer County, N.J.

IMPROVEMENT LOCATIONS AND COSTS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

PRIORITY 2

Improvement	Report Area	Estimated Cost
Arterial Improvements		
Princeton Avenue	II	$224,900.00
Signalized Intersections		
N. J. Route 27 (Nassau Street)/Mercer Street-University Place	I	19,800.00
N. J. Route 27 (Nassau Street)/ Witherspoon Street	I	18,900.00
N. J. Route 27 (Nassau Street)/Washington Road-Vandeventer Avenue	I	29,100.00
N. J. Route 27 (Nassau Street)/Harrison Street	I	31,000.00
Harrison Street North/Hamilton Avenue	I	30,500.00
Witherspoon Street/Wiggins Street	I	19,800.00
Harrison Street North/Valley Road	I	41,700.00
Washington Road/Faculty Road	I	3,000.00
Parkside Avenue/Spruce Street Extension	II	39,400.00
East State Street/Nottingham Way	III	10,000.00
Nottingham Way/Mercerville Quakerbridge Road	III	2,000.00
White Horse Avenue/Arena Drive	III	2,800.00
Liberty Street/Newkirk Avenue	III	20,800.00
Nottingham Way/Ward Avenue	III	29,400.00
White Horse Avenue/South Clinton Avenue-Locust Avenue	III	29,100.00
Subtotal		$327,300.00

PRIORITY 2 (Continued)

Improvement	Report Area	Estimated Cost
Non-Signalized Intersections and Between Intersection Improvements		
U.S. Route 206/Witherspoon Street-Valley Road	I	$ 9,700.00
Avalon Place-Wiggins Street/Chambers Street-John Street	I	6,000.00
N. J. Route 33 (Greenwood Avenue)/ Nottingham Way	III	2,600.00
Hamilton Avenue/Liberty Street-Kuser Road	III	3,700.00
Hamilton Square Yardville Road/Klockner Road	III	20,500.00
Cedar Lane/Sylvan Street	III	800.00
Hamilton Avenue/Ward Avenue	III	400.00
Hamilton Square Whitehorse Road/Kuser Road	III	4,800.00
Hamilton Square Whitehorse Road/Klockner Road	III	4,500.00
South Clinton Avenue/Fetter Avenue	III	4,200.00
Cornell Heights Bridge	III	500.00
Subtotal		$ 57,700.00
Signal Systems		
Report Area	I	8,000.00
Report Area	II	18,000.00
Report Area	III	25,000.00
Subtotal		$ 51,000.00
Total Priority 2		$660,900.00

PRIORITY 3

Improvement	Report Area	Estimated Cost
Signalized Intersections		
Parkway Avenue/Lower Ferry Road	II	$ 73,400.00
Parkway Avenue/North Olden Avenue Extension	II	19,400.00
Chambers Street/Cedar Lane	III	100.00
East State Street/Johnston Avenue	III	6,200.00
South Olden Avenue/Liberty Street	III	5,600.00
South Olden Avenue/Cedar Lane	III	1,700.00
Chambers Street/South Clinton Avenue	III	28,800.00
Nottingham Way/Hamilton Square Yardville Road-Mercer Street	III	37,000.00
South Broad Street/Yardville Allentown Road	III	50,700.00
Whitehead Road/Sweet Briar Avenue	III	52,200.00
Subtotal		$275,100.00

PRIORITY 3 (Continued)

Improvement	Report Area	Estimated Cost
Non-Signalized Intersections and Between Intersection Improvements		
N.J. Route 29/Delaware Avenue	II	$ 200.00
N.J. Route 29/Jacobs Creek Road	II	1,000.00
Princeton Pike/Provinceline Road	II	1,000.00
Scotch Road, north of Carlton Avenue	II	2,300.00
N.J. Route 156/South Broad Street	III	9,700.00
Cypress Lane	III	3,000.00
Klockner Road, between Kuser Road and U.S. Route 130	III	21,800.00
Kuser Road, 3000 feet east of Hamilton Square Whitehorse Road	III	300.00
Yardville Allentown Road at N.J. Turnpike Overpass	III	800.00
Subtotal		$ 40,100.00
CBD Parking		
Report Area	I	217,000.00
Total Priority 3		$532,200.00

PRIORITY 4

Improvement		Report Area	Estimated Cost
Bridge Improvement			
Mercer Street over Stony Brook		I	$392,000.00
Traffic Operations			
Report Area		III	3,900.00
Speed Limits			
Report Area		I	3,600.00
Report Area		II	7,000.00
Report Area		III	3,600.00
	Subtotal		$ 14,200.00
Public Transit			
Report Area		I	900.00
Report Area		II	7,300.00
Report Area		III	6,200.00
	Subtotal		$ 14,400.00
	Total Priority 4		$424,500.00

PRIORITY 5

Improvement	Report Area	Estimated Cost
Bridge Improvement		
Whitehead Road over the Assunpink Creek	III	$407,000.00
Total Priority 5		$407,000.00

Existing Federal Aid Roadways

The total system of existing Federal Aid roadways is estimated at 118.1 miles within the study area and is subdivided as follows:

Federal Aid Roadway Classification	Mileage by Report Area			
	I	II	III	Total
Primary Type I	6.3	25.4	11.4	43.1
Secondary	2.1	25.3	23.8	51.2
Urban	-	7.6	16.2	23.8
Total	8.4	58.3	51.4	118.1

Figure A6 shows these roadways coded by color. It is noted that the existing 2.8-mile section of Interstate Route 95 in Report Area II is classified in the illustration as a Federal Aid, Primary Type I roadway since Federal funds amounted to 50% of the cost of construction, rather than 90% typically allocated to Interstate highways.

Also indicated in the illustration by dashed lines are the proposed Federal Aid Secondary roadways. These are official classifications presently on record. The total of 51.2 miles of Secondary roadways in the study area does not include the proposed sections shown in Figure A6.

Proposed Federal Aid, Primary Type II Roadways

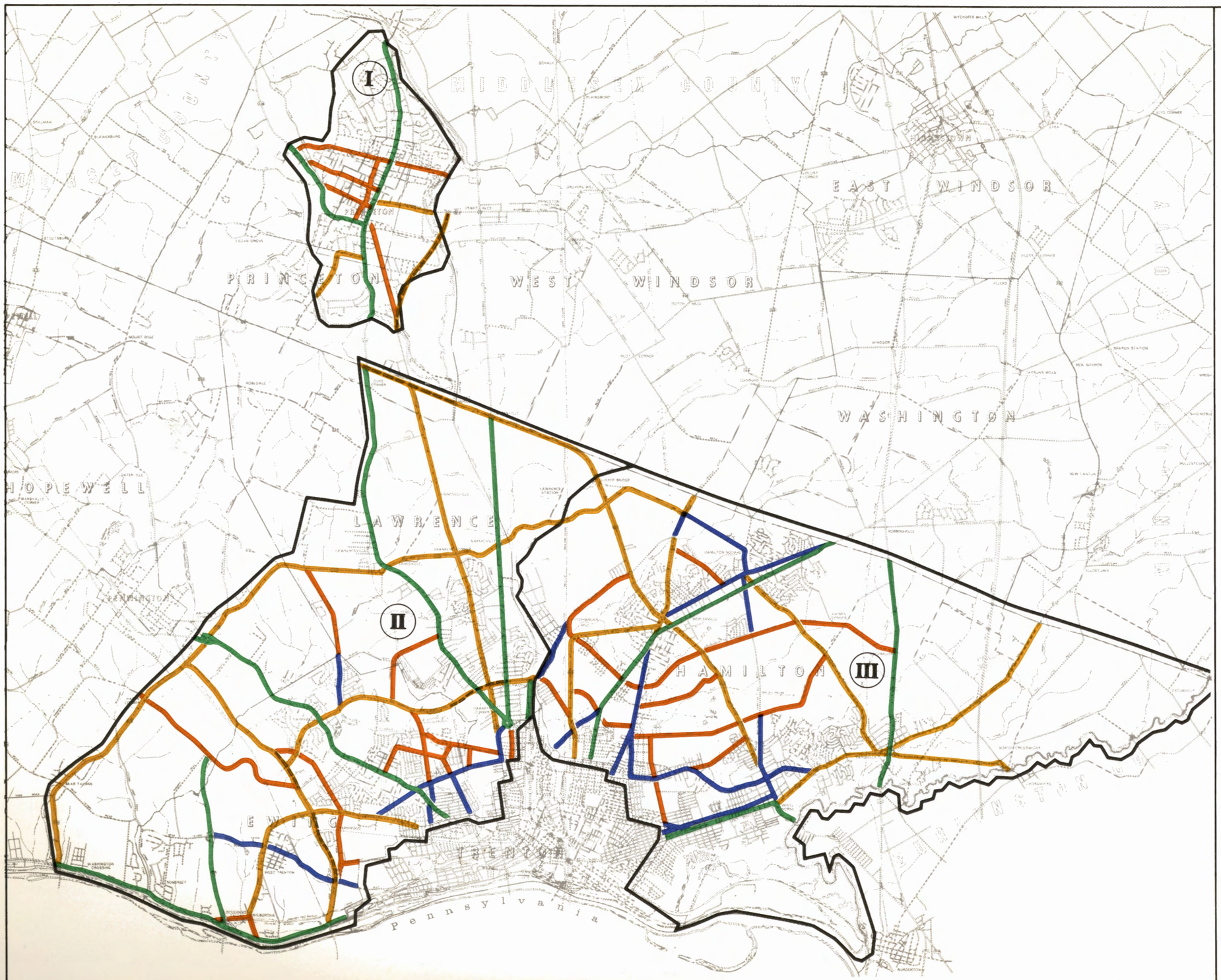
The recommended extension of the Federal Aid system as Primary Type II roadways is shown in orange in the illustration and has been chosen on the following basis:

- Roadways that have been proposed for improvement as a result of the Areawide TOPICS Study.
- Major collector streets or connectors.
- Roadway extensions which by virtue of being designated as Primary Type II would complete a roadway network and avoid "stub" sections on the Federal Aid system.

The proposed Primary Type II roadways are subdivided within the study area as follows:

Report Area I	7.0 miles
Report Area II	14.9 miles
Report Area III	16.3 miles
Total	38.2 miles

Figure A 6



0 4,000 8,000 16,000

SCALE IN FEET

Notes

1. THE PROPOSED FEDERAL AID SECONDARY ROADWAYS (SHOWN DASHED) HAVE BEEN PREVIOUSLY DESIGNATED BY OTHERS AND ARE SHOWN ONLY TO CLARIFY THE CONTINUITY OF THE FEDERAL AID SECONDARY SYSTEM.

Legend

- PRIMARY TYPE I
- SECONDARY
- URBAN
- PRIMARY TYPE II (PROPOSED)

FEDERAL AID ROADWAYS	MILEAGE			
	AREA I	AREA II	AREA III	TOTAL
PRIMARY TYPE I	6.3	25.4	11.4	43.1
SECONDARY *	2.1	25.3	23.8	51.2
URBAN	—	7.6	16.2	23.8
PRIMARY TYPE II (PROP.)	7.0	14.9	16.3	38.2
TOTAL	15.4	73.2	67.7	156.3

* EXCLUDING PROPOSED SECTIONS

AREAWIDE TOPICS STUDY

Mercer County, N.J.

PROPOSED

FEDERAL AID ROADWAYS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

The specific purposes of the TOPICS program are to facilitate the flow of traffic and reduce the potential for accidents. The success of the program is, to some degree, measurable through the use of traffic data that can be collected after completion of construction, and after an appropriate period of exposure. The project evaluations are to be based on a comparison of "before" and "after" data, and will be a major consideration relative to the future availability of Federal funds. Thus, a necessary final step in a TOPICS project is the completion of evaluations by the State, County, or municipality whose jurisdiction encompasses the street or highway where an improvement is located.

Speed-Delay

It is anticipated that the proposed signal systems will lead to improved travel speeds and reduced congestion and delays. Accordingly, speed-delay information should be gathered along the routes where the systems have been completed and the results compared with the speed-delay data collected during the study. It should be noted, however, that dramatic reductions in travel time are not anticipated, but perceptible benefits are expected, especially when evaluations are taken over an extended length of roadway. It is further noted that the success of a signal system will very much depend upon the timing relationships that are ultimately programmed. Thus, the time settings initially proposed for each system should be adjusted in accordance with the findings of trial runs made during both peak and off-peak travel periods.

Accidents

The extensive accident data collected will also be useful toward completing evaluations of specific projects. Most intersections which were proposed for signalization had histories principally involving right angle accidents. At locations where improvements were proposed at existing signalized intersections, the accident history typically indicated a high number of same direction type and left turn type accidents. Other improvement locations listed below also suggested for evaluation are non-signalized intersections where right angle type accidents have been notable and the arterial highways which have experienced a high proportion of both right angle and same direction type accidents.

Existing Signalized Intersections: The following existing signalized intersections had three-year accident histories of 25 or more and are especially recommended for evaluation.

Location	Report Area
N. J. Route 27 (Nassau Street)/Witherspoon Street	I
N. J. Route 27 (Nassau Street)/Washington Road-Vandeventer Avenue	I
Witherspoon Street/Wiggins Street	I
North Olden Avenue Extension/Pennington Road	II
North Olden Avenue Extension/Parkside Avenue	II
North Olden Avenue Extension/Prospect Street	II
North Olden Avenue Extension/Princeton Avenue	II
Parkway Avenue/Lower Ferry Road	II
Parkway Avenue/North Olden Avenue Extension	II
Princeton Avenue/Spruce Street	II
Nottingham Way/Mercerville Quakerbridge Road	III
White Horse Avenue/Arena Drive	III

Proposed Signalized Intersections: The following locations have been recommended for traffic signal control and also had accident histories of 25 or more; accordingly, they are particularly suited for evaluation.

Location	Report Area
Harrison Street North/Valley Road	I
Parkside Avenue/Spruce Street Extension	II
Klockner Road/East State Street Extension	III
Liberty Street/Newkirk Avenue	III
Mercerville Whitehorse Road/Kuser Road	III
Mercerville Whitehorse Road/Klockner Road	III
Mercerville Quakerbridge Road/Youngs Road	III
Nottingham Way/Ward Avenue	III
South Broad Street/Yardville Allentown Road	III
South Olden Avenue/Arena Drive	III

Non-Signalized Intersection Improvements and Between Intersection Improvements: The following locations, with a three-year history of 15 or more accidents, are suggested for evaluation:

Location	Report Area
Mercer Street over Stony Brook	I
Witherspoon Street/Valley Road	I
N. J. Route 33 (Greenwood Avenue)/Nottingham Way	III
N. J. Route 156/South Broad Street	III
Cedar Lane/Sylvan Street	III
Hamilton Avenue/Ward Avenue	III
Hamilton Square Yardville Road/Klockner Road	III
Hamilton Square Whitehorse Road/Klockner Road	III
Hamilton Square Whitehorse Road/Kuser Road	III
South Clinton Avenue/Fetter Avenue	III

Arterial Highways: It is anticipated that the proposed improvements to North Olden Avenue Extension and Princeton Avenue will result in a substantial reduction of accidents both at intersections and between intersections. Accordingly, evaluation of these two projects is also recommended.

PART B

Detailed Proposals for Report Area III

SUMMARY

The Areawide TOPICS Study for Report Area III involved a total of 105 miles of streets and highways which comprised the study network and included all existing Federal Aid roadways together with other State and local roadway segments.

The findings and recommendations of the study focus on intersection improvements - in particular, signalized intersection improvements together with related signal systems. Other street and highway improvements are also recommended.

The total estimated cost for all improvements is $1,163,100.00. It is anticipated that implementation of the program will be scheduled over a five-year period with project priorities reflecting consideration of functional urgency, safety, system influence, proximity to related physical improvements, and effect on cost balance.

Accidents

The accident history of 159 intersections was recorded for the three-year study period of 1968-1970 at locations where six or more accidents had occurred. These are summarized in Table A of the Appendix. Each of the 60 intersections which had a history of 15 or more accidents in three years was investigated.

With respect to between intersection accidents, a total of seven locations were investigated where the accident data was useful in pinpointing locations having three or more accidents.

A total of 17 fatal accidents occurred in Hamilton Township during the three-year study period. Of these, 15 took place at 13 intersections, and two occurred between intersections. Each of these locations was also investigated.

State Highway Improvements

The New Jersey Department of Transportation has directed that no improvements on State highways be scheduled for TOPICS implementation at this time. Where an improvement is proposed at the intersection of a State highway and a local road, however, the Department's guideline permits programming the project with TOPICS funds if the principal beneficiary is local traffic. In other instances, where the proposed improvement is primarily on the State highway, the deficiencies and possible relief measures are discussed, but no cost estimate has been made, nor has the improvement been scheduled for TOPICS implementation. The intent of the Department is to implement the improvements as funds become available.

Signalized Intersection and Signal System Improvements

Proposed improvements relative to the signalization of intersections comprise a major part of the study effort and estimated implementation costs. Twenty of the 28 existing signalized intersections have been recommended for improvement, and 15 unsignalized intersections have been recommended for traffic signal control. Eight of these projects

are proposed for Early Implementation. The total cost of all scheduled signalized intersection improvements is estimated to be $639,800.00.* All proposed signalized intersection improvements, as well as other projects, are shown in Figure B1.

It is proposed to incorporate all but two of the ultimate 43 signalized intersections within one of six signal systems proposed in Hamilton Township. Two of the proposed systems replace existing nonintercon-nected systems on U.S. Route 206 and N.J. Route 33 and include a total of 17 State-owned installations, along with ten installations under local jurisdiction. The four other proposed signal systems involve 14 County-owned signal installations.

The total cost of providing the four County signal systems and interconnecting the ten other local signal installations with the proposed State highway systems is estimated at $25,000.00. Signalized intersection improvements, together with signal system improvements, result in a total estimated cost of $664,800.00.

*Twenty-one of the 35 signalized intersection projects have been scheduled for improvement under the TOPICS program. One of the others will be improved by the County outside the TOPICS program. The others are located on State highways and, under the Department's guidelines, are not to be scheduled for TOPICS implementation at this time. Existing and proposed traffic signal and flashing signal locations are listed in Table B of the Appendix.

Other Street Improvements

A total of 13 improvements have been recommended at nonsignalized intersections and include proposed flashing signal installations, channelization improvements, pavement widening, and reorganization of the operation of traffic through revised pavement markings. Nine of these projects are scheduled for improvement under the TOPICS program; the remaining four concern State highway improvements.

Another six projects involve between intersection improvements and include the proposed reconstruction of an existing bridge structure on Whitehead Road and the improvement of the vertical alignment of Klockner Road at a railroad grade crossing. All six projects have been scheduled.

Four additional scheduled projects relate to the regulation of traffic along sections of roadway and involve operational improvements through parking control, posting of speed limits, and upgrading of bus stops.

The total estimated cost of the 19 scheduled projects is $498,300.00. It is noted, however, that most of this ($407,000.00) is associated with one project, improvement of the Whitehead Road bridge over the Assunpink Creek.

Figure B1

0 3,000 6,000 12,000

SCALE IN FEET

Legend

- ○ EARLY IMPLEMENTATION
- ⊗ EXISTING SIGNALIZED INTERSECTIONS (20)
- ● PROPOSED SIGNALIZED INTERSECTIONS (15)
- ○ NON-SIGNALIZED INTERSECTIONS (13)
- △ BETWEEN INTERSECTION LOCATIONS (8)

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III

IMPROVEMENT LOCATIONS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

During the initial phases of the study, it became apparent that certain locations would obviously qualify for improvement under the TOPICS program due to their poor accident history or inadequate capacity to accommodate traffic. In several instances, accidents and capacity were both major factors contributing to deficient operations. Consideration of these facts and discussions with interested officials led to choosing the following eight intersections (all of which are illustrated) for early analysis and implementation:

U.S. Route 206, South Broad Street/White Horse Avenue*
Mercerville Whitehorse Road/South Olden Avenue
Mercerville Whitehorse Road/Kuser Road
Mercerville Whitehorse Road/Klockner Road
Mercerville Quakerbridge Road/Sloane Avenue-Flock Road
Mercerville Quakerbridge Road/Youngs Road
Klockner Road/East State Street Extension
South Olden Avenue/Arena Drive

The Mercerville Quakerbridge Road/Sloane Avenue-Flock Road intersection is presently controlled by a temporary fixed-time traffic signal; the others are all STOP sign controlled. Traffic signal control has been recommended at all of these locations.

A ninth location in Hamilton Township was also designated at the outset as requiring early study because of its disruptive effect on traffic flow. The Cornell Heights Bridge over the main line of the Penn Central Railroad was one of the first locations studied and is the subject of a separate section of this report.

*It is noted that study and analysis of the U.S. Route 206, South Broad Street/White Horse Avenue intersection (White Horse Circle) was completed as an Early Implementation project prior to issuance of the guideline relative to State highway improvements.

U.S. ROUTE 206, SOUTH BROAD STREET, AND WHITE HORSE AVENUE (Figure B2)

Existing Conditions

A principal bottleneck of U.S. Route 206 occurs at the White Horse Circle (the junction of U.S. Route 206, South Broad Street, and White Horse Avenue). Severe delays occur at the Circle during peak hours of operation with major back-ups taking place on the State highway. The three-year accident history includes 64 right angle type, 53 same direction type, and 22 accidents involving fixed objects. Of the total 157 reported accidents, only 23 involved personal injuries, however, presumably because of the relatively low speeds involved.

The recent installation of traffic signal control at Ruskin Avenue and Route 206 (approximately 1000 feet south of the Circle) was undertaken by the New Jersey Department of Transportation to meter northbound Route 206 traffic, thereby creating gaps at the Circle for side street motorists to utilize. While this operation has probably reduced the accident potential, operations at the Circle in terms of capacity have not been greatly enhanced.

Proposed Improvements

Present volumes of traffic readily meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, it is proposed to replace the existing channelization with an intersection of more conventional geometric design and to regulate movements with traffic signalization as follows:

- Widen the west leg to permit four approach lanes, two for straight and left turn movements and two for right turn movements.
- Provide three-phase, semi-actuated traffic signal control with gap reduction capability.
- Install overhead directional signing for eastbound traffic, approximately 400 feet in advance of the intersection.

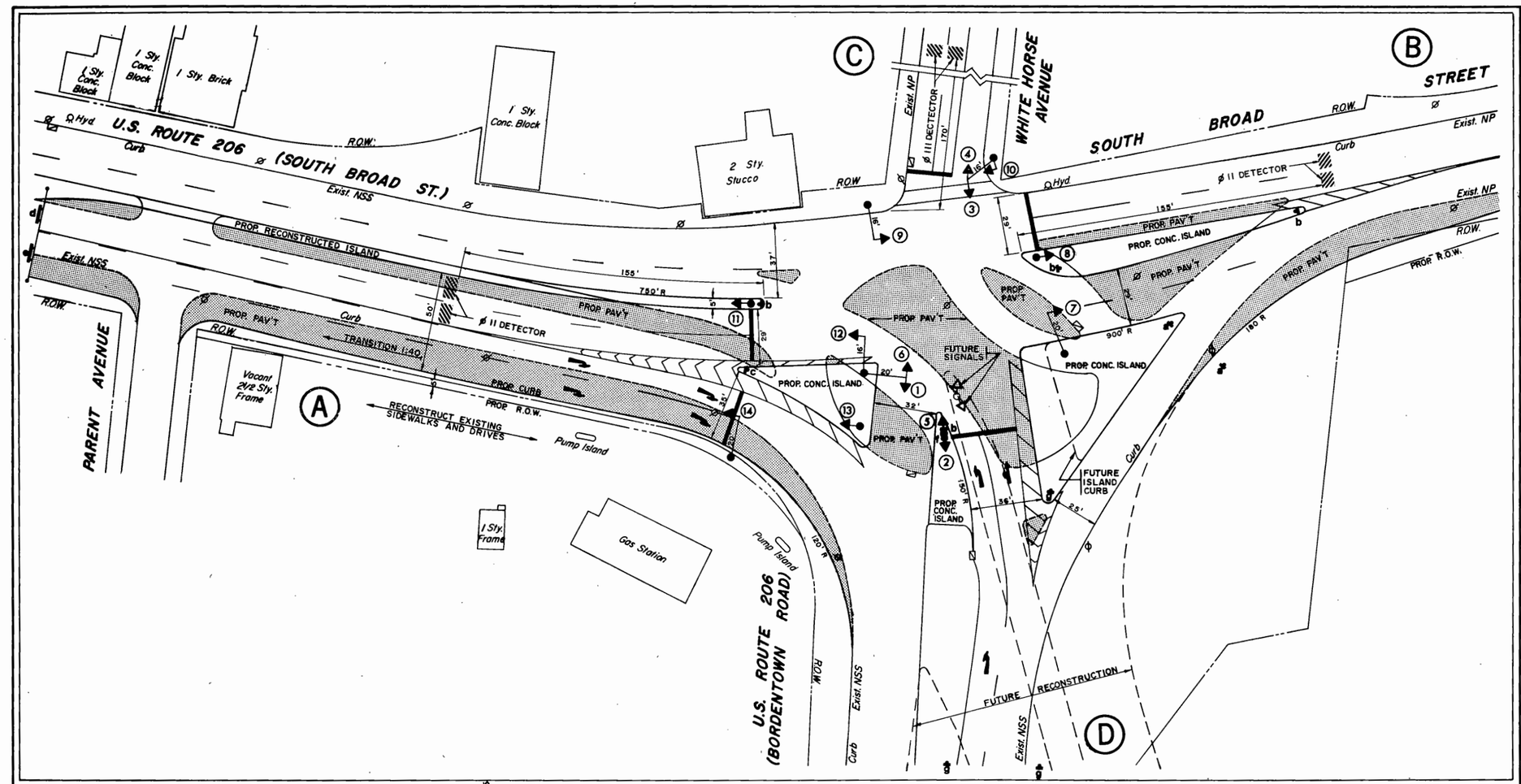
The planned construction of Route 29 and Interstate 195, and the related interchange approximately one-quarter mile south of the intersection, contemplates reconstruction of the south leg of Route 206. The reconstruction will require some modification to the proposed channelization and only a modest change to the signal hardware as shown on the plan.

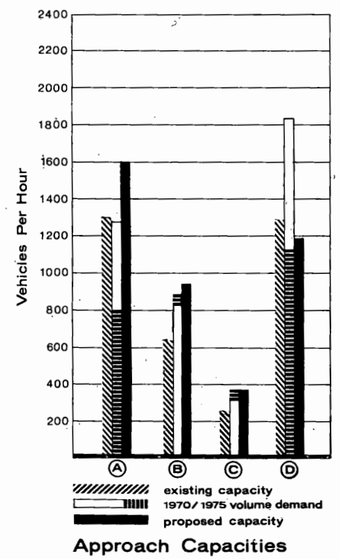
Benefit

The capacity of the intersection will be increased by an estimated 20% above the existing capacity. While the improvements will not be sufficient to accommodate existing volumes, they have been designed to adequately serve the traffic demands expected after completion of Route 29 and Interstate 195. The proposed signalization will significantly reduce the potential for right angle accidents by eliminating the existing uncontrolled right angle traffic conflicts. It is also anticipated that the potential for same direction type accidents will be reduced due to the likely reduction of false starts.

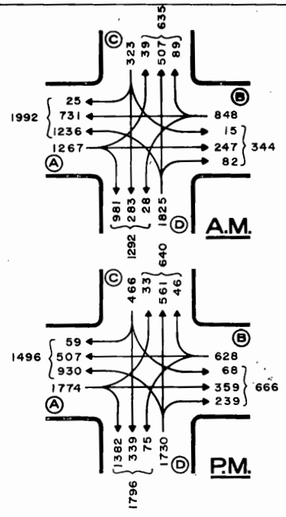
Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

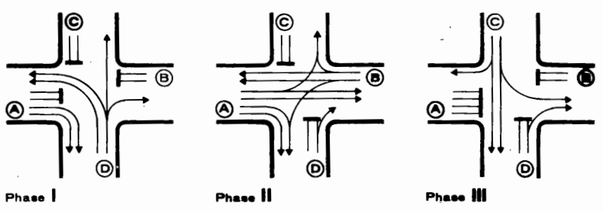




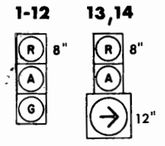
Approach Capacities



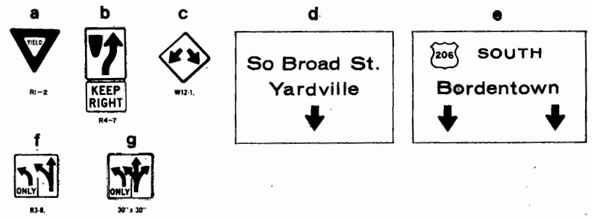
Peak Hour Traffic-1970



Signal Phasing

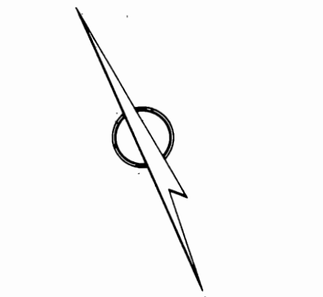


Signal Faces



Sign Legend

Figure B2



0 30 60 120

SCALE IN FEET

Notes

1. *Existing noted by lower case lettering.*
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS"
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. THE PROPOSED SIGNAL ARRANGEMENT IS SUBJECT TO REVISION BASED ON A DETAILED STUDY BY THE N.J.D.O.T.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

U.S. ROUTE 206, SOUTH BROAD STREET WHITE HORSE AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

MERCERVILLE WHITEHORSE ROAD AND SOUTH OLDEN AVENUE (Figure B3)

Existing Conditions

Mercerville Whitehorse Road is 46 feet wide between curbs north of South Olden Avenue and 38 feet wide south of the intersection. Traffic volumes at the intersection approach capacity levels during peak periods of flow and include a flow of over 900 vehicles per hour northbound in the morning and 850 southbound in the evening. Of the ten accidents that have occurred at the intersection in three years, four were of the right angle type, five of the same direction type, and one involved a fixed object.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control based on a reduction to 70% of the volumes normally required where the 85th percentile speed of traffic on the major roadway exceeds 40 mph. Accordingly, the following improvements are recommended:

- Widen Mercerville Whitehorse Road at the intersection to 50 feet to match the proposed widening of that roadway north of South Olden Avenue.
- Provide two-phase, semi-actuated traffic signal control.

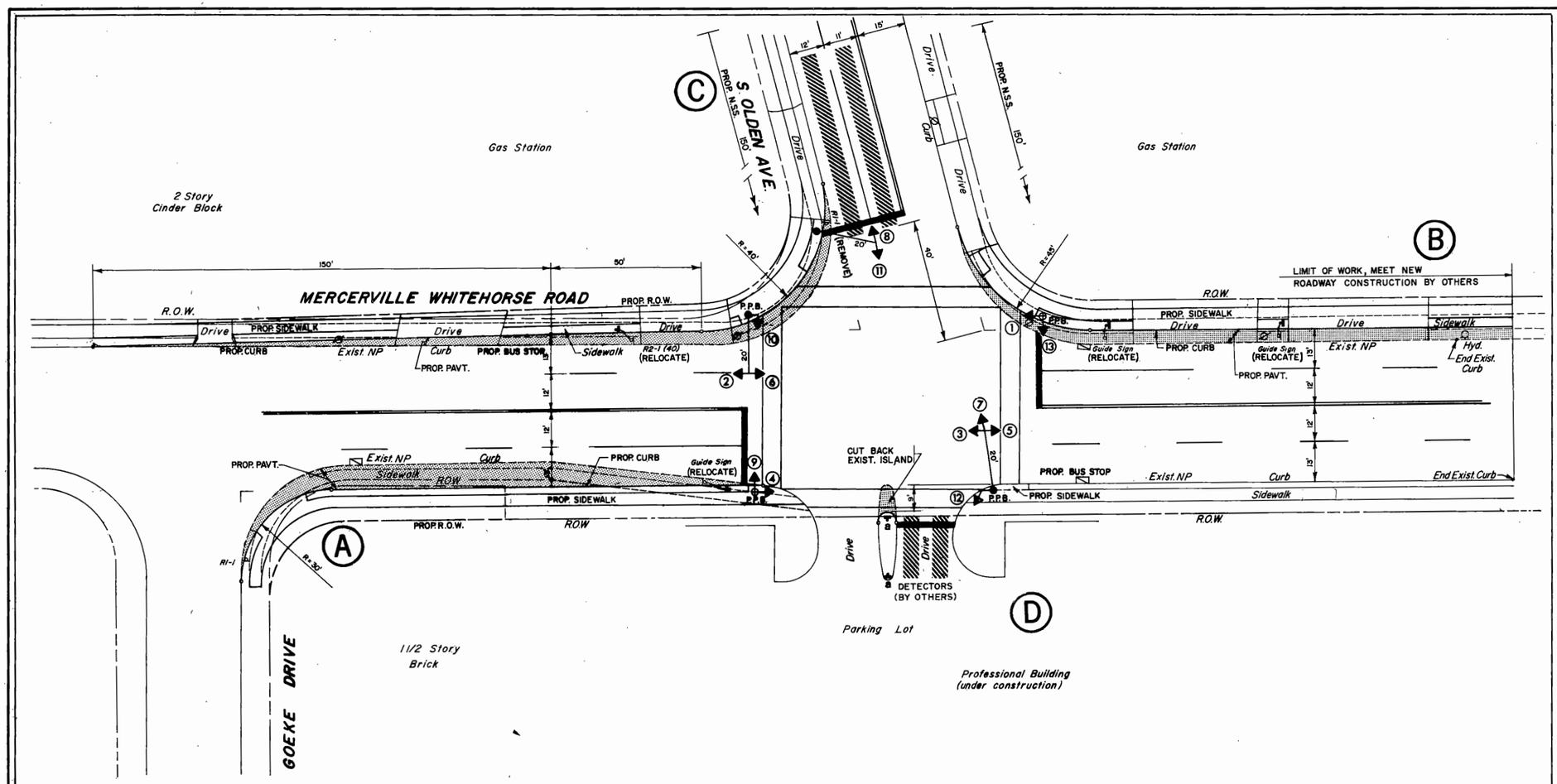
Benefit

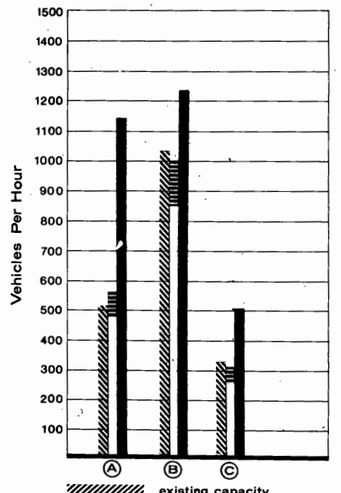
The widening of Mercerville Whitehorse Road will provide four operating traffic lanes for an adequate distance on either side of South Olden Avenue enabling waiting left turning vehicles to be passed by other traffic. Thus, the widening will not only afford a margin of increased intersection capacity, but will also reduce the potential for same direction type accidents. The potential for right angle type accidents is also reduced by virtue of the proposed traffic signal control.

Cost Estimate

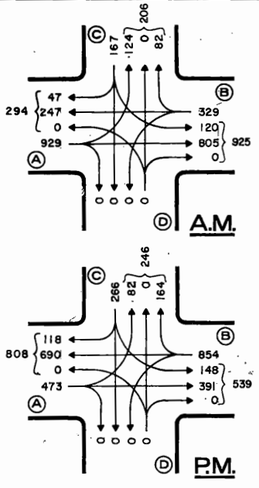
Construction	$31,600.00
Engineering	3,800.00
Total	$35,400.00

Figure B3

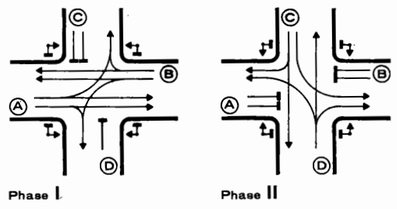




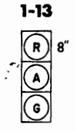
Approach Capacities



Peak Hour Traffic·1970

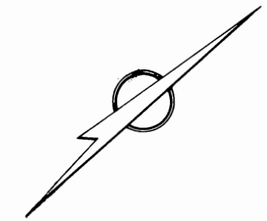


Signal Phasing



Signal Faces

Sign Legend



Notes

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2. PROPOSED NOTED BY UPPER CASE LETTERING.
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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED
5. PARKING PROHIBITIONS DESIGNATATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN b AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

MERCERVILLE WHITEHORSE ROAD
SOUTH OLDEN AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

MERCERVILLE WHITEHORSE ROAD AND KUSER ROAD (Figure B4)

Existing Conditions

A total of 27 accidents have occurred at the intersection of Mercerville Whitehorse Road and Kuser Road during the three-year study period; seventeen of these were of the right angle type and four were of the same direction type. A community size shopping center is presently under construction in the southeast quadrant, and a regional shopping center northwest of the intersection is also being planned. Various apartment house developments to the north, east, and west are projected within the next five years.

Proposed Improvements

Present volumes of traffic meet the Interruption of Continuous Traffic Warrant for traffic signal control, based on a reduction to 70% of the volumes normally required where the 85th percentile speed of traffic exceeds 40 mph. It is also noted that the New Jersey Department of Transportation has authorized signalization of the subject intersection; accordingly, the following improvements are recommended:

- Channelize and widen the north leg of Mercerville Whitehorse Road and the east leg of Kuser Road.
- Provide two-phase, semi-actuated signal control.

The County of Mercer is presently planning the reconstruction of Mercerville Whitehorse Road from South Olden Avenue to Route 33. Therefore, intersection modifications completed under the TOPICS program need not include extended improvements along Mercerville Whitehorse Road to accommodate transitioning between the proposed and existing pavements. It is suggested that work along Mercerville Whitehorse Road be limited to 200 to 250 feet from Kuser Road.

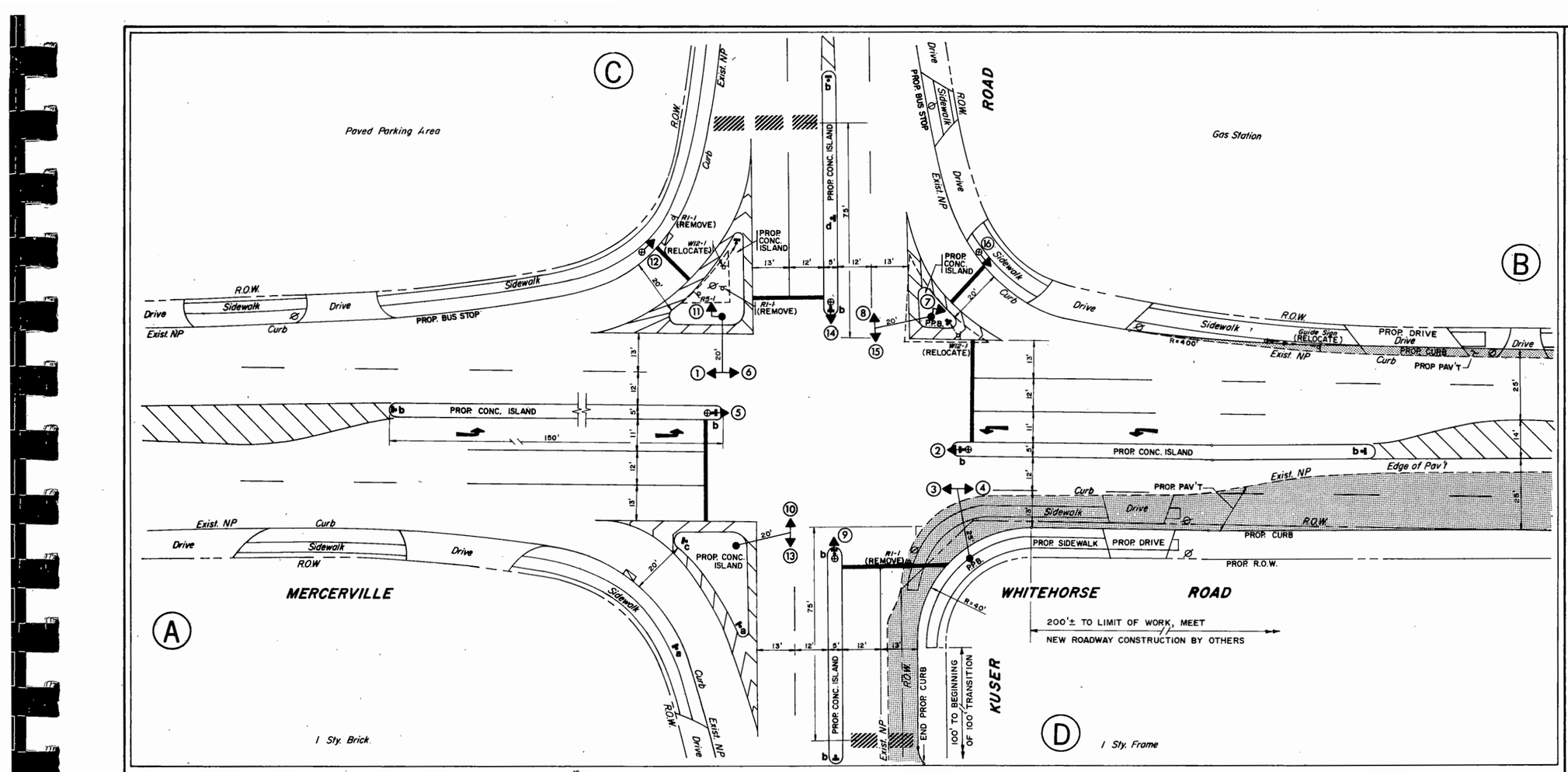
Benefit

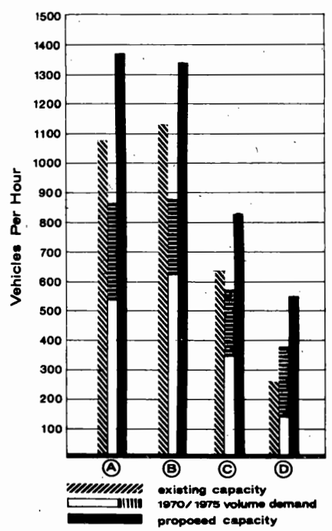
The widening of the north and east legs will permit them to be geometrically compatible with their respective opposite roadways, while the proposed channelization will better organize the traffic flow, thereby encouraging safer movements through the intersection. The potential for right angle type accidents will be reduced by the proposed traffic signal installation. In addition, vehicles turning left from Mercerville Whitehorse will be protected from the potential of same direction type accidents by virtue of the additional turning lane. Future multiphase signal operation will afford further protection by the addition of a separate phase for left turns from the arterial.

Cost Estimate

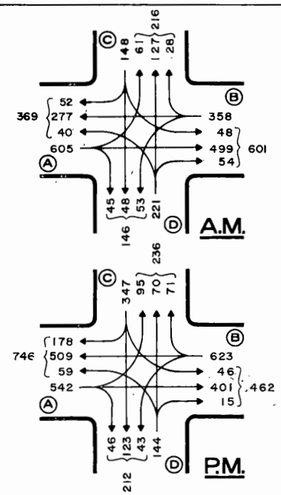
Construction	$44,000.00
Engineering	5,300.00
Total	$49,300.00

Figure B4

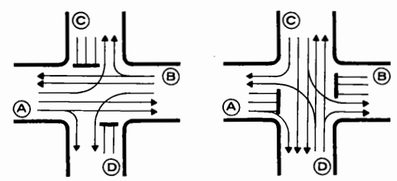




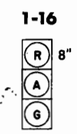
Approach Capacities



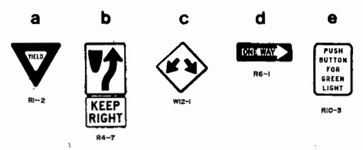
Peak Hour Traffic-1970



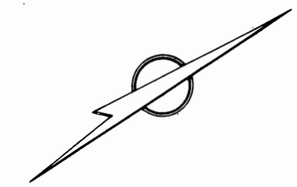
Signal Phasing



Signal Faces



Sign Legend



0 20 40 80

SCALE IN FEET

Notes

1. *Existing noted by lower case lettering.*
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. REMOVE EXISTING PRE-CAST CONCRETE ISLANDS.
8. INSTALL SIGN ● AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

MERCERVILLE WHITEHORSE ROAD

KUSER ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

MERCERVILLE WHITEHORSE ROAD AND KLOCKNER ROAD (Figure B5)

Existing Conditions

North of the intersection, the minimum paved width of Mercerville Whitehorse Road is approximately 30 feet compared to a width of approximately 65 feet south of the intersection. Klockner Road also has a great disparity of pavement widths: 40 feet east of the intersection and approximately 75 feet to the west. Of the 26 accidents reported during the three-year study period, 15 were of the right angle type, six were of the same direction type, three involved fixed objects, and two were head-on accidents.

Various apartment house developments to the south are projected for the next five years, and, as indicated previously, a regional shopping center is currently in the planning stage on a site located southwest of the intersection.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control based on a reduction to 70% of the volumes normally required where the 85th percentile speed of traffic exceeds 40 mph. It is also noted that the New Jersey Department of Transportation has authorized signalization of the subject intersection; accordingly, the following improvements are recommended:

- Channelize and widen the north leg of Mercerville Whitehorse Road and the east leg of Klockner Road.
- Provide two-phase, semi-actuated signal control.

As discussed above, the County of Mercer is planning to reconstruct Mercerville Whitehorse Road; therefore, it is suggested that the proposed intersection improvement along Mercerville Whitehorse Road be limited to 150 to 200 feet south of Klockner Road and 200 to 250 feet north of Klockner.

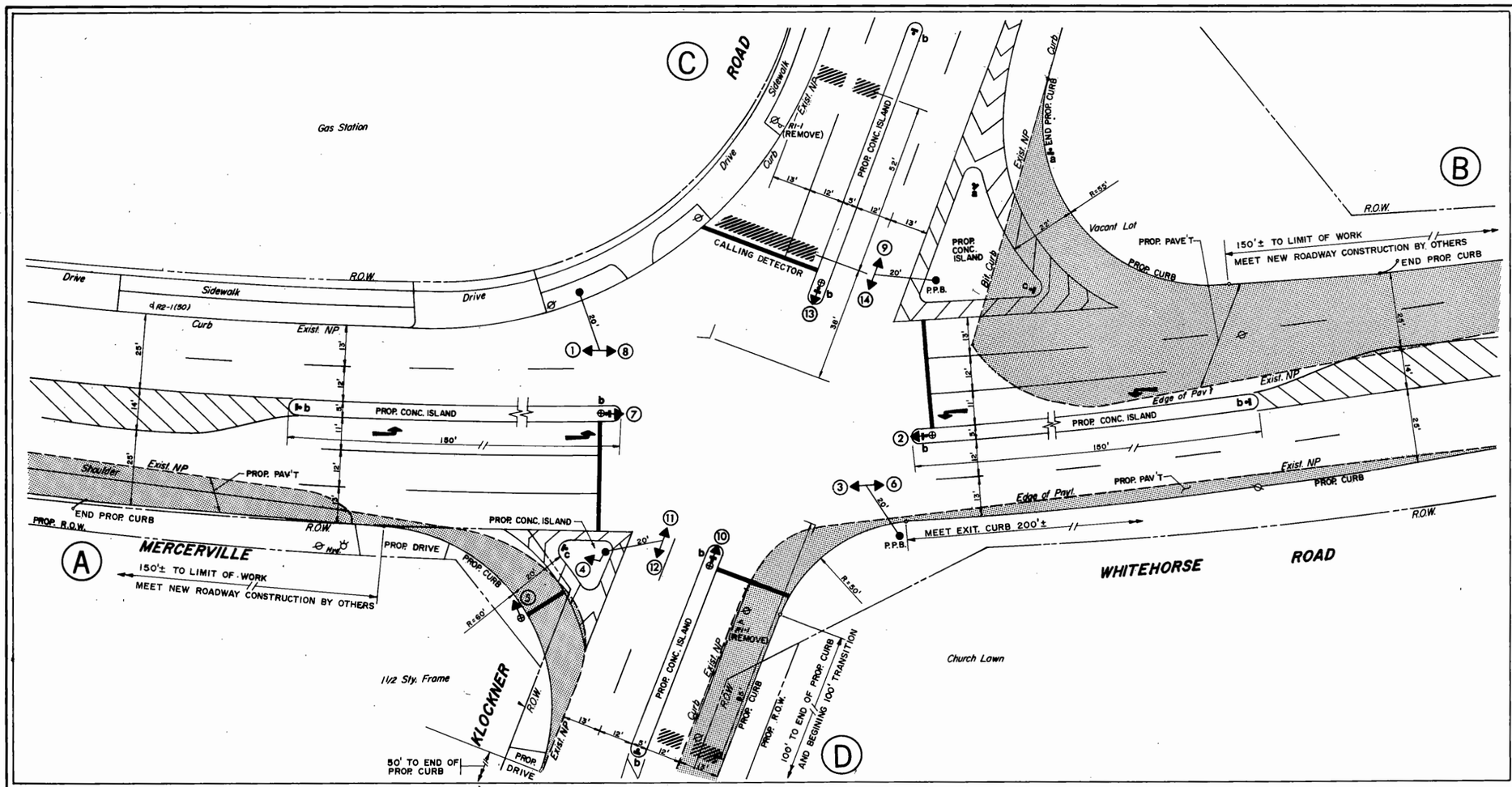
Benefit

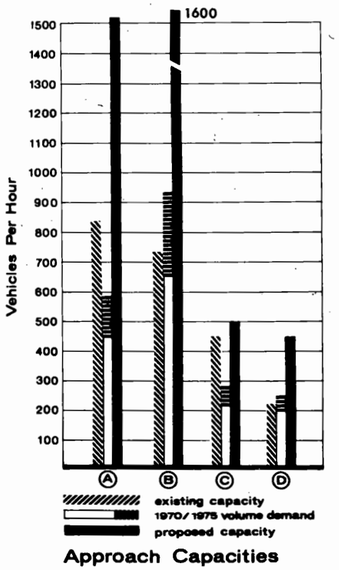
The proposed widening of two legs of the intersection will serve to provide balanced intersection geometry, thereby enhancing traffic operations, while the traffic signal will reduce the potential for right angle type accidents. In addition, the proposed left turn channelization will minimize the potential for same direction type accidents while also affording further protection through possible future left turn signal phasing.

Cost Estimate

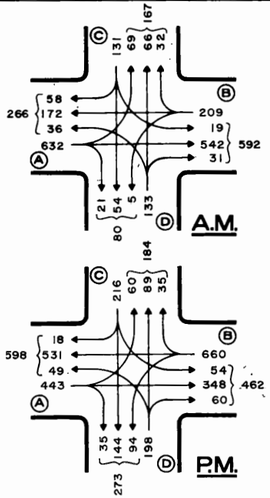
Construction	$58,500.00
Engineering	7,000.00
Total	$65,500.00

Figure B5

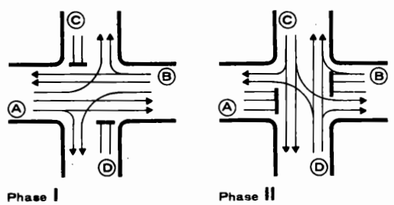




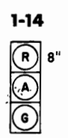
Approach Capacities



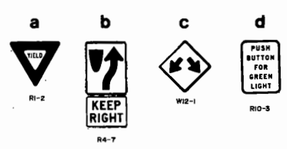
Peak Hour Traffic-1970



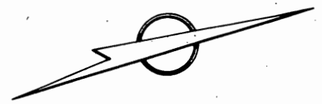
Signal Phasing

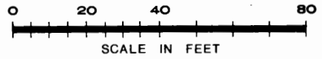


Signal Faces



Sign Legend





Notes

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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN d AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

MERCERVILLE WHITEHORSE ROAD
KLOCKNER ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

MERCERVILLE QUAKERBRIDGE ROAD AND SLOANE AVENUE-FLOCK ROAD (Figure B6)

Existing Conditions

A temporary fixed-time signal installation controls traffic at this intersection which presently accommodates more than 1400 vehicles on the Mercerville Quakerbridge Road approaches during the evening peak hour. The pavement width of the four intersection legs varies considerably. Moreover, Flock Road is offset to the south of Sloane Avenue by approximately 15 feet, a deficiency which is compounded by the curved alignment of the roadway. During the three-year study period, 17 reportable motor vehicle accidents occurred at the intersection, of which ten were right angle type.

It is anticipated that the proposed Interstate Route 295 interchange at Sloane Avenue, approximately two-thirds of a mile to the west, will result in a change in traffic patterns at the intersection. Travel on Mercerville Quakerbridge Road will be reduced because of the diversion of traffic to Interstate Route 295, but to some degree this will be partially offset by an increase resulting from the attraction of traffic by the proposed interchange.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control based on a reduction to 70% of the volumes normally required where the 85th percentile speed of traffic exceeds 40 mph. Furthermore, the New Jersey Department of Transportation has authorized a permanent signal installation at the subject intersection; accordingly, the following improvements are recommended:

- Realign and widen Flock Road and Sloane Avenue and channelize both the east and west approaches.
- Widen the northerly leg of Mercerville Quakerbridge Road and pave the shoulder south of the intersection.
- Provide a three-phase traffic signal controller with operation initially limited to two phases. A northbound lagging left turn phase is recommended for future use when the I-295 interchange to the west is completed.

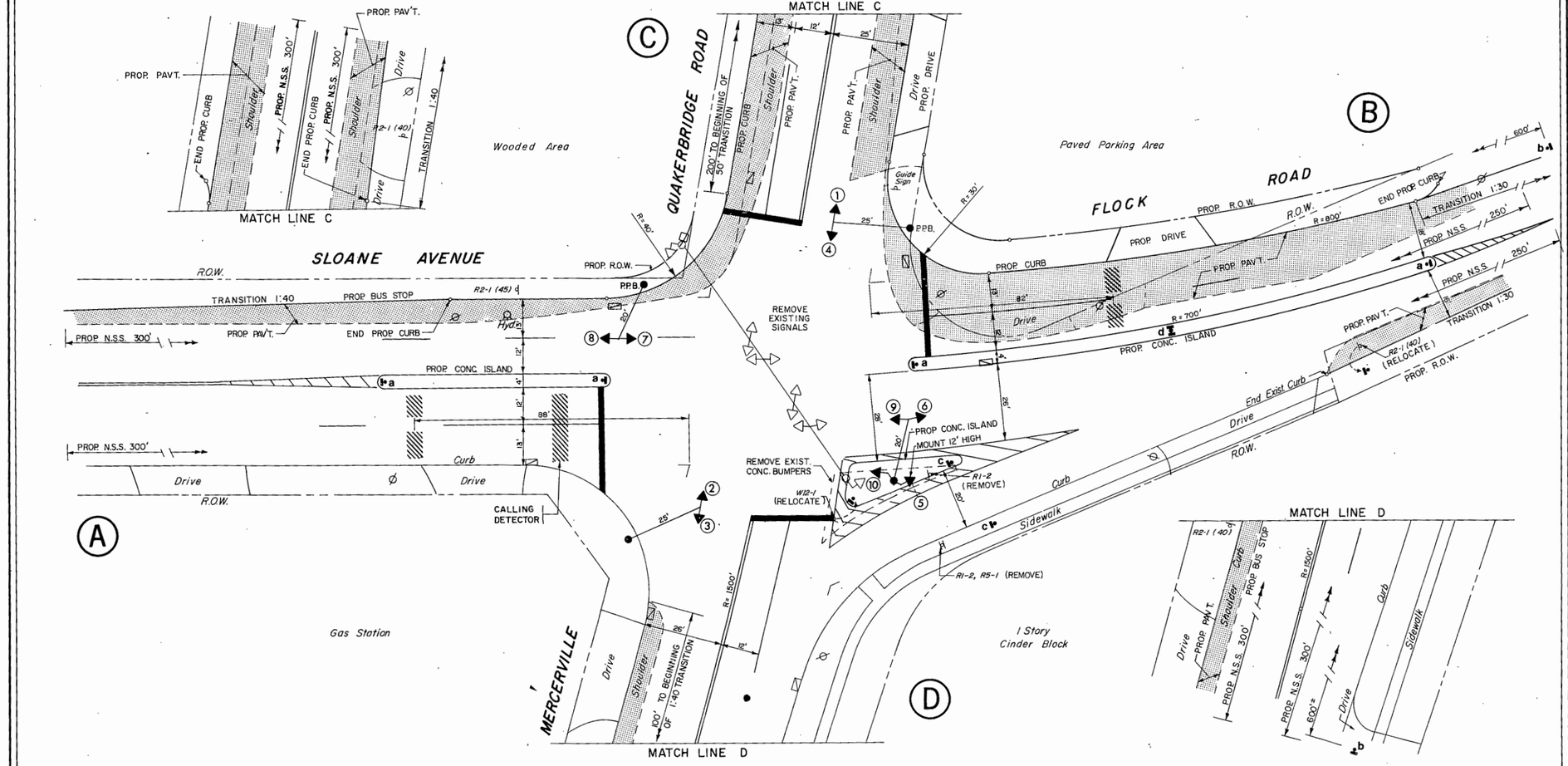
Benefit

Realignment of the northerly edges of Sloane Avenue and Flock Road and the proposed channelization will reduce potential hazards to east-west traffic, while widening will provide adequate intersection capacity. The conversion of the present signal from fixed-time to semi-actuated operation will assure more efficient distribution of the "green" time and the reduction of delays.

Cost Estimate

Construction	$44,100.00
Engineering	5,400.00
Total	$49,500.00

Figure B6



Notes

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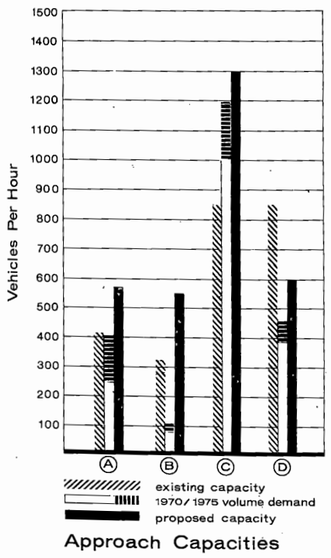
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN e AT ALL PUSH BUTTONS.

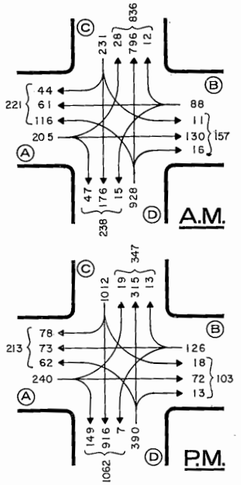
Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- EXISTING SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR.
- PPB. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

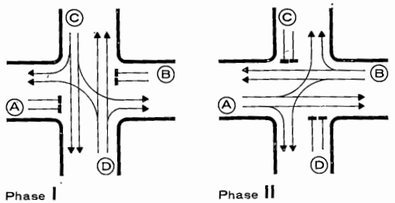
0 20 40 80
SCALE IN FEET



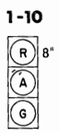
Approach Capacities



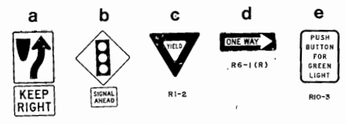
Peak Hour Traffic-1970



Signal Phasing



Signal Faces



Sign Legend

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III • Hamilton Township

MERCERVILLE QUAKERBRIDGE ROAD
SLOANE AVENUE - FLOCK ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION
September 1972 Travers Associates Consultants

MERCERVILLE QUAKERBRIDGE ROAD AND YOUNGS ROAD (Figure B7)

Existing Conditions

The intersection capacity of Mercerville Quakerbridge Road and Youngs Road is not sufficient to accommodate peak hour traffic flows which include a northbound morning volume in excess of 900 vehicles per hour and southbound evening volumes of more than 750 vehicles per hour. Furthermore, the accident history at the intersection for the three-year study period indicates a total of 32 accidents of which 20 were the right angle type.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control based on a reduction to 70% of the volumes normally required where the 85th percentile speed of traffic exceeds 40 mph. Accordingly, the following improvements are recommended:

- Widen Mercerville Quakerbridge Road to 50 feet between curbs.
- Improve Youngs Road to a paved width of 40 feet west of the intersection and 30 feet to the east.
- Provide two-phase, semi-actuated signal control.

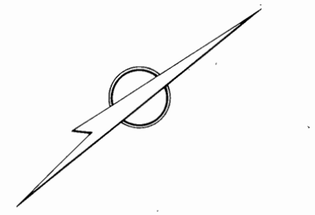
Benefit

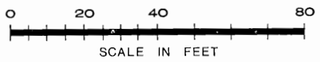
The widening of Mercerville Quakerbridge Road and Youngs Road will provide sufficient intersection capacity to accommodate peak hour traffic flows. It is further anticipated that the proposed signal control will sharply reduce the incidence of right angle accidents as well as the delays presently incurred by traffic during peak hour flows.

Cost Estimate

Construction	$41,000.00
Engineering	5,000.00
Total	$46,000.00

Figure B7





Notes

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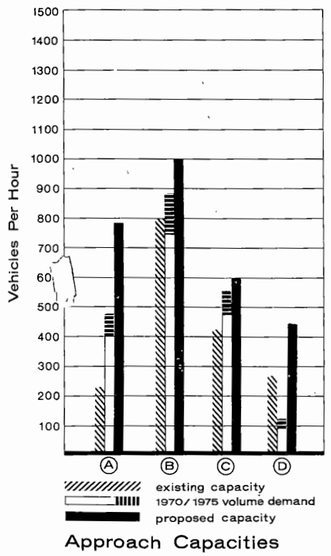
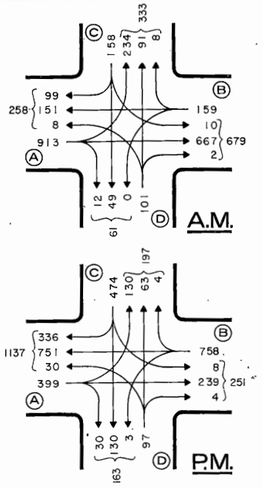
4. ALL SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN a AT ALL PUSH BUTTONS.

Legend

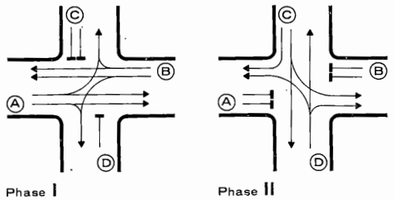
- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB — PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT



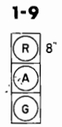
Approach Capacities



Peak Hour Traffic·1970



Signal Phasing



Signal Faces

Sign Legend

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

MERCERVILLE QUAKERBRIDGE ROAD

YOUNGS ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

KLOCKNER AVENUE AND EAST STATE STREET EXTENSION (Figure B8)

Existing Conditions

The principal intersection on the south side of the Cornell Heights Bridge is that of Klockner Avenue and East State Street Extension. It is estimated that two-thirds of the 12,500 vehicles that use the bridge each day pass through this intersection.

The minimum curb to curb width of East State Street is 48 feet and that of Klockner Avenue is 30 feet, yet the southbound approach of Klockner accommodates in excess of 800 vehicles during the evening peak hour. This is more than twice the volume of any of the other three approaches. Heavy left turn volumes are characteristic from the northbound approach of Klockner during the morning peak hour and from the southbound approach during the evening peak hour. Accidents at the intersection have increased successively for two years following the first of three years that the accident history was examined. The total number of accidents amounted to 50, of which 34 were the right angle type.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, the following improvements are recommended:

- Widen Klockner Avenue in the vicinity of the intersection to 40 feet.
- Provide increased corner radii.
- Provide three-phase, fully actuated traffic signal control with a lagging left turn phase for southbound Klockner Avenue.

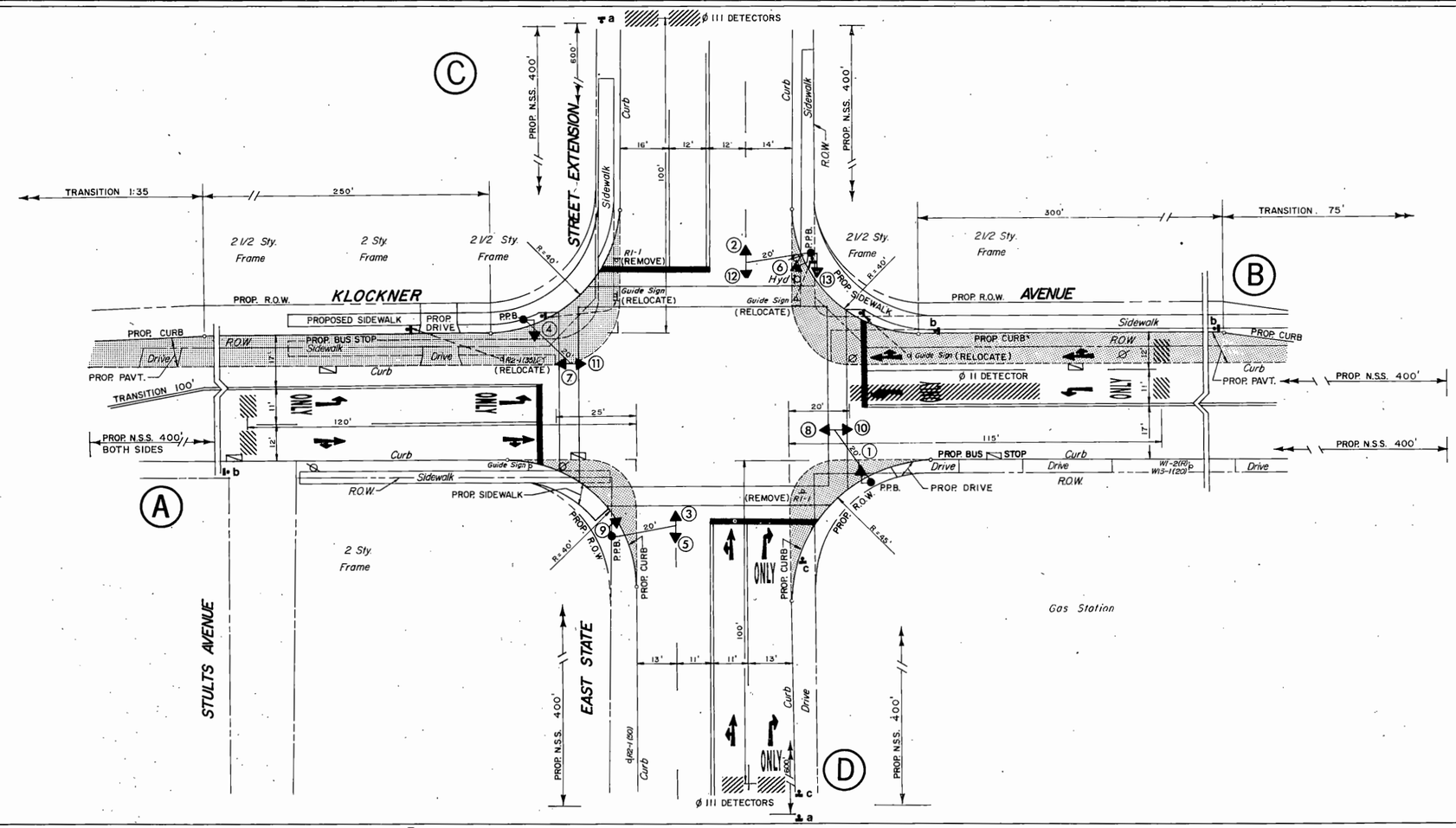
Benefit

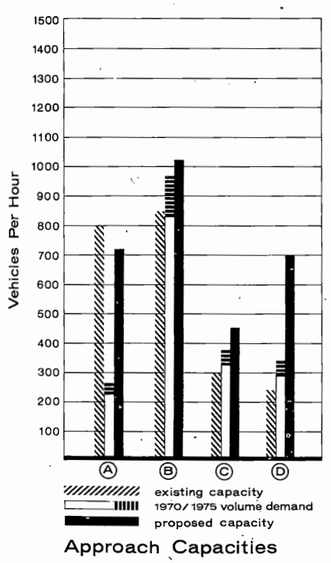
It is anticipated that the proposed traffic signal control will relieve the high accident incidence at the intersection, and fully actuated signal control will provide the flexibility of operation required to efficiently accommodate the wide fluctuation in traffic volumes. Furthermore, the widening of Klockner will permit two approach lanes for northbound and southbound traffic and assure adequate intersection capacity.

Cost Estimate

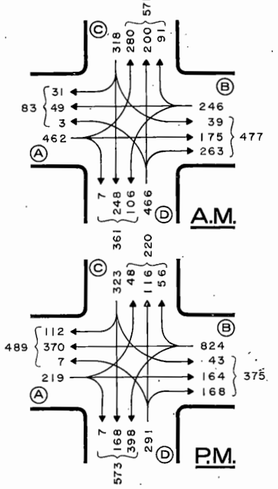
Construction	$50,400.00
Engineering	6,000.00
Total	$56,400.00

Figure B8

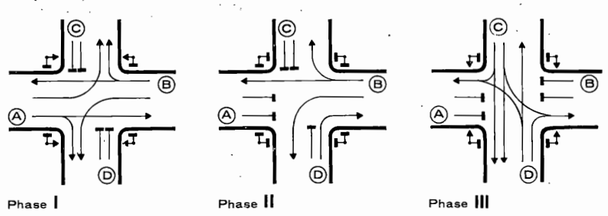




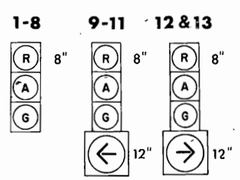
Approach Capacities



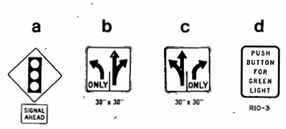
Peak Hour Traffic-1970



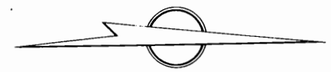
Signal Phasing



Signal Faces



Sign Legend



0 20 40 80

SCALE IN FEET

Notes

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6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN d AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III • Hamilton Township

KLOCKNER AVENUE

EAST STATE STREET EXTENSION

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

SOUTH OLDEN AVENUE AND ARENA DRIVE (Figure B9)

Existing Conditions

Arena Drive forms a skewed "T" type intersection with South Olden Avenue. The principal flow of traffic occurs between Arena Drive (with a 55-foot paved width) and the westerly leg of South Olden Avenue (with a 36-foot paved width).

The three-year accident history at the intersection indicates a total of 29 accidents, of which 13 were right angle type and five were same direction type. Intersection control is provided by YIELD signs displayed to Arena Drive traffic.

The proposed Interstate Route 295 interchange with South Olden Avenue and with Arena Drive, approximately one-half mile to the east, will result in the attraction of additional traffic to the local street network to the extent that the capacity of the existing intersection will be deficient by 1975.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control for seven hours of the traffic count period. Accordingly, the following improvements are recommended:

- Widen South Olden Avenue and channelize Arena Drive and the west leg of South Olden Avenue.
- Provide two-phase, semi-actuated traffic signal control with continuous operation of west to south traffic movements.
- Operate Graffam Avenue one-way in the northbound direction for one block.

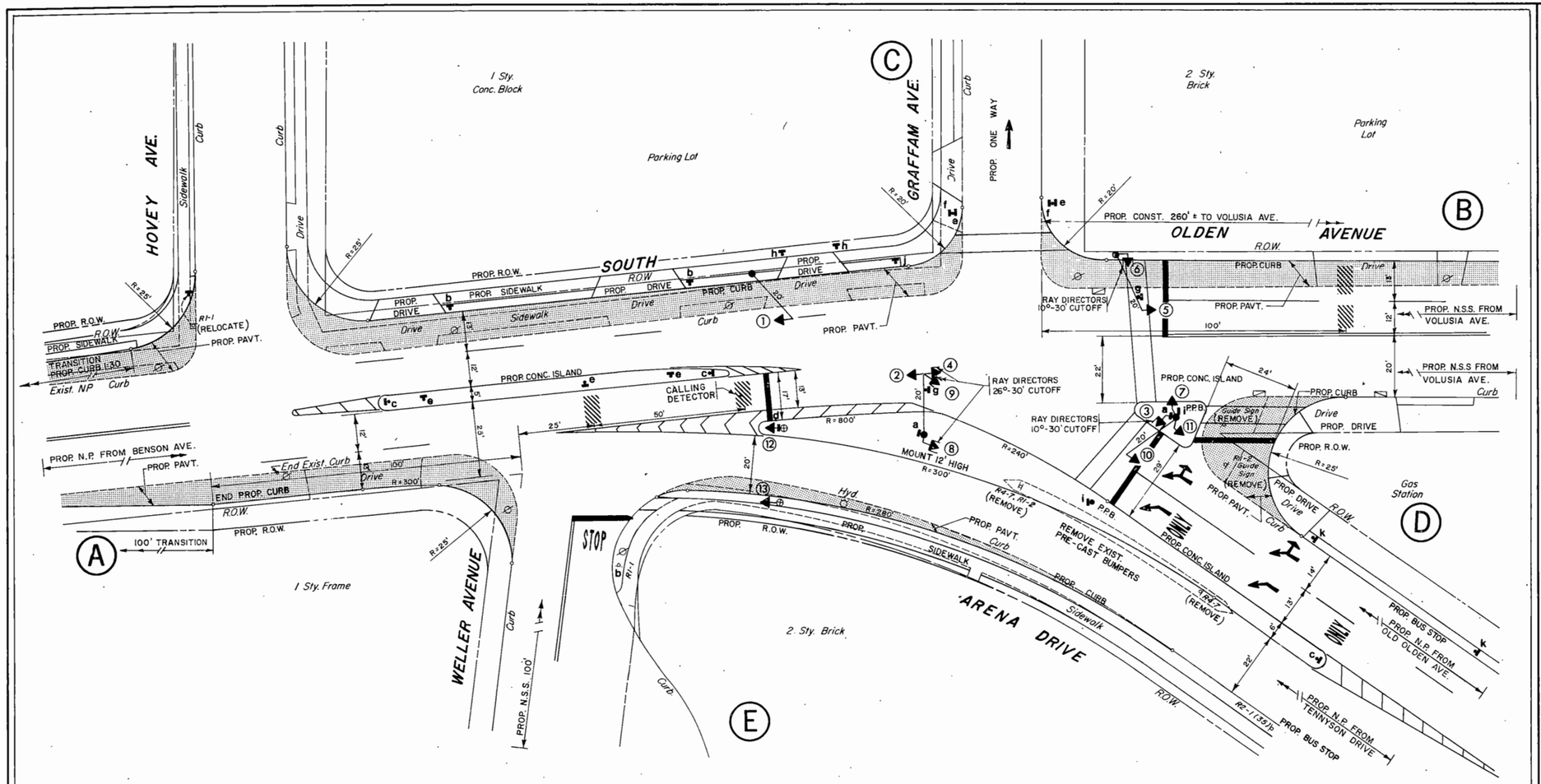
Benefit

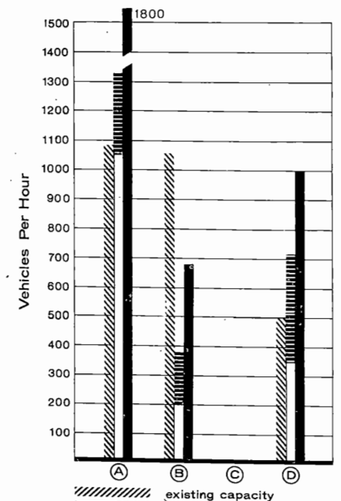
The proposed widening of South Olden Avenue will provide for the flow of two lanes of traffic from Arena Drive through the intersection to the west, and the channelization will serve to separate opposing traffic flows along the curved alignment that the major flow of traffic must assume in traversing the intersection. Thus, it is anticipated that 1975 traffic volumes will be readily accommodated, including traffic generated as a result of Interstate Route 295 construction. The proposed traffic signal control in conjunction with the roadway improvements will provide for the distribution of intersection approach capacity commensurate with the approach volume demands. The signal will minimize delays to the major traffic movements that pass through the intersection while also reducing the potential for right angle type accidents.

Cost Estimate

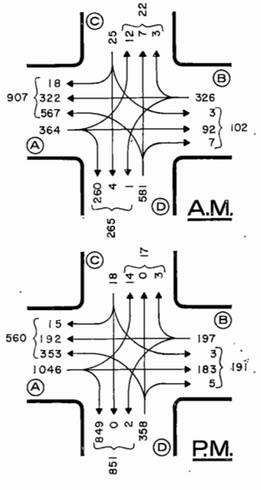
Construction	$54,700.00
Engineering	6,600.00
Total	$61,300.00

Figure B9

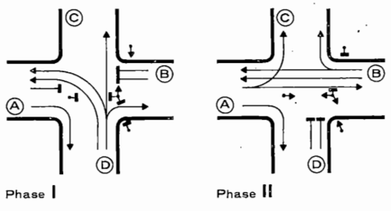




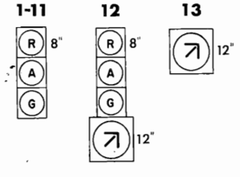
Approach Capacities



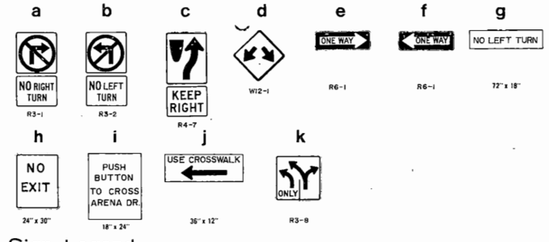
Peak Hour Traffic·1970



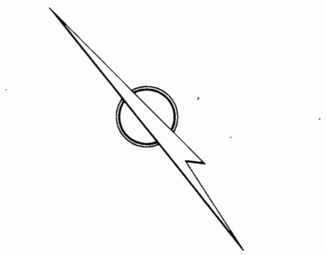
Signal Phasing



Signal Faces



Sign Legend



Notes

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2. PROPOSED NOTED BY UPPER CASE LETTERING.
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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

SOUTH OLDEN AVENUE
ARENA DRIVE

NEW JERSEY DEPARTMENT OF TRANSPORTATION
September 1972 Travers Associates Consultants

A total of 28 traffic signal installations are presently in operation in Hamilton Township. Of these, 16 are located on the State highway system, 11 are under the jurisdiction of the County of Mercer, and one installation is owned by the municipality. All existing signalized installations were investigated relative to their physical and operational adequacy. Three of the signals are relatively new and require minor additions or changes to qualify for State approval. These are the two County installations at the Hamilton Avenue/Klockner Avenue intersection and the South Broad Street/Sunnybrae Boulevard intersection, and the municipally-owned installation at the South Clinton Avenue/Park Avenue intersection. It is anticipated that these deficiencies will be corrected in the near future and that State approval will be issued.

Recommendations for improvements have been made relative to 11 of the signals on the State highway system. The proposals range from revisions to the signal timing to complete replacement of the signal hardware. In keeping within the guidelines established by the New Jersey Department of Transportation, these improvements have not been scheduled for implementation, nor have cost estimates or illustrations been prepared. The State-owned traffic signal installations at the following locations are discussed in this section of the report:

U.S. Route 206/Chambers Street-Rennie Street
U.S. Route 206/Park Avenue
U.S. Route 206/Beech Avenue-Trebor Drive
U.S. Route 206/Fetter Avenue-Harcourt Drive
U.S. Route 206/Homestead Avenue-Hobson Avenue
N.J. Route 33/Klockner Avenue
N.J. Route 33/Hamilton Avenue
N.J. Route 33/Concord Avenue
N.J. Route 33/Nottingham Way-Winslow Avenue
N.J. Route 33/Mercerville Whitehorse Road
N.J. Route 156/Yardville Allentown Road

Recommendations have been made for improvements to nine County-owned signal installations. The installation at the Mercerville Quakerbridge Road/Sloane Avenue-Flock Road intersection has been granted temporary authorization to operate as a fixed-time signal with the provision that it be converted to semi-actuated operation. The conversion of signal operation, as well as geometric improvement, has been proposed as an Early Implementation project and is discussed in another section of the report.

Of the eight County signal installations discussed in this section of the report, seven have not previously received State approval. The proposals presented herein range from the regulation of parking to reconstruction of portions of the roadway and replacement of all the existing signal hardware and are located as follows:

East State Street/Nottingham Way (Illustrated)
East State Street/Whitehead Road (Illustrated)*
Chambers Street/Cedar Lane
East State Street/Johnston Avenue
Nottingham Way/Mercerville Quakerbridge Road
South Olden Avenue/Liberty Street
South Olden Avenue/Cedar Lane
White Horse Avenue/Arena Drive

*Improvement of the East State Street/Whitehead Road intersection is to be completed by the County outside of the TOPICS program.

EAST STATE STREET AND NOTTINGHAM WAY (Figure B10)

Existing Conditions

No approval has been issued for the existing signal at the intersection of East State Street and Nottingham Way which operates as a school crossing. The signals operate on a fixed-time basis and an 80-second cycle, with the "green" time equally divided between the two streets. Parking is permitted on all approaches, and traffic delays are a daily occurrence, particularly on Nottingham Way. In addition, the left signal head, facing the west approach, is hidden by tree branches.

A total of 23 accidents have been reported during the three-year study period, including seven right angle type, nine same direction type, five involving fixed objects, and one involving a pedestrian.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, it is recommended that traffic signal control be retained and that the following improvements be made:

- Provide two-phase, semi-actuated traffic signal control with pedestrian indications at the four crosswalks.
- Reorganize the existing traffic signal heads and provide additional heads to include adequate coverage for crossing pedestrians.
- Trim the tree in the northwest corner.
- Prohibit the stopping and standing of motor vehicles as indicated on the plan.

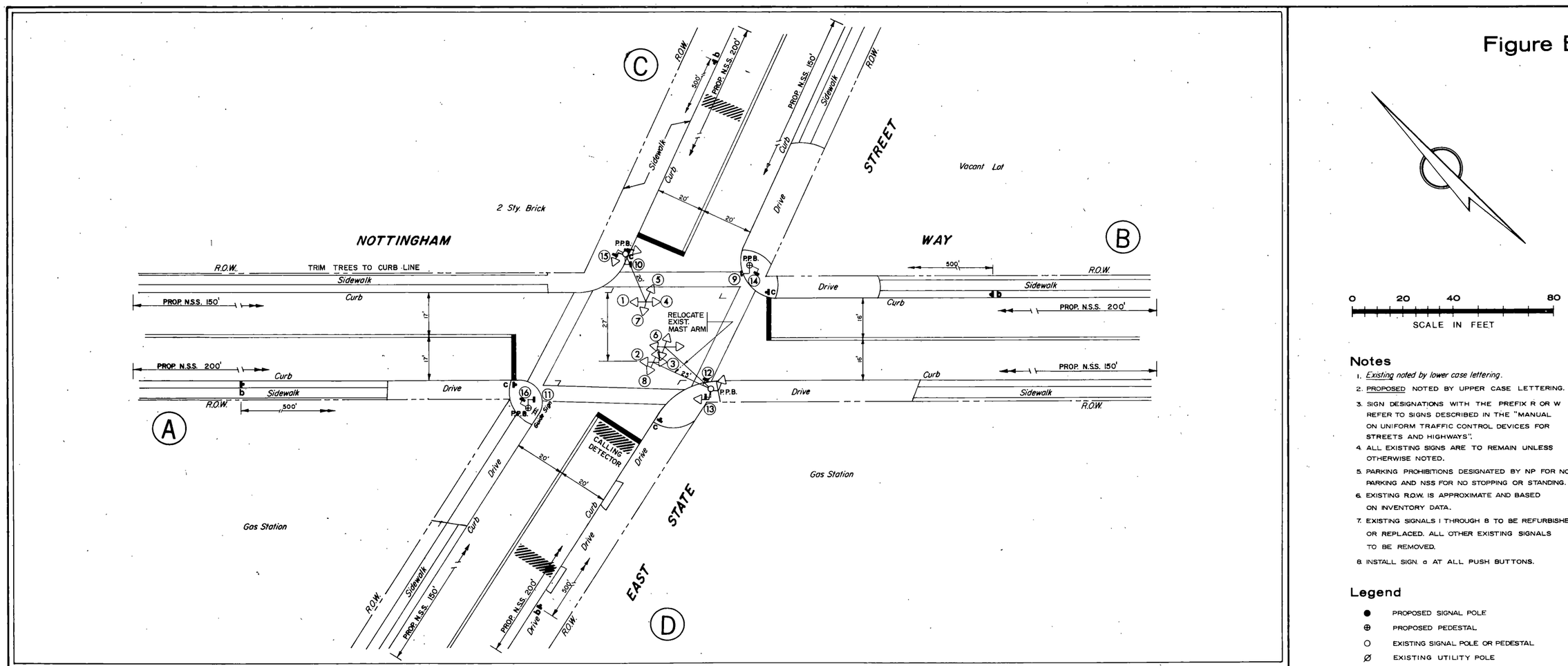
Benefit

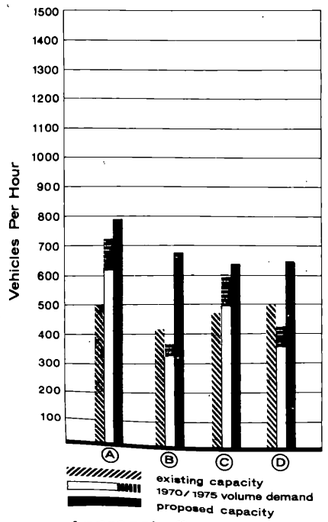
The removal of curb parking in the vicinity of the intersection will provide the additional intersection capacity to accommodate peak period traffic volumes. Relocating existing signal heads and providing additional faces, as well as trimming the tree, will assure better signal recognition. Finally, the semi-actuated type controller will provide the additional benefit of proportioning "green" time relative to demand, thereby minimizing delays.

Cost Estimate

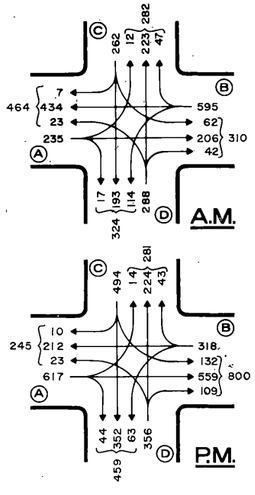
Construction	$ 8,900.00
Engineering	1,100.00
Total	$10,000.00

Figure B10

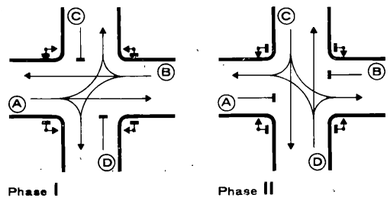




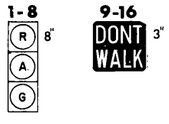
Approach Capacities



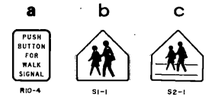
Peak Hour Traffic-1970



Signal Phasing



Signal Faces



Sign Legend

0 20 40 80

SCALE IN FEET

Notes

1. *Existing noted by lower case lettering.*
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
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5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. EXISTING SIGNALS 1 THROUGH 8 TO BE REFURBISHED OR REPLACED. ALL OTHER EXISTING SIGNALS TO BE REMOVED.
8. INSTALL SIGN a AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

EAST STATE STREET

NOTTINGHAM WAY

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

EAST STATE STREET AND WHITEHEAD ROAD (Figure B11)

Existing Conditions

East State Street and Whitehead Road forms a skewed intersection which is controlled by a fixed-time traffic signal that can be preempted by the nearby fire station. Signalization has been authorized, but the existing installation has not been approved. Present operation permits conflicting movements from East State Street and Adella Avenue to occur simultaneously, and signal timing is inadequate to accommodate Whitehead Road traffic during the evening peak period of operation. The heavy westbound right turn movement from East State Street to Whitehead Road includes semi-trailers which have difficulty negotiating the turn. The principal flow of traffic at the intersection occurs on Whitehead Road and the south leg of East State Street.

The three-year accident history indicates a total of 14 reportable accidents of which two were right angle type, five same direction type, five involved fixed objects, and two were head-on collisions.

Proposed Improvements

Present volumes meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control with preemption retained for the fire station, and an all-red clearance interval after each signal phase.
- Close the driveway which enters the intersection from the Delaware Valley Warehouse Company and provide a new drive on Roberts Avenue.
- Reconstruct the channelizing island in the northeast corner of the intersection and realign and channelize the west approach.

Proper signal operation requires reversal of the existing westbound one-way operation of Adella Avenue, which in turn suggests that the existing eastbound one-way operation of Victor Avenue also be reversed.

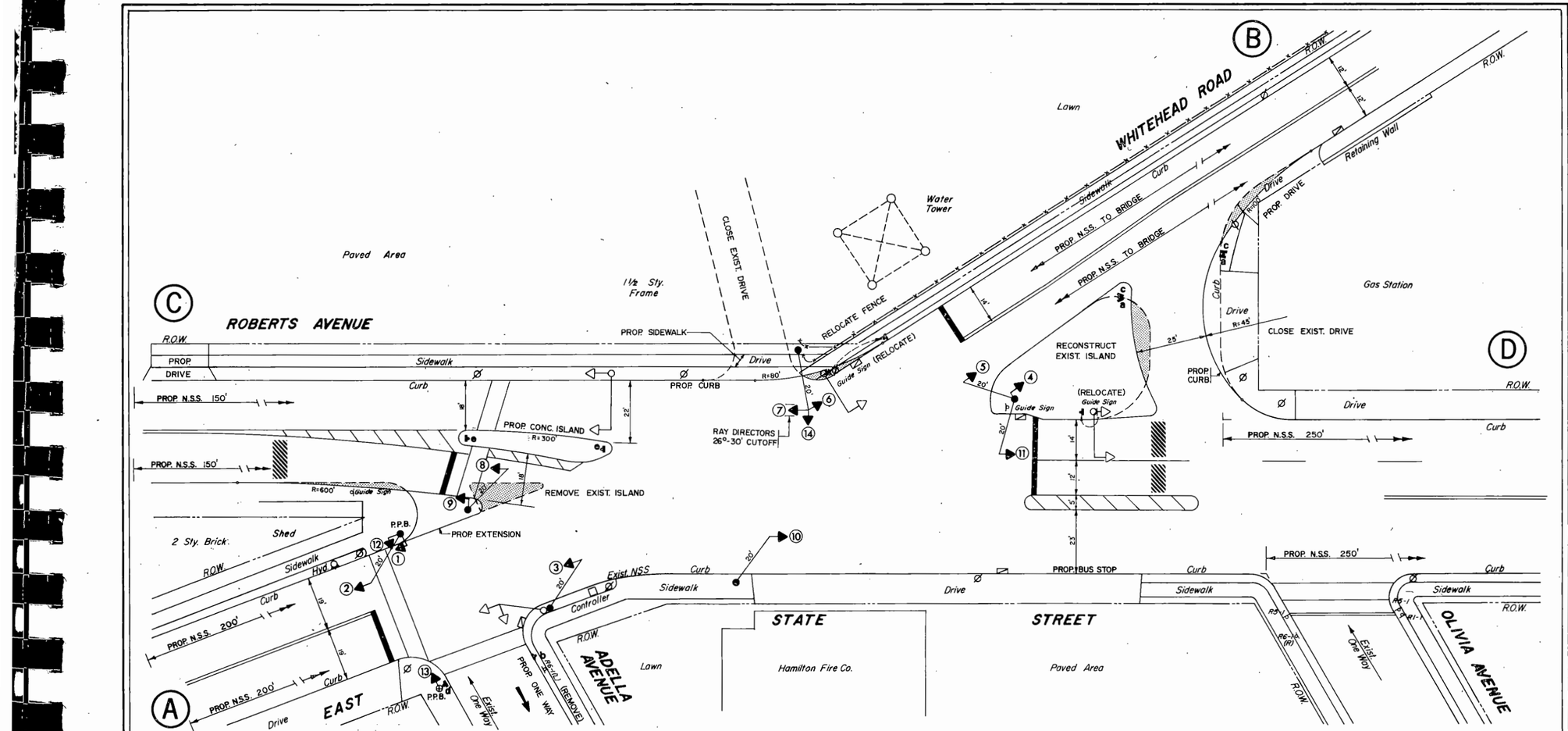
Benefit

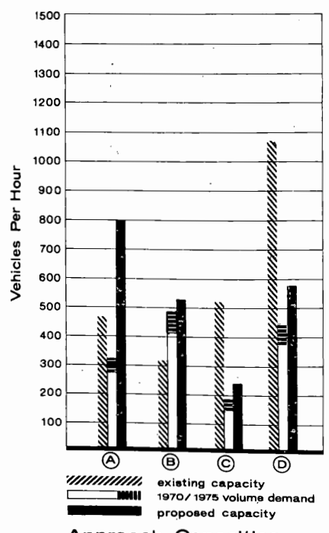
Semi-actuated signal control will permit greater flexibility of signal timing, thus assuring the apportionment of the "green" in relation to demand, thereby minimizing delay. The potential for head-on collisions will be reduced by the physical channelization which will serve to guide motorists through the intersection. Finally, the potential for right angle type accidents will be reduced by prohibition of conflicting movements from Adella Avenue.

Cost Estimate

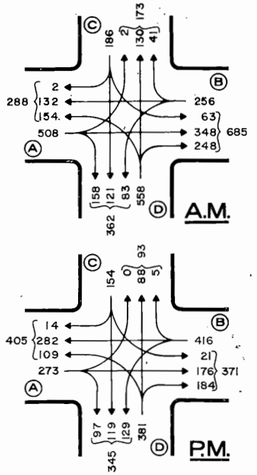
The County is proceeding with plans to improve the East State Street/ Whitehead Road intersection with an alternate plan. Accordingly, the proposed improvement has not been scheduled for TOPICS implementation.

Figure B11

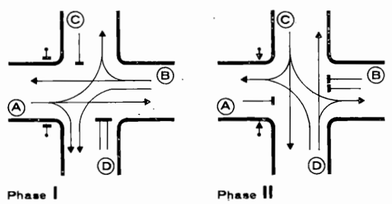




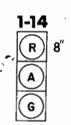
Approach Capacities



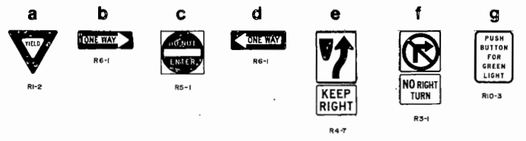
Peak Hour Traffic-1970



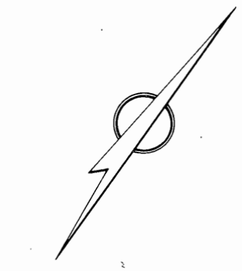
Signal Phasing



Signal Faces



Sign Legend



0 20 40 80

SCALE IN FEET

Notes

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6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. REMOVE EXISTING SIGNALS.
8. INSTALL SIGN g AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III • Hamilton Township

EAST STATE STREET

WHITEHEAD ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

U.S. ROUTE 206 (SOUTH BROAD STREET) AND CHAMBERS STREET-RENNIE STREET (Not Illustrated)

Existing Conditions

Chambers Street forms a skewed "T" intersection with U.S. Route 206 while Rennie Street (a minor street) meets the highway at a conventional "T" approximately 35 feet east of Chambers Street. An elementary school is located on the north side of South Broad Street between Chambers Street and Rennie Street, and a fire station is located on the easterly corner of Rennie Street and South Broad Street. In addition, there is a first aid ambulance garage on Rennie Street, just north of the fire station.

Traffic is presently controlled by a two-phase, fixed-time traffic signal which is an old, pedestal mounted installation. Current operation permits a right angle conflict between Chambers Street and Rennie Street traffic, and, during periods of heavy pedestrian demand, the signal is manually operated. The three-year accident history at the Chambers Street intersection shows a total of 25 accidents, including 14 of the same direction type and eight involving fixed objects. At the Rennie Street intersection, the accident history includes eight same direction type and two right angle type accidents of the 15 total.

Proposed Improvements

It is recommended that the existing signals be replaced as follows:

- Provide three-phase, semi-actuated traffic signal control with Chambers Street and Rennie Street the actuated phases, and provide push buttons to actuate an extended Chambers Street phase.
- Provide preemption capability of the signals.
- Provide over-the-road signals in lieu of present pedestal mounted signals.
- Relocate the existing crosswalk on U.S. Route 206 to west of Chambers Street, and prohibit left turns from South Broad Street to Chambers Street.
- Do not provide for manual control of the new signal installation, but continued use of school crossing guard protection is appropriate.

As an alternate solution to providing three-phase signal operation, consideration should be given to making Rennie Street a one-way northbound street with two-phase signal control.

Benefit

Mast arm mounted signals will provide greater visibility than the pedestal mounted signals and will thus reduce the same direction accident potential. Three-phase signal operation will minimize the right angle type accident potential, and the relocated pedestrian crossing will obviate the need for the manual control, thereby avoiding total traffic stoppage during pedestrian crossings.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 (SOUTH BROAD STREET) AND PARK AVENUE (Not Illustrated)

Existing Conditions

The intersection of U.S. Route 206 and Park Avenue is controlled by a two-phase, semi-actuated traffic signal. Traffic volumes show light left turn movements off U.S. Route 206, which indicates that the 13 left turn accidents are probably the result of great traffic pressure during peak periods. Analysis of the accident history at the intersection indicates 26 right angle type, 33 same direction type, together with 15 in other classifications, for a total of 77 during the three-year study period.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide left turn refuge lanes in the median of U.S. Route 206 for both directions of travel.
- Provide a two-second, all-red clearance interval after both vehicle phases.
- Prohibit stopping and standing of motor vehicles for a distance of 150 feet from the intersection along both sides of South Broad Street on both the approaching and leaving sides.
- Sign the existing prohibitions along Park Avenue.

Benefit

The addition of left turn refuge lanes will decrease the potential for same direction type accidents by removing waiting vehicles from the through lanes of traffic. Furthermore, left turning motorists will not be as pressured; thus, it is anticipated that the potential of left turn type accidents will also be reduced. The proposed all-red clearance phases will reduce the right angle accident potential, while the stopping and standing prohibition will reduce traffic friction, thereby enhancing operations at the intersection.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 (SOUTH BROAD STREET) AND BEECH AVENUE-TREBOR DRIVE (Not Illustrated)

Existing Conditions

This intersection provides the only ingress and egress for westbound South Broad Street traffic to the Independence Mall Shopping Center. While eastbound left turns are prohibited, westbound left turns from U.S. Route 206 are heavy and are accommodated in a median lane controlled by the third phase of a semi-actuated traffic signal. Over-the-road signal indications are limited to one face in each direction for U.S. Route 206 traffic, and the left turn phase is controlled by two pedestal mounted signals with eight-inch louvered lenses including a green arrow. The accident history includes a total of 28, of which 15 were same direction type, eight right angle type, and five involved left turns.

Proposed Improvements

It is recommended that the following improvements be made:

- Supplement the existing three-way, over-the-road signal heads with a fourth signal face.
- Replace the existing eight-inch green arrow located in the median with a twelve-inch optically programmed signal.
- Supplement the pedestals in the northwest and southeast corners with a second signal head to provide indications to pedestrians crossing U.S. Route 206 and Beech Avenue-Trebor Drive.
- Provide a WAIT FOR GREEN sign for eastbound traffic.

Benefit

The increased visibility afforded by the proposed signal modifications will potentially alleviate the left turn and same direction accident problems. And, the proposed sign will potentially reduce false starts by eastbound motorists, thus minimizing the possibility of left turning accidents. Finally, the potential for right angle type accidents will be reduced by the all-red interval.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 (SOUTH BROAD STREET) AND BEECH AVENUE-TREBOR DRIVE (Not Illustrated)

Existing Conditions

This intersection provides the only ingress and egress for westbound South Broad Street traffic to the Independence Mall Shopping Center. While eastbound left turns are prohibited, westbound left turns from U.S. Route 206 are heavy and are accommodated in a median lane controlled by the third phase of a semi-actuated traffic signal. Over-the-road signal indications are limited to one face in each direction for U.S. Route 206 traffic, and the left turn phase is controlled by two pedestal mounted signals with eight-inch louvered lenses including a green arrow. The accident history includes a total of 28, of which 15 were same direction type, eight right angle type, and five involved left turns.

Proposed Improvements

It is recommended that the following improvements be made:

- Supplement the existing three-way, over-the-road signal heads with a fourth signal face.
- Replace the existing eight-inch green arrow located in the median with a twelve-inch optically programmed signal.
- Supplement the pedestals in the northwest and southeast corners with a second signal head to provide indications to pedestrians crossing U.S. Route 206 and Beech Avenue-Trebor Drive.
- Provide a WAIT FOR GREEN sign for eastbound traffic.

Benefit

The increased visibility afforded by the proposed signal modifications will potentially alleviate the left turn and same direction accident problems. And, the proposed sign will potentially reduce false starts by eastbound motorists, thus minimizing the possibility of left turning accidents. Finally, the potential for right angle type accidents will be reduced by the all-red interval.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 (SOUTH BROAD STREET) AND FETTER AVENUE-HARCOURT DRIVE (Not Illustrated)

Existing Conditions

Fetter Avenue from the north and Harcourt Drive from the south form an offset type intersection with U.S. Route 206, having a centerline offset of about 20 feet. Because of this geometry, signal visibility on Fetter Avenue is primarily limited to one overhead face. Signal indications for each direction of U.S. Route 206 include one over-the-road face, one median pedestal mounted face, and a far right pedestrian face. It is noted that, of the 17 total accidents recorded during the study period, ten were of the same direction type.

Proposed Improvements

It is recommended that the following improvements be made:

- Supplement the existing three-way, over-the-road signal heads with a fourth signal face.
- Provide a pedestal mounted signal on the southwest corner, opposite Fetter Avenue.
- Provide a two-second, all-red clearance interval after each vehicle phase.

Benefit

The additional signal faces for U.S. Route 206 traffic will increase signal visibility, thereby reducing the potential for same direction type accidents. Moreover, it is anticipated that the pedestal signal and the all-red clearance interval will tend to stem the incidence of right angle accidents by providing increased signal visibility and a margin of safety between conflicting vehicular movements.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 (SOUTH BROAD STREET) AND HOMESTEAD AVENUE-HOBSON AVENUE (Not Illustrated)

Existing Conditions

Homestead and Hobson Avenues meet U.S. Route 206 as "T" type intersections from the north and south respectively. The centerline of Homestead Avenue is offset 75 feet east of Hobson, and a median island, 30 feet long, separates the two intersections. A two-phase, semi-actuated signal provides traffic control, but only one overhead signal indication is displayed to each direction of highway traffic. Hobson Avenue is marked for two approach lanes while Homestead Avenue, which experiences the heavier demand, is wide enough for only one. Of the 32 total accidents recorded for the three-year study period, 21 were of the same direction type, six were of the right angle type, and two were left turn type accidents.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide an additional signal face on the existing mast arm located at the southeast corner of U.S. Route 206 and Hobson Avenue, facing westbound traffic.
- Provide an additional over-the-road signal face on a new pole and mast arm to be located on the north side of U.S. Route 206, west of Hobson Avenue, for eastbound traffic.
- Extend the existing parking regulations for Homestead and Hobson Avenues to a distance of 150 feet from the intersection, on both sides of the roadway.

Benefit

The addition of the two overhead signal faces will provide a more visible and balanced arrangement for both approaches of South Broad Street, thereby decreasing the same direction type accident potential. Extending the stopping and standing prohibitions will assure the free flow of traffic on the Homestead and Hobson Avenue legs minimizing traffic friction on the approaches.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33 (NOTTINGHAM WAY) AND KLOCKNER AVENUE (Not Illustrated)

Existing Conditions

The intersection of Route 33 and Klockner Avenue is controlled by a two-phase, semi-actuated traffic signal. The three-lane highway is marked for four lanes at the intersection, but, just west of Klockner Avenue, the right westbound lane ends abruptly causing driver confusion and unsafe maneuvering. A similar condition exists in the eastbound lanes of Route 33. Over-the-road signals displayed to southbound Klockner Avenue traffic are limited to one face. Examination of the accident history at the intersection indicates 19 same direction type, seven right angle type, and seven left turn type accidents, plus three others, for a total of 36.

Proposed Improvements

As discussed in the TRAFFIC OPERATIONS section of this report, major improvements are ultimately expected for Route 33. Hence, the lack of appropriate lane transitions will be corrected in the future. It is recommended that the following improvements be made:

- Supplement the existing three-face signal head on the mast arm located on the southwest corner with a fourth signal face facing the north approach of Klockner Avenue.
- Provide a two-second, all-red clearance interval following the Klockner Avenue phase.

Benefit

The addition of a signal face for the southbound Klockner Avenue approach will give each approach two over-the-road indications, thereby encouraging better driver response and decreasing the likelihood of right angle accidents. The all-red interval will also tend to promote safer intersection operation by providing a safety margin between conflicting traffic maneuvers.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33 (NOTTINGHAM WAY) AND HAMILTON AVENUE (Not Illustrated)

Existing Conditions

N.J. Route 33 and Hamilton Avenue meet as a skewed "T" type intersection, and North Hamilton Avenue intersects the highway as a "T." The two-phase, semi-actuated signal permits traffic from North Hamilton Avenue (which averages less than 50 vehicles per hour) to enter the intersection simultaneously with movements to and from Hamilton Avenue. All signal indications, including green arrows, are eight-inch diameter lenses. Two of the three left turn type accidents involved the Hamilton to North Hamilton movement, and three of the six right angle type accidents involved North Hamilton Avenue traffic in a signalized right angle conflict. In addition, of the total 31 accidents during the three-year study period, four were of the head-on type.

Proposed Improvements

It is recommended that the following improvements be made:

- Operate North Hamilton Avenue as a one-way northbound street for a distance of one block from N.J. Route 33 to Lexington Place.
- Prohibit left turns from Hamilton Avenue.
- Replace the eight-inch green arrow signal indications with twelve-inch.
- Mount a bracket type signal indication facing Hamilton Avenue on the pole opposite the stop line on that approach.
- Permit the continuous movement of westbound Route 33 traffic unless a separate pedestrian phase is actuated.

Benefit

The elimination of the North Hamilton Avenue right angle conflict not only greatly increases the safety of the intersection, it also increases the capacity by allowing continuous movement of westbound Route 33 traffic. The prohibition of left turns from Hamilton Avenue will further reduce the accident potential. Furthermore, the addition of a signal face for Hamilton Avenue traffic and the use of twelve-inch arrow indications will increase visibility, thereby diminishing the potential for same direction accidents.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33 AND CONCORD AVENUE (Not Illustrated)

Existing Conditions

Concord Avenue is a signalized "T" intersection, approximately 200 feet east of Hamilton Avenue. Pedestrian push buttons on the west side of the intersection allow for pedestrian actuation of the Concord Avenue phase. Concord Avenue itself is actuated and marked for two approach lanes, as is Nottingham Way. Observations of existing parking practices indicated occasional parking on the pressure detectors. During the three-year study period, there were 17 accidents of which eight same direction type accidents comprised the largest single group, followed by three each of the right angle and left turn types.

Proposed Improvements

It is recommended that the following improvements be made:

- Extend the existing parking prohibitions along both sides of Concord Avenue to a distance of 150 feet from the intersection.

Benefit

The increased stopping and standing prohibitions will discourage parking over the detectors and allow freer movement into and out of Concord Avenue, thus increasing intersection capacity.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33, NOTTINGHAM WAY AND WINSLOW AVENUE (Not Illustrated)

Existing Conditions

Route 33 forms a skewed "T" type intersection with Nottingham Way, and Winslow Avenue intersects from the south as a "T" about 100 feet west of the skewed leg. Physical channelization in the Route 33 east approach separates eastbound and westbound traffic, and three-phase, semi-actuated traffic signals control all movements. During the Route 33 westbound phase, eastbound traffic is permitted to turn right to Route 33 only, but not to proceed straight into Nottingham Way. The right turning traffic is controlled by three, eight-inch green arrow indications. Two of these are mounted overhead, while the third is bracket mounted on the traffic island. No lane reservation signs are posted on any of the approaches. Combined accident histories for the intersection included 24 same direction type, nine right angle type, five involving fixed objects, and one head-on type accident contributing to a total of 45.

Proposed Improvements

It is recommended that the following improvements be made:

- Replace all three existing eight-inch green arrow indications with twelve-inch.
- Provide two lane reservation signs, designating the two left lanes for straight movements and the right lane for right turns only on the Route 33 eastbound approach.
- Prohibit left turns from Nottingham Way to Route 33.

Benefit

The twelve-inch lenses will markedly increase the visibility of the arrow indications as they normally are visible for several hundred feet. Thus, the potential for same direction accidents will be reduced. The ban on left turns into N. J. Route 33 will potentially reduce the number of left turn accidents, and the lane reservation signs for eastbound traffic will help promote a more efficient use of the right turn only phase by clearly defining the available lanes for that movement.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33 AND MERCERVILLE WHITEHORSE ROAD (Not Illustrated)

Existing Conditions

The intersection of Route 33 and Mercerville Whitehorse Road is one of the busiest in Hamilton Township with observed peak hour volumes of 640 vehicles southbound on the County road and 980 vehicles eastbound on the highway. Traffic is controlled by a two-phase, semi-actuated signal, and the highway operates with one approach lane in each direction, a condition which does not afford sufficient capacity during peak hours of operation.

A channelizing island located on the northwest corner eases southbound right turns. Although this movement is controlled by the signal, it tends to conflict with westbound traffic at the end of the Route 33 phase; traffic on the County road generally starts to move as westbound stragglers approach the merging area at the far end of the island. Of the 14 right angle type accidents that occurred at the intersection during the three-year study period, five involved this location.

The entrance to the Mercerville Shopping Center, located approximately 140 feet east of the intersection, appears to be a contributory factor in the accidents that have occurred at the intersection. Of the 45 total accidents recorded, 22 were of the same direction type, several of which undoubtedly directly or indirectly involved eastbound vehicles desiring to turn left into the Center. Access to the Center presently includes four principal two-way driveways, three on Route 33 and one on Mercerville Whitehorse Road.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide a two-second, all-red clearance interval following each vehicle phase.
- Close the most westerly shopping center driveway on Route 33, or reconstruct the driveway with channelization that would permit exiting right turns only.

Benefit

The all-red clearance phases will provide a margin of safety between conflicting movements, thereby reducing the potential of right angle type accidents. Modifying the shopping center drive will discourage vehicles from stopping on the highway immediately east of the intersection, thereby improving the flow of traffic while reducing same direction accident potential.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 156 and YARDVILLE ALLENTOWN ROAD (Not Illustrated)

Existing Conditions

N.J. Route 156 is an old State highway, which has been bypassed by U.S. Route 130. As a result, traffic on this north-south road is light, averaging just under 200 vehicles per hour southbound (in an eight-hour period) and half that number in the northbound direction. Yardville Allentown Road is a moderately traveled east-west commuter road, averaging approximately 300 vehicles per hour in both directions. The existing traffic signals operate two-phase, fixed-time, with mast arm signal faces displayed to Route 156 and pedestal mounted faces for Yardville Allentown Road. The three-year accident history shows a total of 13, including six same direction type accidents and two each of right angle and left turn types.

A plan proposed herein to improve traffic operation on South Broad Street will divert additional traffic to the Route 156/Yardville Allentown Road intersection, but the existing capacity will readily permit acceptance of the traffic load.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide two over-the-road signal indications for each direction of Yardville Allentown Road traffic.
- Provide a two-second, all-red clearance interval following the Route 156 phase.
- Prohibit the stopping and standing of vehicular traffic along both sides of each of the four legs for a distance of 150 feet from the intersection.

Benefit

Mast arm signals for Yardville Allentown Road will increase the signal visibility for these approaches, thus decreasing the potential for same direction accidents, and possibly for right angle accidents. The all-red phase will provide a margin of safety for the potential conflict between northbound left turning vehicles and cross street traffic. Finally, the stopping and standing prohibitions will insure the ability of left turning vehicles to be passed by others, maintaining the capacity of the intersection.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

CHAMBERS STREET AND CEDAR LANE (Not Illustrated)

Existing Conditions

The approaches of Chambers Street and Cedar Lane each accommodate one traffic lane. The existing two-phase, fixed-time traffic signal at the intersection apparently has not been authorized, a condition which cannot be confirmed since the State's records for the intersection are missing. The accident history shows six right angle type and four left turn type accidents contributing to the total of 13.

Proposed Improvements

Present traffic volumes meet the Minimum Vehicular Volume Warrant for traffic signal control. Moreover, the present signal layout conforms to accepted standards. Accordingly, the following improvements are recommended:

- Prohibit the stopping and standing of motor vehicles for a distance of 100 feet from the intersection on both sides of all four legs.
- Change the four-second amber intervals to three seconds, and provide a two-second, all-red clearance interval following both signal phases.

Benefit

The stopping and standing prohibitions will increase intersection capacity, thereby reducing delays, and the all-red intervals will potentially reduce the incidence of right angle type accidents.

Cost Estimate

Construction	$100.00
Engineering	-
Total	$100.00

EAST STATE STREET AND JOHNSTON AVENUE (Not Illustrated)

Existing Conditions

East State Street and Johnston Avenue each accommodate one lane of traffic in each direction. While East State Street typically carries a substantial volume of traffic during much of the day, Johnston Avenue accommodates a variable demand. Two-way volumes on Johnston Avenue, for example, can range from 500 vehicles during the morning commuter hour to 150 two hours later. Traffic signal control at the intersection has been authorized, but has not been granted approval, and consists of a two-phase, semi-actuated signal with detectors located on the Johnston Avenue approaches. The controller, however, is presently recalling the cross street phase, and vehicle extension is occurring. Furthermore, the pedestrian push buttons, originally located on three corners, have been removed. The four accidents involving pedestrians, together with four right angle type accidents, contribute to the total of 16 during the study period.

Proposed Improvements

Present volumes of traffic at the intersection indicate that seven of the eight survey hours meet the prescribed level of traffic volumes on the major street approaches, and that the higher minor street approach meets the criteria for five hours. During the latter period, the heavier Johnston Avenue approach accommodated volumes up to 468 vehicles per hour, with heavier flows concentrated during the morning and evening commuter period. Accordingly, the retention of traffic signal control is recommended, and the following improvements are proposed:

- Restore semi-actuated operation of the signal by repairing or replacing the controller and detectors as necessary, and add a fourth signal face to the existing signal head suspended over the southeast corner.
- Install pedestal signals on the northeast and southwest corners along with a full set of four pedestrian buttons and painted crosswalks.
- Prohibit the stopping and standing of motor vehicles for a distance of 150 feet along the two sides of Johnston Avenue, on both legs, and along the two sides of the north leg of East State Street.

Benefit

Restoration of the semi-actuated operation will decrease delays, and the stopping and standing prohibitions will increase intersection capacity by providing two full approach lanes on each leg. In addition, the pedestal signals, pedestrian push buttons, and crosswalks will afford greater protection to pedestrians.

Cost Estimate

Construction	$5,500.00
Engineering	700.00
Total	$6,200.00

NOTTINGHAM WAY AND MERCERVILLE QUAKERBRIDGE ROAD (Not Illustrated)

Existing Conditions

Commonly called the Five Points, this is the intersection of three major arteries: Mercerville Whitehorse-Mercerville Quakerbridge Roads (north-south), Nottingham Way-Mercerville Edinburg Road (east-west), and Nottingham Way (northwest-southeast). Traffic is controlled by a three-phase, semi-actuated traffic signal with east-west movements operating on the non-actuated phase. Northwest movements from Nottingham Way are given the "green" on the third phase of the signal cycle. The signal has New Jersey Department of Transportation conditional authorization requiring ultimate two-phase operation; thus, no approval has been given.

The eastbound approach of Nottingham Way operates with three lanes that are reserved by a single sign designating the left lane as left turn and straight, the center lane as straight only, and the right lane as right only. This last movement may be made during the Nottingham Way actuated phase, and it is controlled by three, eight-inch green arrows on one overhead and two bracket mounted signal faces. Of the 30 accidents recorded during the three-year study period, eleven were same direction type and eight each were of the right angle and left turn type.

Proposed Improvements

Traffic count data at nearby intersections indicate that traffic volumes at the Nottingham Way and Mercerville Quakerbridge Road intersection meet the prescribed requirements of the Minimum Vehicular Volume Warrant for traffic signal control. It is recommended that the signal operation be retained and that the following improvements be made:

- Revise controller operation so that the Nottingham Way phase is actuated.
- Replace the eight-inch green arrows with twelve-inch arrow indications.
- Install lane reservation signs along the eastbound approach of Nottingham Way, and paint appropriate arrows in each of the approach lanes.

Benefit

It is anticipated that restoration of actuated operation of the signal will improve traffic operation in terms minimizing wasted "green" time. The additional lane reservation sign, the pavement markings, and the twelve-inch arrows will provide more positive visual direction to motorists thereby minimizing last second lane changing and reducing the same direction type accident potential.

Cost Estimate

Construction	$1,800.00
Engineering	200.00
Total	$2,000.00

SOUTH OLDEN AVENUE AND LIBERTY STREET (Not Illustrated)

Existing Conditions

Each of the four approaches at South Olden Avenue and Liberty Street accommodates one approach traffic lane. Existing traffic control at the intersection consists of a fixed-time, two-phase signal which was reconstructed in 1957 according to an approved plan. No final approval, however, has been granted for the installation. The lack of parking prohibitions and curbing on the northeast corner, in addition to nonconforming pavement markings, are items which will require rectification before approval is given. The three-year accident history shows eleven same direction and four right angle type accidents out of a total of 17.

Proposed Improvements

Present volumes meet the Minimum Vehicular Volume Warrant for traffic signal control. Retention of signal control is recommended in accordance with the 1957 plan. In addition, the following improvements are recommended:

- Install curbing along the northeast corner of the intersection, and pave the shoulder as indicated on the plan.
- Repaint the existing crosswalks to provide a width of six feet, and relocate the stop lines to a position of four feet from the crosswalks.
- Prohibit the stopping and standing of motor vehicles on both sides of all four legs for a distance of 150 feet from the intersection.

Benefit

The physical widening and curbing of Liberty Street will permit two lanes of traffic to enter Liberty Street together, thus increasing capacity and minimizing delay. The stopping and standing prohibitions will reduce traffic friction through the intersection while reducing the potential for same direction type accidents. Finally, the repainted markings will afford greater safety to pedestrians.

Cost Estimate

Construction	$5,000.00
Engineering	600.00
Total	$5,600.00

SOUTH OLDEN AVENUE AND CEDAR LANE (Not Illustrated)

Existing Conditions

Each of the four approaches at the intersection of South Olden Avenue and Cedar Lane accommodates one approach lane of traffic controlled by a two-phase, fixed-time traffic signal. Two over-the-road signal heads are displayed to traffic on South Olden Avenue, but only one to Cedar Lane motorists. One bracket mounted signal head also faces each approach. During certain periods of the day, the glare of the sun adversely affects signal visibility to South Olden Avenue traffic.

Parking along the northerly curb of South Olden Avenue, in combination with the slightly skewed alignments, tends to direct westbound motorists into opposing traffic west of the intersection. The removal of parking was a condition for traffic signal approval dating from 1954. The accident history shows a total of 17 for the three-year study period, of which five were the same direction type, four were of the right angle type, and four involved fixed objects.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, retention of traffic signal control is recommended in addition to the following improvements:

- Install a fourth signal face on each of the existing overhead three-way signal heads.
- Install back plates on the overhead east-west signals.
- Prohibit the stopping and standing of motor vehicles along both sides on the two legs of South Olden Avenue for a distance of 150 feet from the intersection.

Benefit

The installation of additional overhead faces and back plates will enhance signal visibility, thereby encouraging better motorist response and reducing the potential for right angle type accidents. Furthermore, the posting of stopping and standing prohibitions will allow for freer intersection operation which will tend to decrease the potential for fixed object and head-on type accidents.

Cost Estimate

Construction	$1,500.00
Engineering	200.00
Total	$1,700.00

WHITE HORSE AVENUE AND ARENA DRIVE (Not Illustrated)

Existing Conditions

White Horse Avenue and Arena Drive intersect at right angles, approximately 2200 feet north of U.S. Route 206. Both experience heavy evening peak hour traffic volumes, 680 southbound on White Horse Avenue and 600 eastbound on Arena Drive. Left turn volumes, however, are generally not great. Traffic is controlled by an unapproved two-phase, fixed-time signal, and channelizing islands separate eastbound and westbound traffic on Arena Drive. Each of the four approaches accommodates two approach lanes of traffic with the left lane marked for left turns only; no lane reservation signs are posted, however. Currently, only the west approach leg of Arena Drive has no ordained parking regulations. The three-year accident history total is 49, including 19 of the right angle type, 15 same direction type, and 12 left turn type accidents.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, retention of traffic signal control is recommended in addition to the following improvements:

- Replace all eight-inch overhead signal faces with twelve-inch indications.
- Provide a two-second, all-red clearance interval after each vehicle phase.
- Remove all lane reservation markings and signs.
- Prohibit the stopping and standing of motor vehicles along both sides of the west leg of Arena Drive for a distance of 250 feet from the intersection.

Benefit

The twelve-inch lenses will provide greater signal visibility on all approaches, decreasing the potential for same direction accidents, and the all-red clearance intervals will provide a margin of safety between conflicting traffic movements, reducing right angle accident potential. The elimination of the lane reservations will increase the capacity of the intersection and provide smoother operation by eliminating restrictive lanes which are not being fully utilized, and the stopping and standing restrictions will further increase the capacity and reduce friction on Arena Drive.

Cost Estimate

Construction	$2,500.00
Engineering	300.00
Total	$2,800.00

Since the onset of the TOPICS study, new traffic signals have been installed at three intersections in Hamilton Township: U.S. Route 206 at Ruskin Avenue, Hamilton Avenue at Klockner Road, and South Clinton Avenue at Park Avenue. Furthermore, the County of Mercer has plans to install signals at the Mercerville Edinburg Road/Hughes Drive intersection. As a result of the Areawide TOPICS Study, the installation of traffic signals has been recommended at 15 additional locations on the TOPICS network where STOP or YIELD signs presently control traffic.

Of the 15 proposed signal installations, seven are included as Early Implementation projects and are discussed in an earlier section of the report. This section of the report deals with eight other proposed traffic signal projects. Except for one location (on the State highway system), the need for signalization has been determined on the basis of traffic volume demand, and in most instances, the accident history provided further evidence of the desirability for signal control. At several locations where signals have been recommended, the 1971 traffic counts had volumes lower than required by the Warrant for one to three hours out of the prescribed eight-hour total. In these instances, expected traffic growth has been considered in determining whether or not signal control should be provided. Thus, if it is expected that the Warrant will be fully satisfied within the scheduled TOPICS construction program, signal installation has been recommended:

The proposed signal improvement locations discussed in this section of the report are as follows:

Chambers Street/South Clinton Avenue
Liberty Street/Newkirk Avenue
Nottingham Way/Ward Avenue
Nottingham Way/Hamilton Square Yardville Road-Mercer Street
South Broad Street/Yardville Allentown Road
Whitehead Road/Sweet Briar Avenue
White Horse Avenue/South Clinton Avenue-Locust Avenue
U.S. Route 206/Dewey Avenue

In keeping with the established policy of the New Jersey Department of Transportation of only scheduling improvements that principally benefit users of local roads, no estimate has been prepared for the recommended project at the U.S. Route 206/Dewey Avenue intersection, nor has an illustration been prepared for it.

CHAMBERS STREET AND SOUTH CLINTON AVENUE (Figure B12)

Existing Conditions

South Clinton Avenue forms a skewed intersection with Chambers Street making right turn maneuvers from the latter very difficult. Operations are further complicated by Lily Street which cuts across both South Clinton Avenue and Chambers Street forming two secondary intersections in proximity to the principal intersection. Furthermore, pavement markings on both Chambers and South Clinton permit only one lane of travel in each direction, a situation which does not provide sufficient intersection capacity for the west approach of Chambers Street during the evening peak period of travel.

During the three-year study period, 24 reported accidents occurred at the Chambers Street/South Clinton Avenue intersection; of these, 14 were of the right angle type. An additional 11 accidents occurred at the Chambers Street/Lily Street intersection resulting in six more right angle type accidents.

Proposed Improvements

Present volumes and the accident history of the intersection indicate that the intersection meets the Accident Experience Warrant for traffic signal control. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control with a leading green interval for southbound traffic during the evening peak period only.
- Provide two lanes on each of the four approaches by the modest widening of the east leg of South Clinton Avenue and re-marking of the existing traffic lanes.
- Close Lily Street between South Clinton Avenue and Chambers Street, and convert Lily Street to one-way operation in the southbound direction between Chambers Street and Genesee Street.
- Prohibit right turns from Chambers Street and the stopping and standing of motor vehicles on both sides of Chambers Street and South Clinton Avenue in proximity to the intersection.

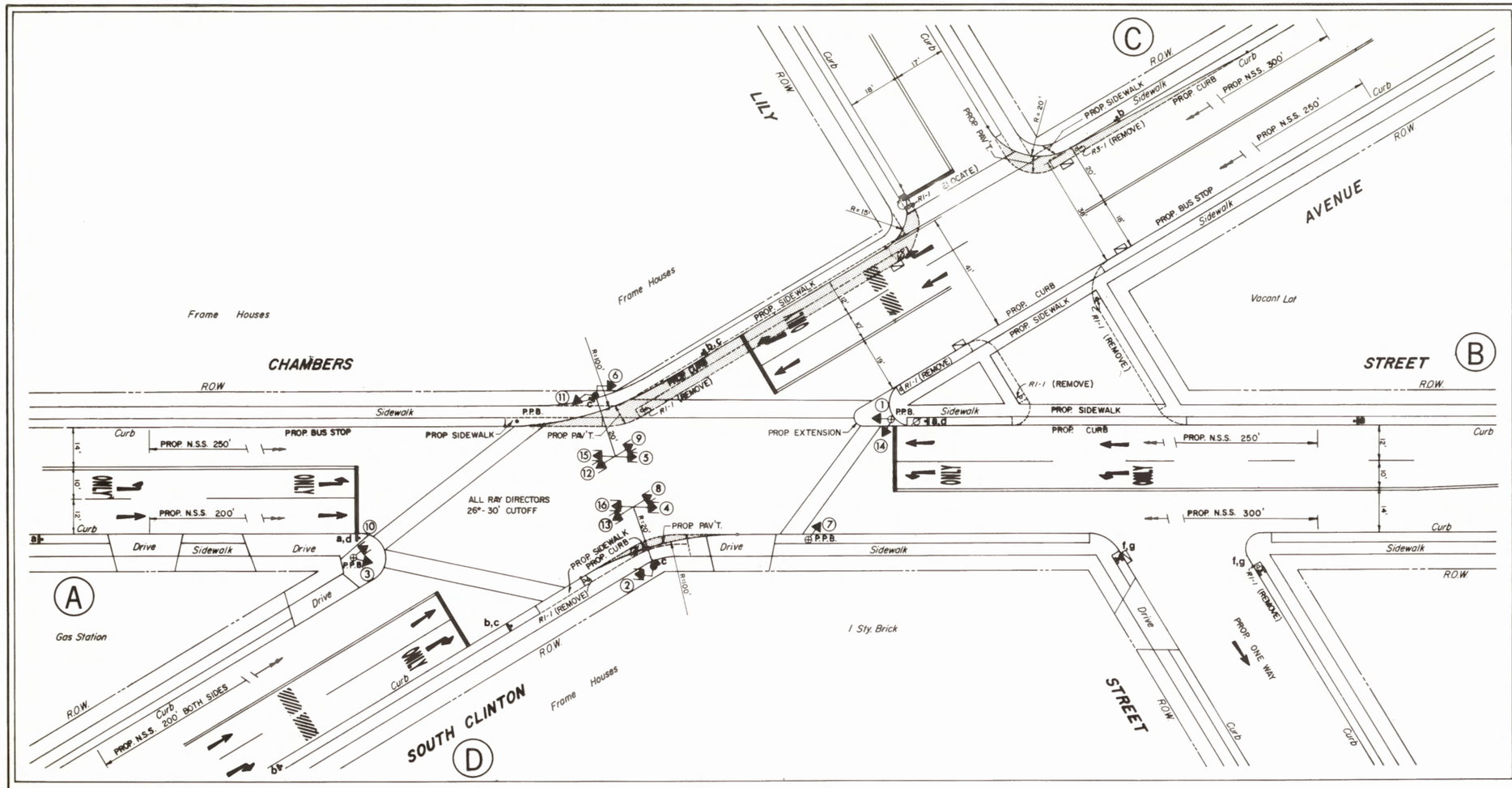
Benefit

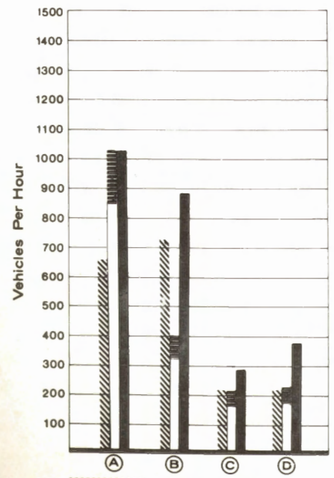
It is anticipated that traffic signal control in conjunction with the closure of Lily Street between Chambers Street and South Clinton Avenue will result in a reduction of right angle type accidents. Further operational efficiencies in terms of increased capacity will result by prohibiting the minor right turn movements and providing two approach lanes on all four legs.

Cost Estimate

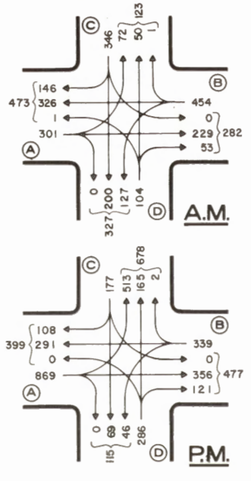
Construction	$25,700.00
Engineering	3,100.00
Total	$28,800.00

Figure B12

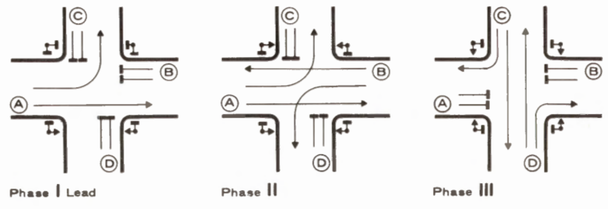




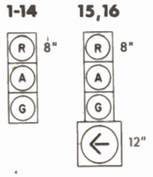
Approach Capacities



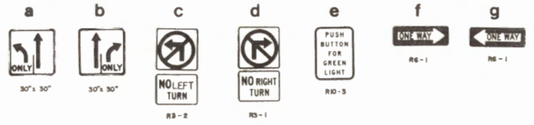
Peak Hour Traffic·1970



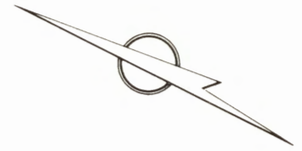
Signal Phasing



Signal Faces



Sign Legend



0 20 40 80

SCALE IN FEET

Notes

1. *Existing* noted by lower case lettering.
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS"
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN e AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

CHAMBERS STREET
SOUTH CLINTON AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

LIBERTY STREET AND NEWKIRK AVENUE (Figure B13)

Existing Conditions

The intersection of Liberty Street and Newkirk Avenue operates as a school crossing, and has had an accident history indicating that 22 of the 27 accidents that occurred during the three-year study period were of the right angle type. A further potentially hazardous condition exists because of the offset in the Newkirk Avenue curb lines which require north-south motorists to shift several feet laterally as they traverse the intersection.

Proposed Improvements

Present volumes and the accident history of the intersection indicate that the intersection meets the Accident Experience Warrant for traffic signal control. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated signal control with pedestrian indications at the four crosswalks.
- Realign the curbs of Newkirk Avenue and increase the four corner radii.
- Prohibit stopping and standing of motor vehicles along the two sides of both streets in the vicinity of the intersection.

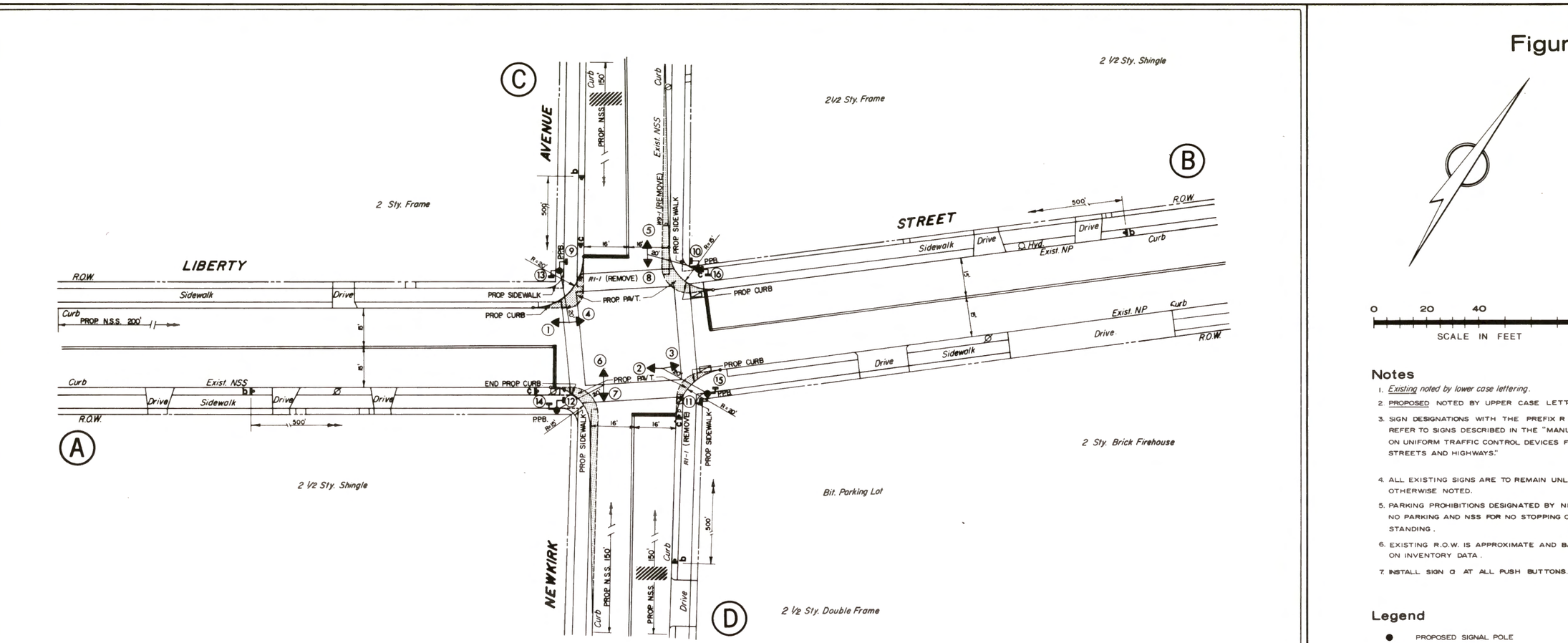
Benefit

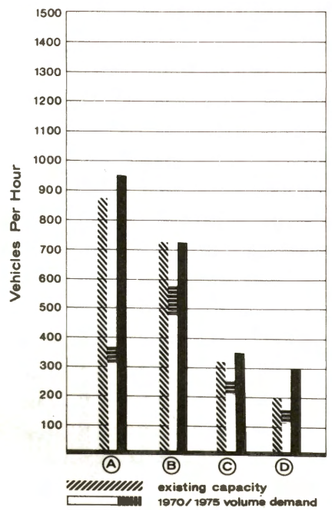
It is anticipated that traffic signal control will reduce the potential for right angle type accidents, and that the curb reconstruction will reduce the potential for head-on and fixed object type accidents.

Cost Estimate

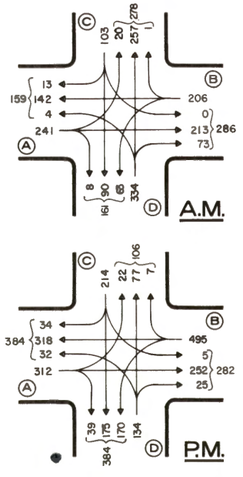
Construction	$18,600.00
Engineering	2,200.00
Total	$20,800.00

Figure B13

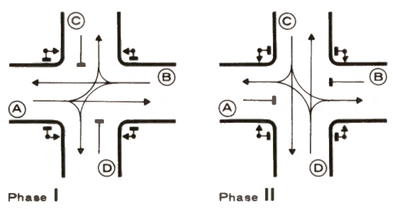




Approach Capacities



Peak Hour Traffic-1970



Signal Phasing

Signal Faces

Sign Legend

0 20 40 80

SCALE IN FEET

Notes

1. *Existing* noted by lower case lettering.
2. PROPOSED NOTED BY UPPER CASE LETTERING.
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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN a AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III • Hamilton Township

LIBERTY STREET

NEWKIRK AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

NOTTINGHAM WAY AND WARD AVENUE (Figure B14)

Existing Conditions

During the eight-hour period in which traffic counts were made at the intersection of Nottingham Way and Ward Avenue, a minimum of 557 and a maximum of 1485 vehicles per hour entered the intersection; approximately two-thirds of this volume travels on Nottingham Way. Accordingly, Ward Avenue motorists have difficulty penetrating east-west traffic, particularly during the heavier periods of travel. Traffic operations are also adversely affected by traffic entering the intersection from a minor fifth approach, Myrtle Avenue. The three-year accident history at the Nottingham Way and Ward Avenue intersection includes 27 right angle type accidents out of a total of 32, a fact which supports the observation that Nottingham Way traffic is difficult to penetrate.

Proposed Improvements

Present volumes at the intersection meet the Minimum Vehicular Volume Warrant for traffic signal control for five of the prescribed eight hours. The relatively high volumes during these five hours, and the anticipated growth in traffic, as well as the accident history, indicate the need for traffic signal control. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control.
- Convert Myrtle Avenue to one-way operation away from the intersection throughout its 300-foot length.
- Reduce the width of Myrtle Avenue to 20 feet in the vicinity of the intersection.
- Modify the two existing channelizing islands.
- Prohibit the stopping and standing of motor vehicles in the vicinity of the intersection at all curb lines not presently so ordained.

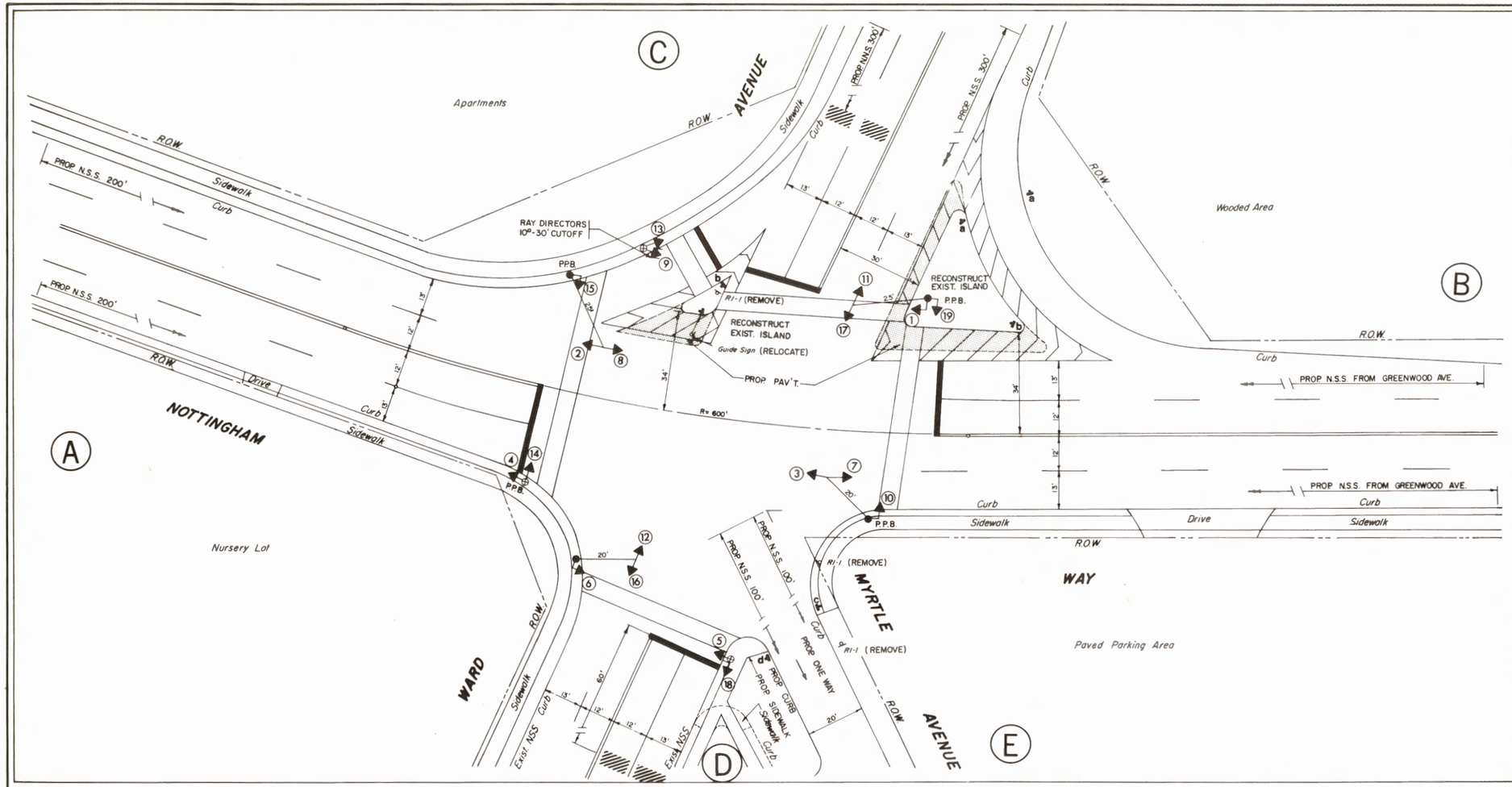
Benefit

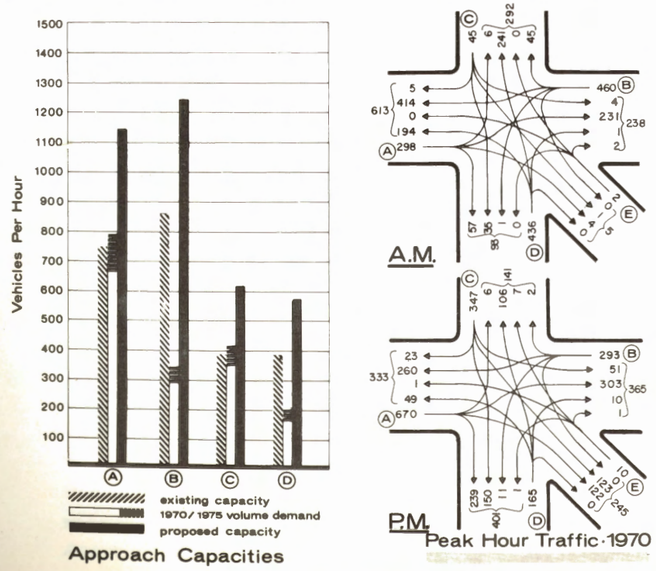
Undoubtedly, traffic signal control will greatly reduce the hazard to traffic using the intersection, potentially eliminating the occurrence of right angle type accidents. The revisions to Myrtle Avenue will assure further operational benefits in terms of minimizing conflicting movements at the intersection.

Cost Estimate

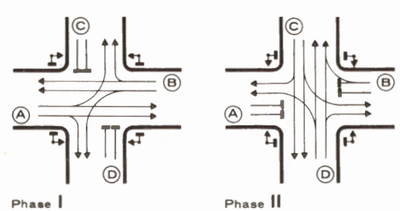
Construction	$26,200.00
Engineering	3,200.00
Total	$29,400.00

Figure B14



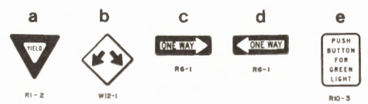


Approach Capacities

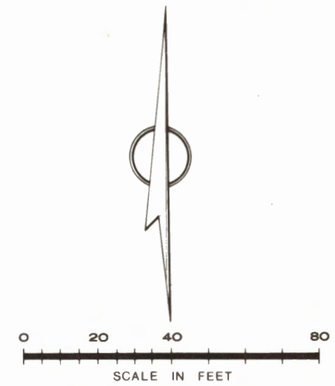


Signal Phasing

Signal Faces



Sign Legend



Notes

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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN 8 AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

NOTTINGHAM WAY
WARD AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

NOTTINGHAM WAY AND HAMILTON SQUARE YARDVILLE ROAD-MERCER STREET (Figure B15)

Existing Conditions

The intersection of Nottingham Way and Hamilton Square Yardville Road-Mercer Street operates as a school crossing. The high volume of traffic utilizing the intersection (1726 vehicles during the evening peak hour) cannot be adequately accommodated during peak periods of travel under prevailing conditions. Particularly constricting to the flow of traffic are the relatively narrow roadway widths and on-street parking practices. The three-year accident history includes eight right angle type accidents and six involving fixed objects of the 16 total.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control for six of the eight prescribed hours. Increased volumes, however, are anticipated in the future. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control.
- Widen Nottingham Way and Mercer Street.
- Improve the southeast corner radius and provide a channelizing island in the Mercer Street approach.
- Improve the corner radii at the intersection of Nottingham Way and Hamilton Square Whitehorse Road.
- Provide painted channelization on Nottingham Way to accommodate left turning vehicles into Mercer Street and Hamilton Square Whitehorse Road.
- Prohibit the stopping and standing of motor vehicles in the vicinity of the intersection at all curb lines not presently so ordained.

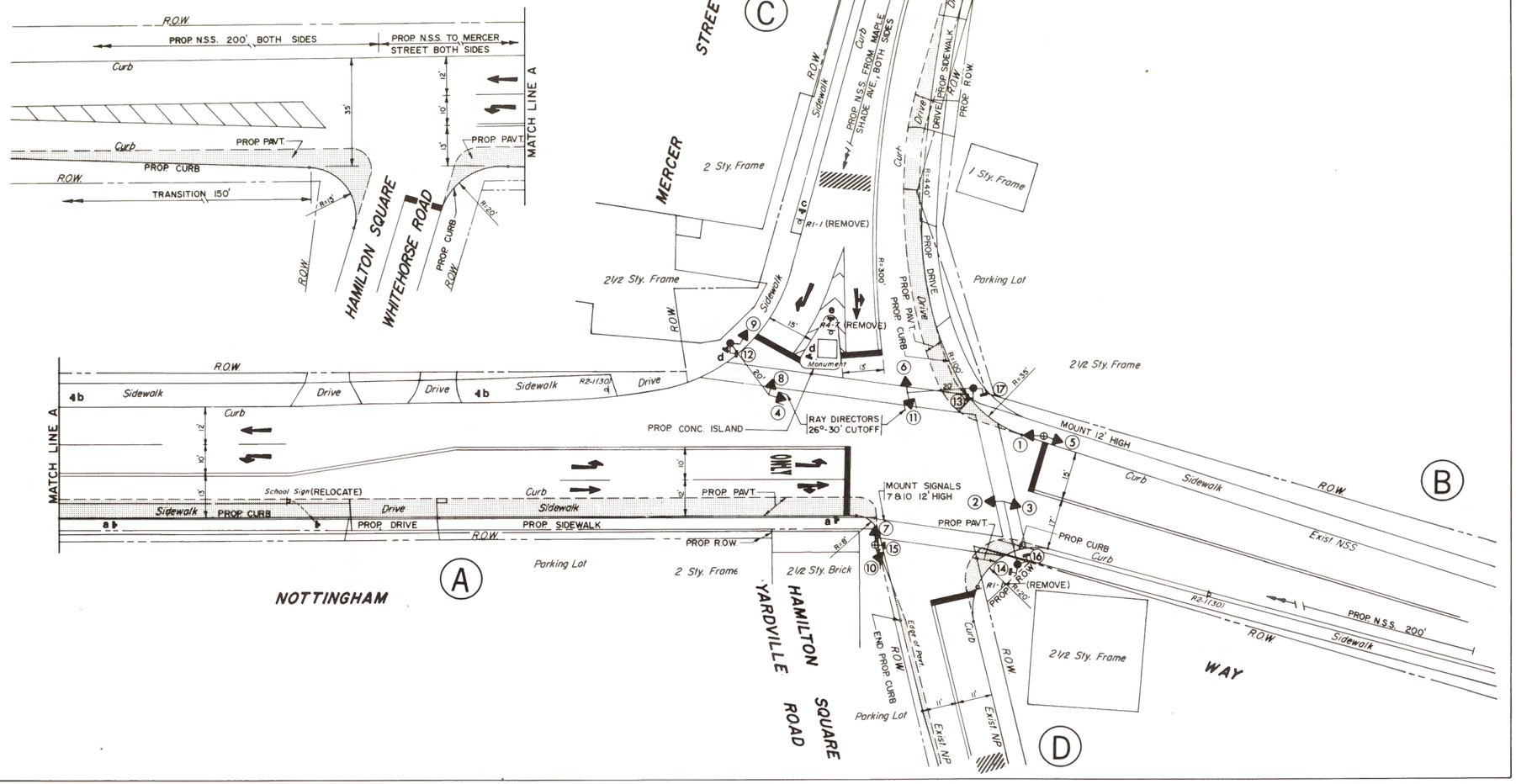
Benefit

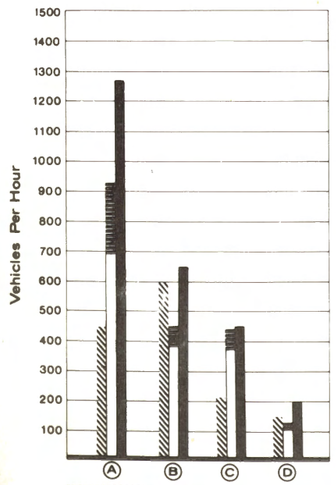
The proposed widening of Nottingham Way in conjunction with the No Stopping and Standing regulations will provide adequate intersection capacity to accommodate present traffic as well as foreseeable increases. It is further anticipated that traffic signal control will minimize conflicting movements under all traffic load situations.

Cost Estimate

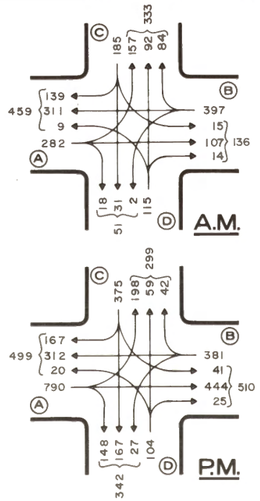
Construction	$33,000.00
Engineering	4,000.00
Total	$37,000.00

Figure B15

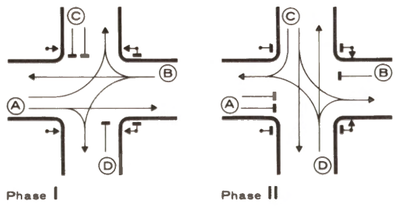




Approach Capacities

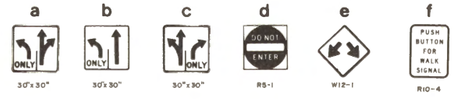


Peak Hour Traffic-1970

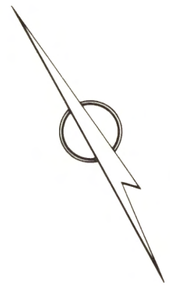


Signal Phasing

Signal Faces



Sign Legend



Notes

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6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. INSTALL SIGN f AT ALL PUSH BUTTONS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

NOTTINGHAM WAY
HAMILTON SQUARE YARDVILLE ROAD – MERCER STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

SOUTH BROAD STREET AND YARDVILLE ALLENTOWN ROAD (Figure B16)

Existing Conditions

Principal traffic movements through the intersection are along Yardville Allentown Road and the westerly leg of South Broad Street where total approach volumes are approximately 2000 vehicles per hour during the evening peak period. Accordingly, the scarcity of gaps in the main traffic stream during peak hours prevents side street traffic from readily entering the intersection. The 12 right angle type accidents of the total of 23 noted in the three-year accident history suggest the possibility that motorists are under pressure at times to accept too short a gap. Complicating the situation further is the fact that five approaches are presently accommodated at the intersection.

Proposed Improvements

Present volumes of traffic meet the requirements of the Interruption of Continuous Traffic Warrant for traffic signal control for seven of the eight prescribed hours. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control.
- Widen South Broad Street and Yardville Allentown Road.
- Provide channelization on the east approach of South Broad Street.

The proposed plan will prohibit westbound South Broad Street traffic from entering the intersection. It is anticipated that this movement will be greatly reduced and limited primarily to local vehicles as a result of a diversion of westbound traffic from South Broad Street (see Figure B20).

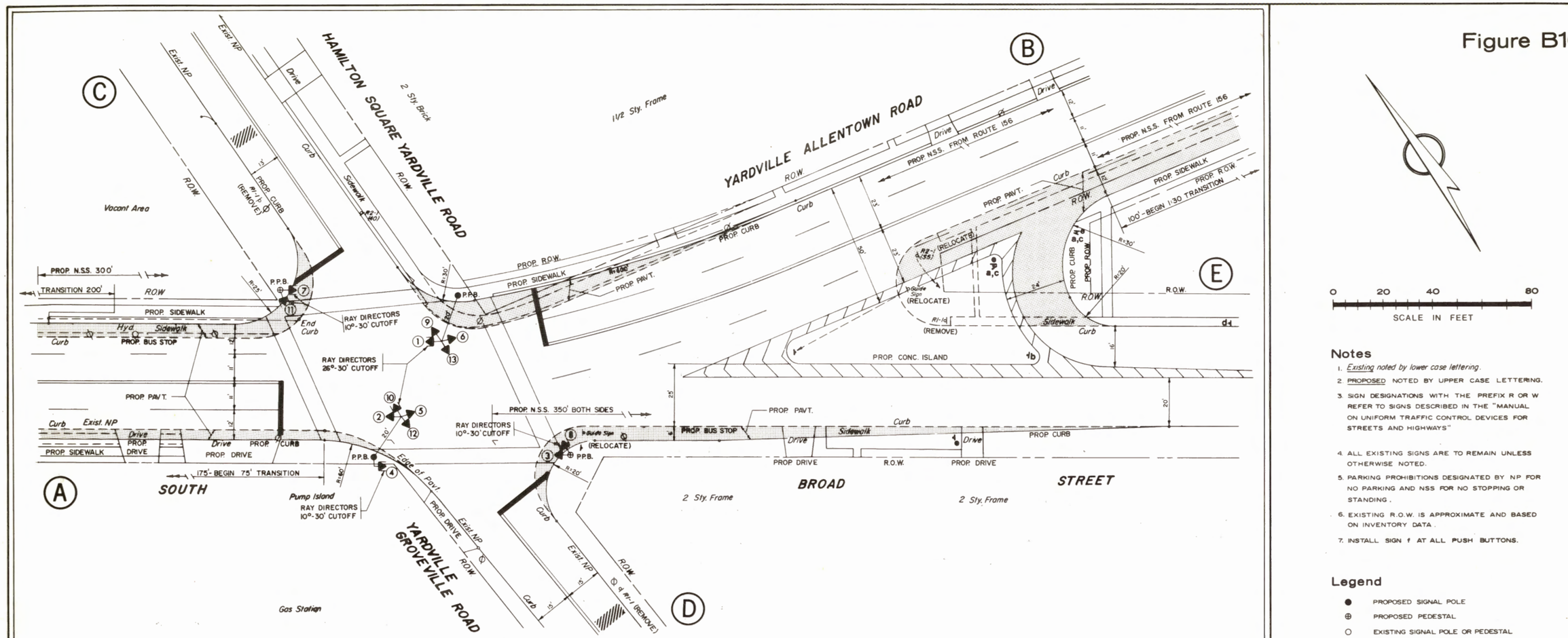
Benefit

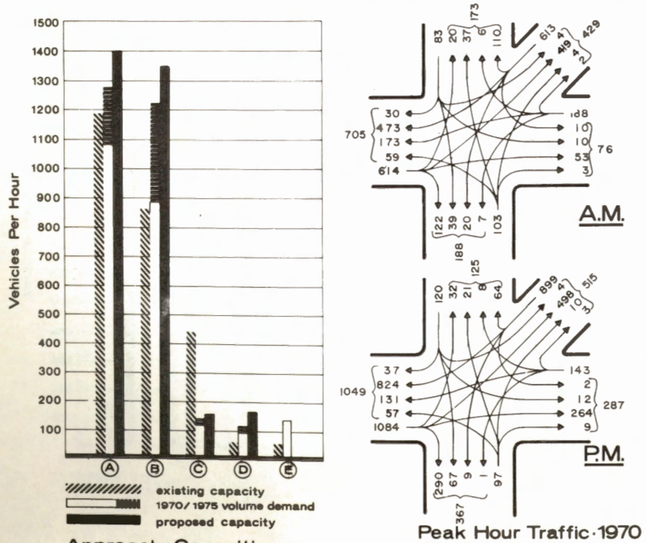
The proposed traffic signal control will provide positive gaps in the main stream of traffic, thus permitting motorists on the minor approaches to enter the intersection safely. The widening of South Broad Street will increase intersection capacity adequately to accommodate future traffic increases. Furthermore, operational efficiencies in terms of increased capacity and safety will result by elimination of the east approach of South Broad Street from the intersection.

Cost Estimate

Construction	$45,300.00
Engineering	5,400.00
Total	$50,700.00

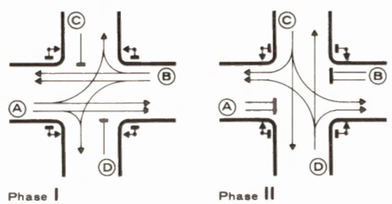
Figure B16





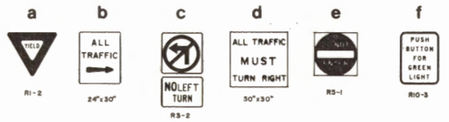
Approach Capacities

Peak Hour Traffic-1970



Signal Phasing

Signal Faces



Sign Legend

0 20 40 80

SCALE IN FEET

Notes

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7. INSTALL SIGN f AT ALL PUSH BUTTONS.

Legend

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- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
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AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

SOUTH BROAD STREET

YARDVILLE ALLENTOWN ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

WHITEHEAD ROAD AND SWEET BRIAR AVENUE (Figure B17)

Existing Conditions

Sweet Briar Avenue meets Whitehead Road as a "T" intersection immediately east of the Assunpink Creek bridge. It is a two-lane roadway, as is Whitehead Road up to and including the structure over the creek. West of Assunpink Creek, Whitehead Road becomes a four-lane facility. Traffic volumes at the Whitehead Road/Sweet Briar Avenue intersection exceed intersection capacity, particularly during the 4:00 to 5:00 P.M. commuter hour. Virtually all of the traffic from Sweet Briar and 90% of that from the east proceeds in a westerly direction on Whitehead Road over the Assunpink Creek.

The New Jersey Department of Transportation is preparing to advertise for construction of the extension of the Trenton Freeway. It is anticipated, however, that the chief benefit of this improvement will be to relieve U.S. Route 1, and not to greatly affect traffic operations at the subject intersection.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, it is recommended that the following improvements be made:

- Provide three-phase, semi-actuated traffic signal control.
- Provide four operating lanes on Whitehead Road.
- Widen Sweet Briar Avenue and channelize the Sweet Briar approach.

Benefit

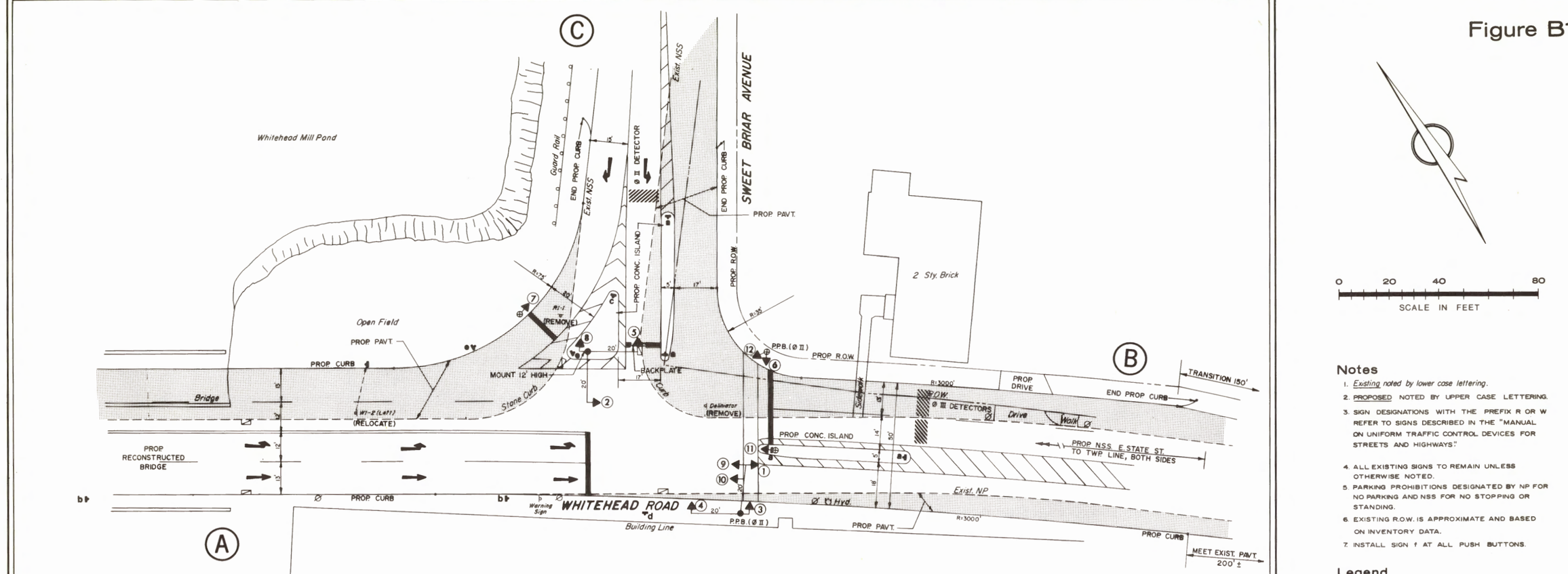
The proposed improvements will provide sufficient intersection and roadway capacity to accommodate present levels of traffic. Ultimately, it is anticipated that Interstate Route 295 will divert some traffic from Whitehead Road, but improvement of the Cornell Heights Bridge will have the effect of increasing traffic volumes at the subject intersection.

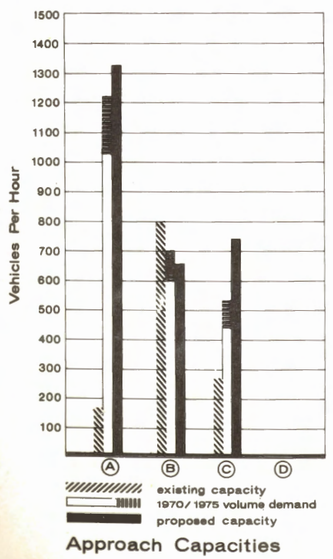
Cost Estimate

The reconstruction of the bridge over the Assunpink Creek is a major element in the proposal to improve traffic operations at the Whitehead Road/Sweet Briar Avenue intersection. However, the nature of the improvements in terms of their engineering requirements and costs suggests that the bridge improvement and intersection improvement be separated. Accordingly, the bridge reconstruction is treated as a separate project and is listed elsewhere in this report. The following represents estimated costs associated with the intersection improvement only:

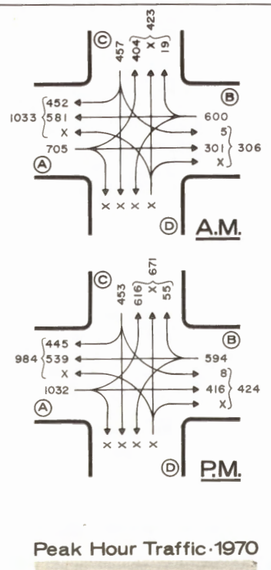
Construction	$46,600.00
Engineering	5,600.00
Total	$52,200.00

Figure B17

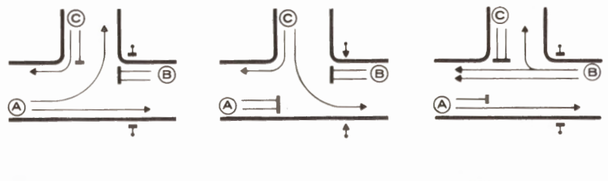




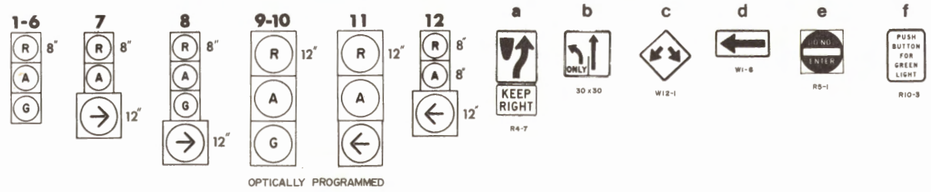
Approach Capacities



Peak Hour Traffic·1970



Signal Phasing



Signal Faces

Sign Legend

Notes

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Legend

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- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
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- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

WHITEHEAD ROAD
SWEET BRIAR AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

WHITE HORSE AVENUE AND SOUTH CLINTON AVENUE-LOCUST AVENUE (Figure B18)

Existing Conditions

South Clinton Avenue and Locust Avenue both meet White Horse Avenue as "T" type intersections, offset by approximately 150 feet. The existing signal at the Locust Avenue intersection normally flashes amber to White Horse Avenue and red to Locust Avenue, but can be actuated to operate as a fire signal from the nearby fire station on Locust Avenue.

Traffic volumes on White Horse Avenue ranged from 656 to 1092 vehicles per hour during eight hours of a traffic count. Traffic volumes on Locust Avenue are low, but on South Clinton Avenue they ranged from 123 to 494 vehicles per hour during the same eight hours. The 35 accidents recorded at the South Clinton Avenue intersection during the three-year investigation include 14 right angle type and 13 same direction type accidents. A total of six accidents were reported at the Locust Avenue intersection during the same period.

Proposed Improvements

Present volumes of traffic meet the Minimum Vehicular Volume Warrant for traffic signal control based on a reduction to 70% of the required volumes where the 85th percentile speed of traffic on the major road exceeds 40 mph. It is recommended that traffic signal control be provided. The proximity of the Locust Avenue fire signal requires that it be converted to stop-and-go operation. Accordingly, the following improvements are recommended:

- Provide a single three-phase, semi-actuated traffic signal installation to control the signals at the two intersections, retaining the fire preemption feature for the fire station.
- Provide distance limiting, optically programmed signals to permit the recommended signal phasing.
- Improve the corner radii at South Clinton Avenue.
- Re-mark White Horse Avenue for four traffic lanes.

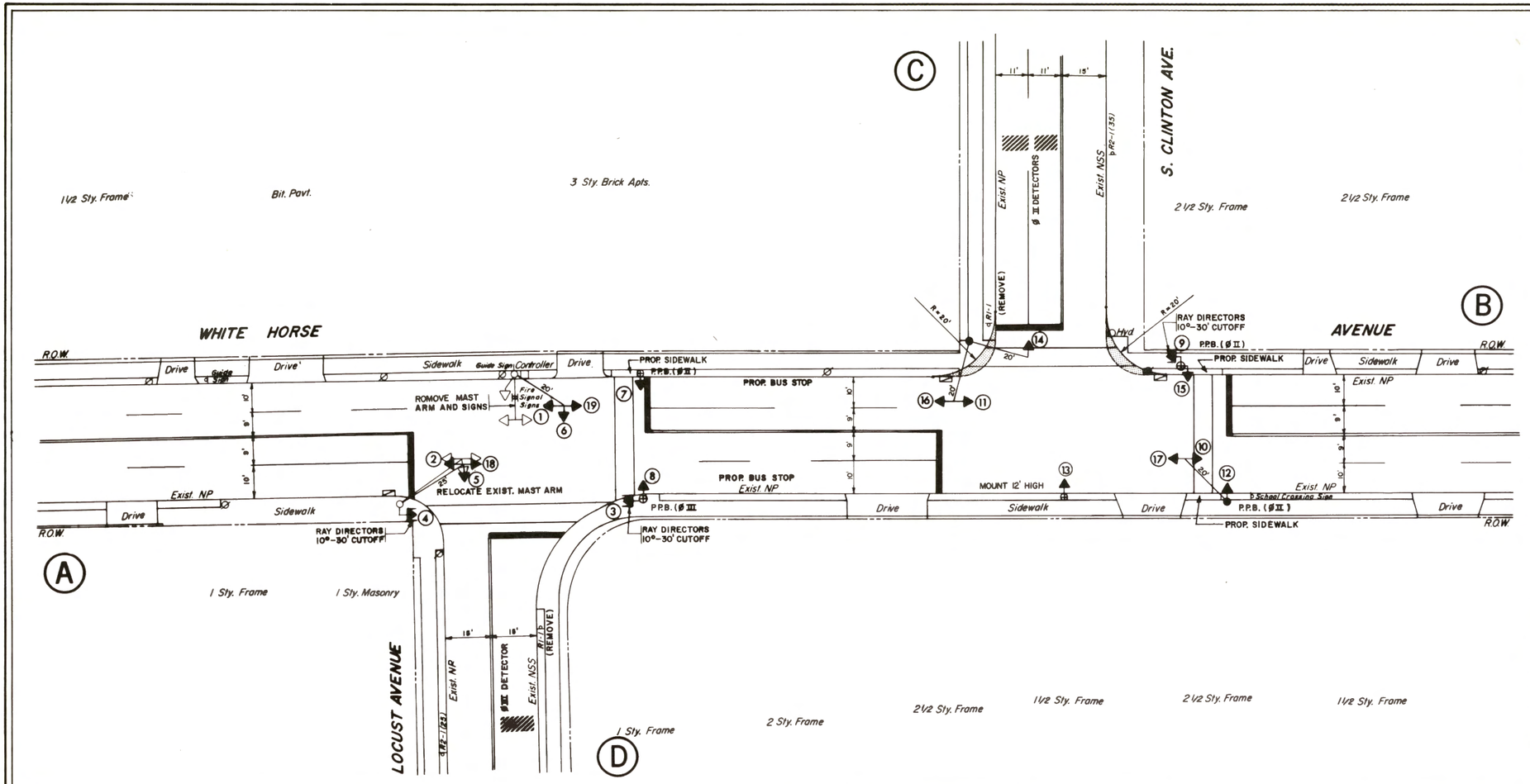
Benefit

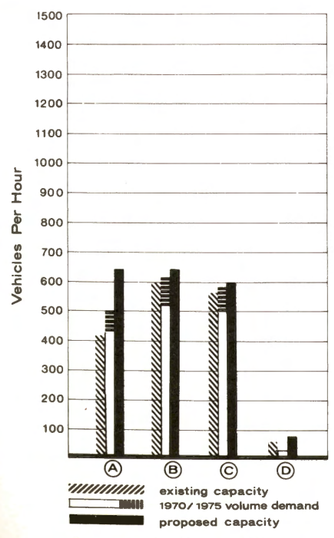
Although the operation of traffic signals at the South Clinton Avenue and Locust Avenue intersections will require traffic on White Horse Avenue to stop periodically, the anticipated benefits are considered to outweigh the disadvantages. The semi-actuated feature of the proposed controller will only require the interruption of artery traffic on a demand basis, thereby minimizing the "red" to those motorists. At the same time, the potential for right angle type accidents will be reduced considerably.

Cost Estimate

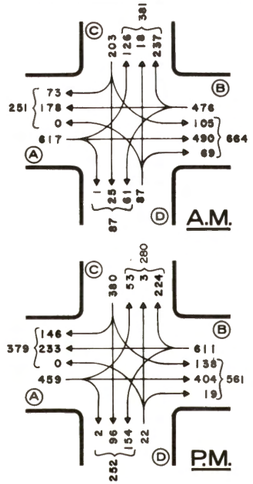
Construction	$26,000.00
Engineering	3,100.00
Total	$29,100.00

Figure B18

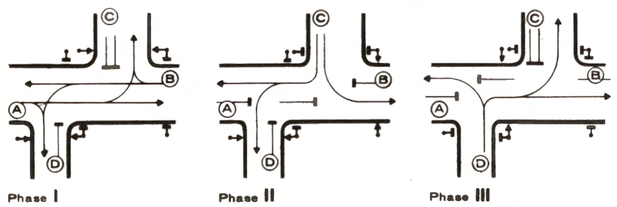




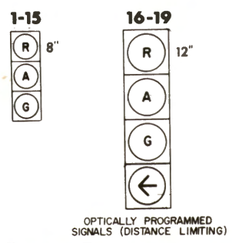
Approach Capacities



Peak Hour Traffic·1970



Signal Phasing



Signal Faces

0 20 40 80

SCALE IN FEET

Notes

1. *Existing* noted by lower case lettering.
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. REMOVE ALL EXISTING SIGNAL HEADS.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

WHITE HORSE AVENUE

S. CLINTON AVENUE - LOCUST AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

U.S. ROUTE 206 AND DEWEY AVENUE (Not Illustrated)

Existing Conditions

Dewey Avenue forms a "T" intersection from the south with U.S. Route 206. Route 206 westbound traffic utilizes an existing median lane to turn into Dewey Avenue or to reach the gas station and supermarket located in the southwest quadrant of the intersection. The accident history at the intersection indicates two left turn type and 18 right angle type accidents, one of which resulted in a fatality. However, a 1971 traffic count indicated a peak hour total of only 99 vehicles from Dewey Avenue (of which approximately one-half made left turns) and an hourly high of 42 left turning vehicles from South Broad Street. Observations during peak periods of traffic indicated that left turning vehicles from Dewey often straddle the eastbound lanes of the highway and wait for a gap in westbound traffic.

Proposed Improvements

Although traffic volumes from Dewey Avenue would normally not warrant traffic signal control, the high rate of right angle type accidents assumes greater significance in establishing the need for signalization. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated traffic signal control.
- Prohibit U-turns on Route 206 from the westbound direction.
- Provide signing at the westerly entrance to the supermarket prohibiting the exiting of vehicles onto Route 206.

Benefit

A semi-actuated traffic signal at this intersection will decrease right angle accident potential by giving those vehicles exiting from Dewey Avenue an unopposed phase, with minimal interruption to U.S. Route 206 traffic. This signal will also provide gaps for vehicles entering the highway at Redwood Avenue to the west and at Woodside Avenue to the east.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

This section of the report is concerned with the evaluation of intersections on the TOPICS network which are not traffic signal controlled and where signal control is not justified. The intersections described herein were found to be deficient in some manner, usually in relation to safety.

Fourteen intersections are discussed in this section, five of which have been recommended for flashing signal control. Only one location involves extensive physical modification; six other intersections require either minor construction improvements or simple traffic control modifications. At one location, it has been recommended that an inoperative flashing signal be removed, and at a final location, existing conditions are discussed but no improvements recommended.

The intersections discussed in this section of the report are located as follows:

N. J. Route 33 (Greenwood Avenue)/Nottingham Way (Illustrated)
N. J. Route 156/South Broad Street (Illustrated)
Hamilton Avenue/Liberty Street-Kuser Road (Illustrated)
Hamilton Square Yardville Road/Klockner Road (Illustrated)
U.S. Route 206/Rowan Avenue
U.S. Route 206/Woodside Avenue
N. J. Route 33/Norway Avenue
N. J. Route 156/Yardville Groveville Road
Cedar Lane/Sylvan Street
Hamilton Avenue/Ward Avenue
Hamilton Square Whitehorse Road/Kuser Road
Hamilton Square Whitehorse Road/Klockner Road
Park Avenue/Schiller Avenue
South Clinton Avenue/Fetter Avenue

Two of the improvements at State highways will principally benefit traffic on the minor roadway. Therefore, in accordance with New Jersey Department of Transportation guidelines, cost estimates for these improvements have been made and the work scheduled as TOPICS projects.

N.J. ROUTE 33 (GREENWOOD AVENUE) AND NOTTINGHAM WAY (Figure B19)

Existing Conditions

Nottingham Way and Greenwood Avenue meet at a skewed "T" type intersection; Greenwood Avenue and Nottingham Way, east of the intersection, are designated as N.J. Route 33. While the principal flow of traffic is along the State highway, eastbound Nottingham Way volumes entering the intersection were counted at 365 vehicles during the evening peak hour. A review of the three-year accident history indicated that nine same direction type and five right angle type accidents were included in the total of 19 accidents.

Proposed Improvements

Because of their proximity to this intersection, the engineering analyses of Greenwood Avenue/Ward Avenue and Nottingham Way/Ward Avenue were undertaken jointly. The recommended signalization of Nottingham Way/Ward Avenue is reported elsewhere (Figure B14). No improvements, however, have been recommended for Greenwood Avenue/Ward Avenue which has had a three-year accident history that includes 11 right angle type out of a total of 25 accidents. Nevertheless, with the continued anticipated increase in traffic volumes, it is recommended that a review of operations be conducted from time to time at both the Greenwood Avenue/Ward Avenue and Greenwood Avenue/Nottingham Way intersections.

The following improvements are recommended at the N.J. Route 33 and Nottingham Way intersection:

- Provide a curbed island to replace the existing painted channelization on the west leg of the intersection.
- Prohibit the stopping and standing of motor vehicles on the west leg of Nottingham Way in the vicinity of the intersection.

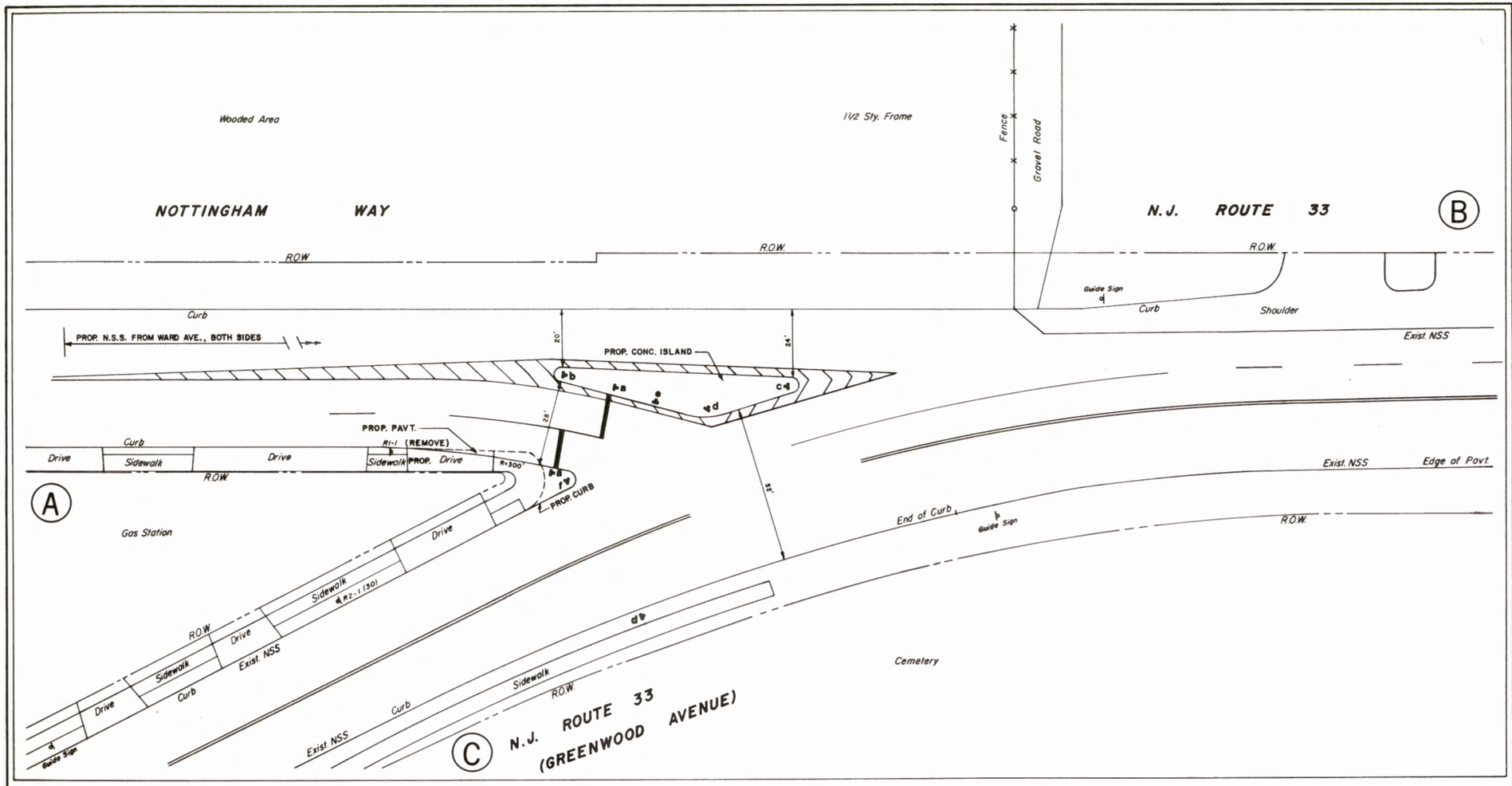
Benefit

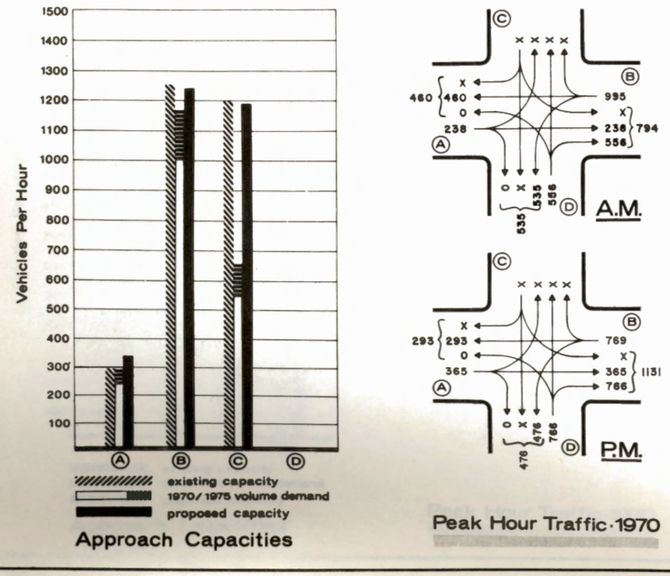
The obvious advantage of physical channelization over painted channelization is that it is more visible to motorists, especially at times when a road is snow covered, and it does not require periodic maintenance as do pavement markings. The physical improvement will also require eastbound traffic from Nottingham Way to enter the intersection at the proper angle, thereby eliminating the flat angle of entry and reducing the distance of travel within opposing traffic lanes.

Cost Estimate

Construction	$2,300.00
Engineering	300.00
Total	$2,600.00

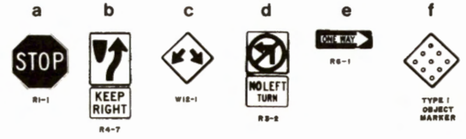
Figure B19



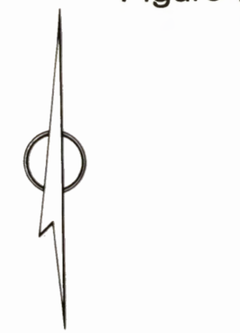


Approach Capacities

Peak Hour Traffic-1970



Sign Legend



Notes

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6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

N.J ROUTE 3 (GREENWOOD AVENUE)

NOTTINGHAM WAY

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

N.J. ROUTE 156 AND SOUTH BROAD STREET (Figure B20)

Existing Conditions

The three-year accident history at N.J. Route 156 and South Broad Street indicated 21 right angle type accidents out of a total of 30. The major flow of traffic occurs along South Broad Street with approach volumes totaling 2185 vehicles during an eight-hour period, compared to 1401 vehicles on the State highway approaches. STOP sign control, however, assigns the right-of-way to Route 156. The STOP signs are placed well and are in good condition, and no apparent impediments to the sight distance of stopped motorists was noted.

Proposed Improvements

In conjunction with the proposed improvements at South Broad Street and Yardville Allentown Road (see Figure B16), it is proposed to alter the traffic pattern at the subject intersection. As indicated on the insert of Figure B20, it is proposed to divert westbound South Broad Street traffic to the north via Route 156 and thence to the west on Yardville Allentown Road. The effect of the diversion will be to add traffic to the intersection of Route 156 and Yardville Allentown Road; but analysis shows that the additional load can readily be accommodated. The following improvements are recommended at the subject intersection:

- Provide a flashing signal with red flashing indications only, to be directed to South Broad Street traffic.
- Widen the westbound approach of South Broad Street and channelize the approach for right turns only from the right lane.

Benefit

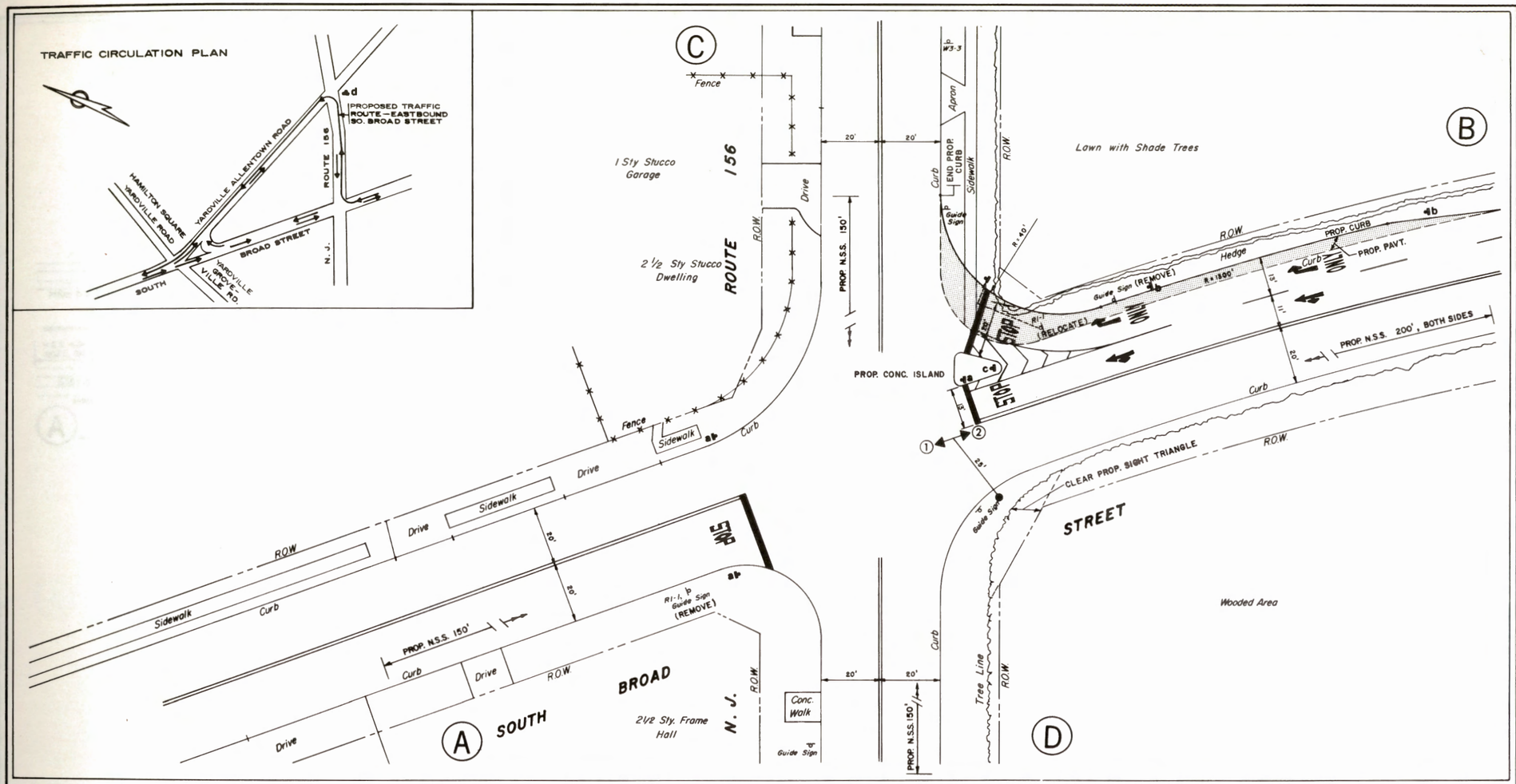
The high incidence of right angle type accidents that have occurred at N.J. Route 156 and South Broad Street can undoubtedly be attributed to the fact that the STOP sign control is on the higher volume roadway. However, reversal of the control is not considered appropriate with the recommended change in the traffic pattern. The recommended flashing signal will provide a greater visual impact, thereby reinforcing the STOP sign control. A reduction in right angle accidents is expected.

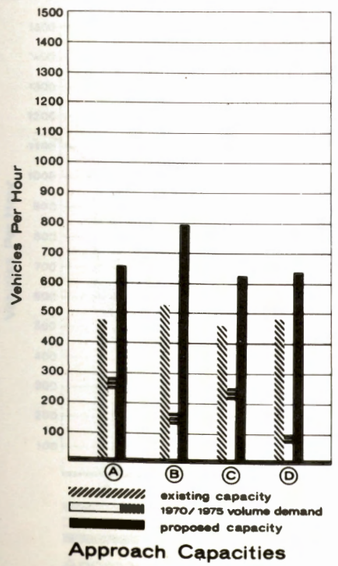
Cost Estimate

Construction	$8,400.00
Engineering	1,300.00
Total	$9,700.00

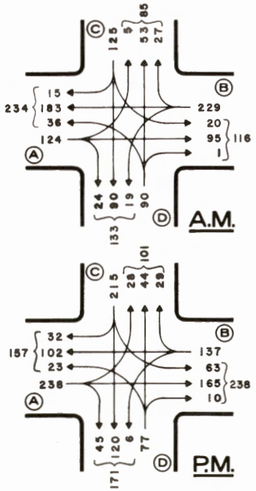
Figure B20

TRAFFIC CIRCULATION PLAN





Approach Capacities



Peak Hour Traffic-1970

1-2

R
R
12"

FLASHING SIGNAL

Signal Faces

a: STOP R1-1

b: 30" X 30"

c: TRENTON 60" X 30"

d: TRENTON 60" X 30"

PROPOSED SIGN AT N.J. ROUTE 156 AND YARDVILLE ALLENTOWN ROAD.

Sign Legend

0 20 40 80

SCALE IN FEET

Notes

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2. PROPOSED NOTED BY UPPER CASE LETTERING.
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5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

N.J. ROUTE 156

SOUTH BROAD STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

HAMILTON AVENUE AND LIBERTY STREET-KUSER ROAD (Figure B21)

Existing Conditions

Liberty Street and Kuser Road terminate at Hamilton Avenue where only approximately 100 feet separates the two roadways. Traffic counts taken at the two intersections indicate that 95% of the traffic entering Hamilton Avenue from these two streets turns right and proceeds in an easterly direction. Comparable westbound volumes were observed turning left from Hamilton Avenue into Kuser and Liberty. Thus, traffic volumes on Hamilton Avenue east of Kuser Road are twice as great as they are west of Liberty Street. Under the prevailing conditions of two operating lanes (one in each direction) and permissible parking, the more heavily traveled portion of Hamilton Avenue is inadequate to accommodate peak periods of traffic flow. The three-year accident history indicated seven accidents at the Liberty Street intersection and four at Kuser Road.

Proposed Improvements

It is recommended that the following improvements be made:

- Thermoplastic pavement markings be installed to provide three operating traffic lanes on Hamilton Avenue with appropriate channelization at Liberty Street and two operating lanes on Kuser Road, Liberty Street, and Haslach Avenue.
- Prohibit left turns from Liberty Street.
- Prohibit stopping and standing of motor vehicles on Hamilton Avenue in the vicinity of Liberty Street and Kuser Road.

Benefit

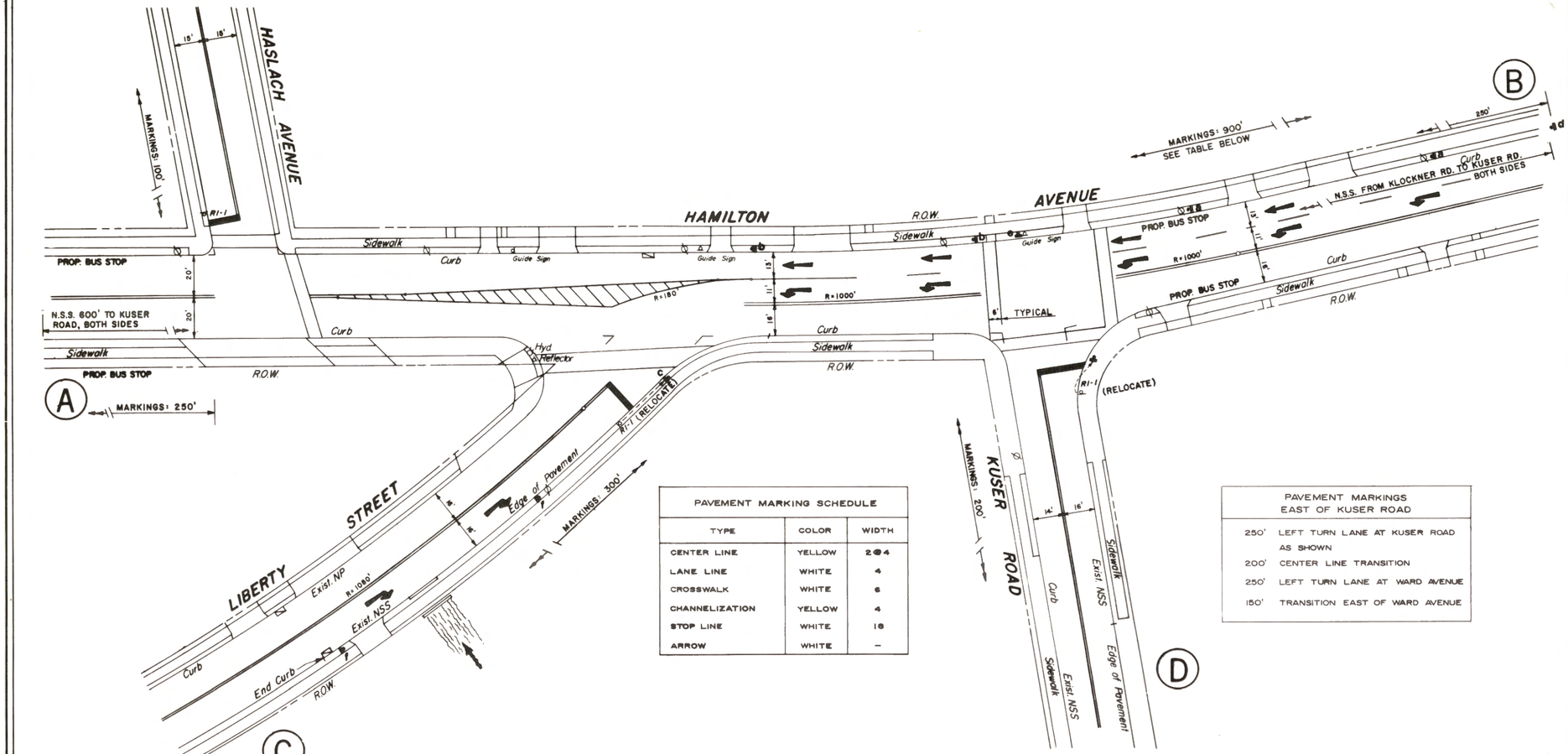
The proposed parking ban and re-marking of Hamilton Avenue to provide two westbound lanes will greatly increase intersection capacity at Kuser Road and Liberty Street reducing delays during peak periods of traffic flow, while also reducing the potential for same direction type accidents.

Cost Estimate

The following costs include the placement of pavement markings on Hamilton Avenue to a point approximately 150 feet east of Ward Avenue. Proposed improvements for the Hamilton Avenue and Ward Avenue intersection are discussed elsewhere in the report.

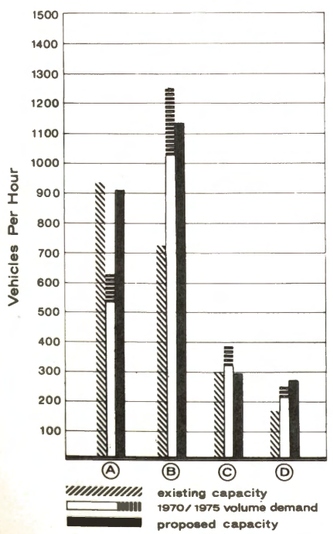
Construction	$3,300.00
Engineering	400.00
Total	$3,700.00

Figure B 21

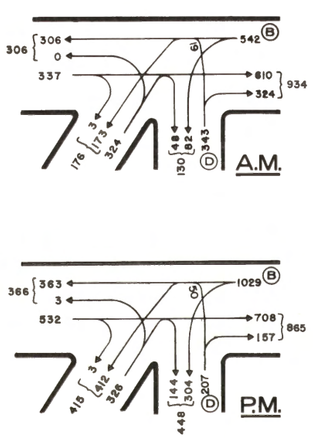


PAVEMENT MARKING SCHEDULE		
TYPE	COLOR	WIDTH
CENTER LINE	YELLOW	2@4
LANE LINE	WHITE	4
CROSSWALK	WHITE	6
CHANNELIZATION	YELLOW	4
STOP LINE	WHITE	18
ARROW	WHITE	–

PAVEMENT MARKINGS EAST OF KUSER ROAD	
250'	LEFT TURN LANE AT KUSER ROAD AS SHOWN
200'	CENTER LINE TRANSITION
250'	LEFT TURN LANE AT WARD AVENUE
150'	TRANSITION EAST OF WARD AVENUE



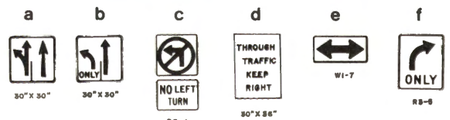
Approach Capacities



Peak Hour Traffic-1970

Signal Phasing

Signal Faces



Sign Legend

Notes

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2. PROPOSED NOTED BY UPPER CASE LETTERING.
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4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING PROHIBITIONS DESIGNATED BY NP FOR NO PARKING AND NSS FOR NO STOPPING OR STANDING.
6. EXISTING R.O.W. IS APPROXIMATE AND BASED ON INVENTORY DATA.
7. ALL PAVEMENT MARKINGS ARE TO BE THERMOPLASTIC MATERIAL.

0 30 60 120

SCALE IN FEET

Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

HAMILTON AVENUE

LIBERTY STREET - KUSER ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

HAMILTON SQUARE YARDVILLE ROAD AND KLOCKNER ROAD (Figure B22)

Existing Conditions

The observed traffic volumes at the intersection of Hamilton Square Yardville Road and Klockner Road are not heavy, yet a review of the three-year accident history showed a total of 22 accidents. Right angle type accidents amounted to 12; collisions with fixed objects, six; the remaining four were of various types. One of the right angle accidents and one of the fixed object accidents resulted in fatalities.

West of Hamilton Square Yardville Road, Klockner Road is approximately 70 feet in width, compared to the 23-foot paved width east of the intersection. Moreover, the southerly edges of pavement of Klockner Road on either side of the intersection are offset approximately seven feet. Furthermore, the easterly extension of Klockner Road bends to the south on a relatively sharp curve with an approximate radius of 80 feet.

Proposed Improvements

It is recommended that the following improvements be made:

- Realign and widen the easterly leg of Klockner Road, and provide physical channelization in the two Klockner Road approaches.
- Install flashing signals with flashing amber to Hamilton Square Yardville Road traffic and flashing red to Klockner Road traffic.
- Install Advance Warning signs on Klockner Road relative to the curve and STOP sign control.

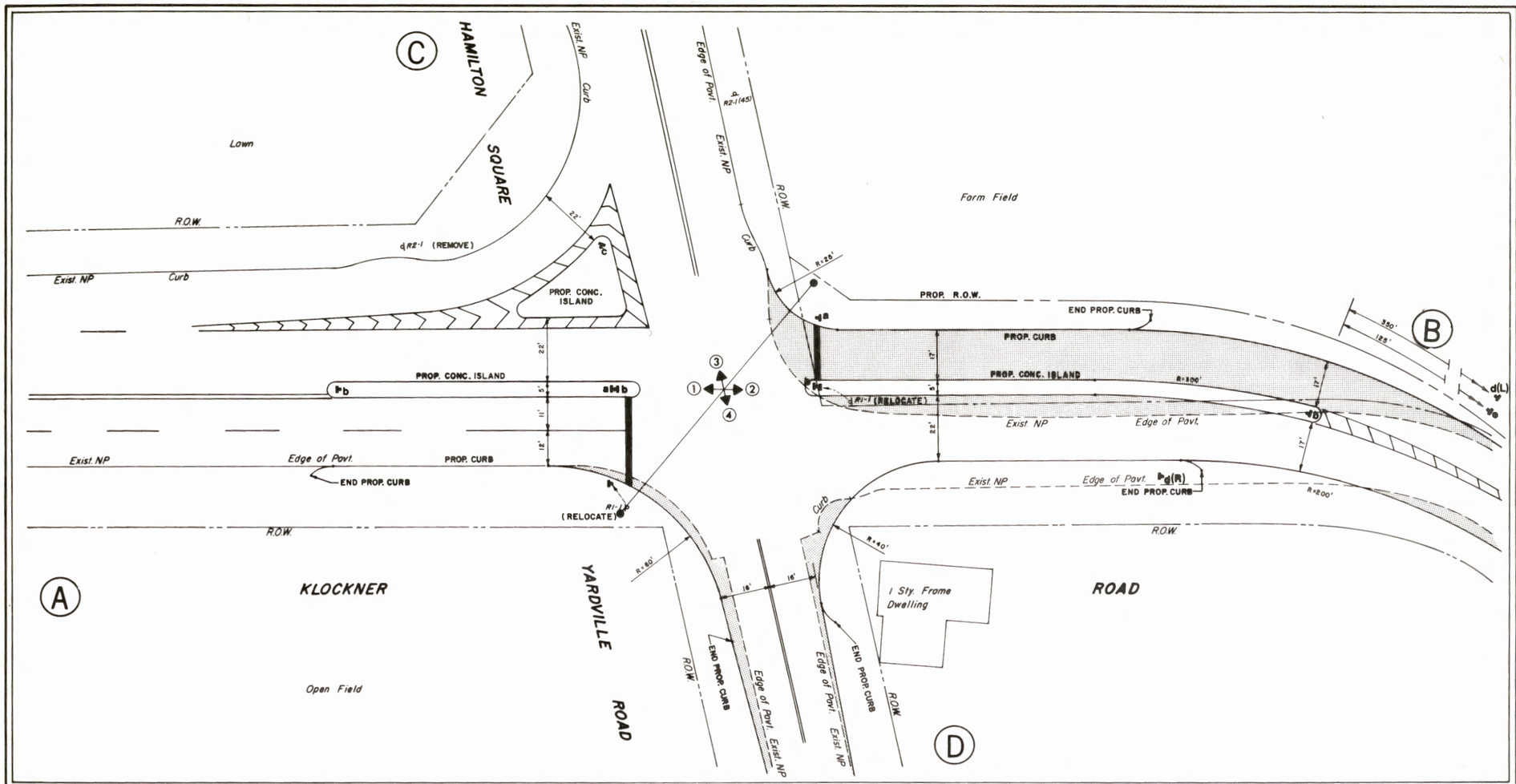
Benefit

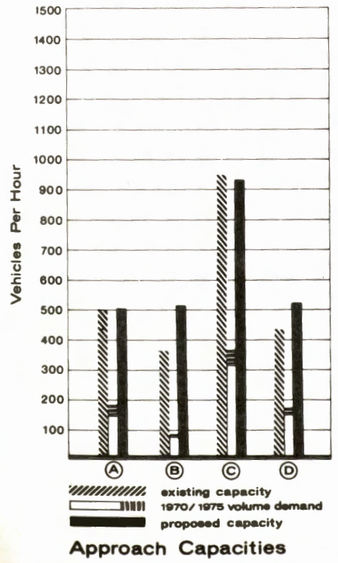
The proposed realignment and widening will make the two Klockner Road approaches compatible, eliminate the offset, and ease the curve east of the intersection. The channelization will further serve to guide traffic through the intersection. Additional visual aids will be provided to motorists by the warning signs and flashing signal.

Cost Estimate

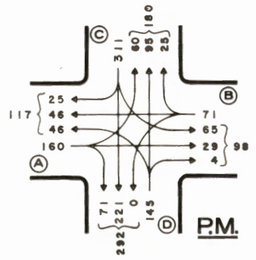
Construction	$18,300.00
Engineering	2,200.00
Total	$20,500.00

Figure B22

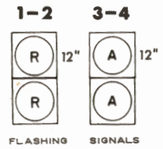




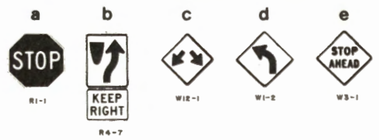
Approach Capacities



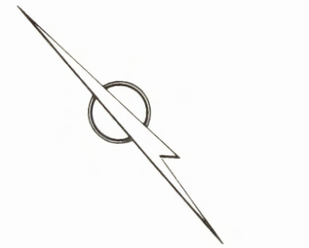
Peak Hour Traffic·1970



Signal Faces



Sign Legend



Notes

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Legend

- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III · Hamilton Township

HAMILTON SQUARE
YARDVILLE ROAD
KLOCKNER ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

U.S. ROUTE 206 AND ROWAN AVENUE (Not Illustrated)

Existing Conditions

North of U.S. Route 206, Rowan Avenue is signed and ordained as one-way northbound; south of the highway it is a two-way street with parking permitted on both sides. The accident history indicated 29 total accidents, including 14 of the right angle type and nine of the same direction type.

Proposed Improvements

It is recommended that the following improvements be made:

- Prohibit stopping and standing of motor vehicles on the west side of the south leg of Rowan Avenue for a distance of 50 feet.
- Post the prohibition of parking on the east side of the south leg of Rowan Avenue in accordance with the statutory regulation prohibiting parking 50 feet in advance of a STOP sign.
- Prohibit left turns from U.S. Route 206 when the left turn median lanes at Park Avenue are constructed.

Benefit

The elimination of stopping and standing, even for modest distances, will allow freer operation of Rowan Avenue and better sight distance for vehicles entering U.S. Route 206. The eventual elimination of some left turns will decrease the potential for same direction accidents.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

U.S. ROUTE 206 AND WOODSIDE AVENUE (Not Illustrated)

Existing Conditions

Woodside Avenue is a local street which forms a "T" intersection with South Broad Street approximately 200 feet east of Dewey Avenue. During the three-year study period, the analysis of accidents at the intersection indicated that the doughnut shop driveway, directly across from Woodside Avenue, was a major factor in the accident incidence. Of four right angle type accidents, three were related to the shop, as well as all three left turn type accidents at the intersection. In addition, four of the ten same direction type accidents were traced to the shop as a direct contributor.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide a left turn lane in the median island of U.S. Route 206 to accommodate westbound vehicles turning left into the doughnut shop drive.
- Prohibit eastbound left turns from U.S. Route 206 into Woodside Avenue, and provide a left turn lane at Redwood Avenue to accommodate this movement.

Benefit

It is anticipated that the addition of a left turn refuge lane in conjunction with the gaps provided by the proposed signal at Dewey Avenue will substantially reduce the incidence of left turn and right angle type accidents at the U.S. Route 206/Woodside Avenue intersection. The potential for same direction type accidents will also be reduced by virtue of the median lanes that will become available.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 33 AND NORWAY AVENUE (Not Illustrated)

Existing Conditions

Norway Avenue intersects Route 33 (Greenwood Avenue) from the south as a two-way street with STOP sign control on Norway Avenue. North of the intersection, Norway Avenue operates as a one-way northbound street. Westbound Greenwood Avenue traffic waiting to turn left into Norway cannot be passed by other vehicles because of parked cars; parking on the east side of Norway Avenue, close to the intersection, creates friction between exiting and entering vehicles. The three-year accident record at the intersection indicates that 11 of the total of 18 were of the right angle type.

Proposed Improvements

It is recommended that the following improvements be made:

- Prohibit the stopping and standing of motor vehicles on both sides of N.J. Route 33 for a distance of 100 feet, both east and west of the intersection.
- Prohibit the stopping and standing of motor vehicles on the east side of Norway Avenue for a distance of 100 feet south of the intersection.

Benefit

The elimination of stopping and standing along the highway will increase intersection capacity by permitting left turning vehicles to be passed. Norway traffic will benefit by the parking control through reduced friction and a reduced accident potential.

Cost Estimate

A determination has not been made regarding implementation of the proposed improvement under the TOPICS program.

N.J. ROUTE 156 AND YARDVILLE GROVEVILLE ROAD (Not Illustrated)

An inoperative flashing signal is located at this intersection with a mast arm installation on the southwest corner of the intersection. The signal is now unnecessary since the fire company on the southeast corner has been relocated to the east, at Main Street. Removal of the inoperative hardware is recommended.

CEDAR LANE AND SYLVAN STREET (Not Illustrated)

Existing Conditions

The accident history at Cedar Lane and Sylvan Street shows that, out of a total of 15 accidents in three years, nine were right angle type and five involved fixed objects. STOP signs on the Sylvan Street approaches provide traffic control, and parking is currently prohibited on both sides of Cedar Lane, although some violations were observed. Along Sylvan Street, parking is practiced on both sides of each approach, right up to the STOP signs. In addition, a bush on the southwest corner obstructs cross street sight distance.

Proposed Improvements

It is recommended that the following improvements be made:

- Prohibit the stopping and standing of motor vehicles on both sides of Sylvan Street from 100 feet west to 100 feet east of the intersection.
- Install Cross Road warning signs on Cedar Lane in advance of the intersection.
- Install STOP AHEAD signs on Sylvan Street in advance of the intersection.
- Paint stop lines and the word STOP on the pavement of each of the Sylvan Street approaches.
- Trim the bush on the southwest corner to provide a sight distance of 350 feet to the south for motorists stopped at the west approach of Sylvan Street.

Benefit

The addition of the pavement markings will emphasize the need for drivers to stop, thereby reducing the right angle accident potential, while the advance warning signs will serve to lend a further cautionary note to approaching motorists. The stopping and standing prohibitions will improve the sight distance on Sylvan Street and provide freer operation at the intersection, tending to decrease the potential for right angle type accidents.

Cost Estimate

Construction	$700.00
Engineering	100.00
Total	$800.00

HAMILTON AVENUE AND WARD AVENUE (Not Illustrated)

Existing Conditions

Ward Avenue meets Hamilton Avenue as a "T" type intersection with an oversized STOP sign controlling movements from Ward. The three-year accident history indicates ten same direction type accidents out of a total of 17; all of these occurred on Hamilton Avenue and involved eastbound vehicles turning or waiting to turn left into Ward.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide a painted left turn lane on Hamilton Avenue west of Ward Avenue to accommodate eastbound traffic turning into Ward Avenue.
- Install lane reservation pavement markings and signs on Hamilton Avenue.
- Relocate the stop line on Ward Avenue to a point ten feet in advance of the northerly curb line of Hamilton Avenue.
- Install a STOP AHEAD sign on Ward Avenue in advance of the intersection.
- Install a Large Arrow sign opposite the Ward Avenue approach.

Benefit

The left turn channelization will provide a refuge area for eastbound traffic turning into Ward Avenue reducing the potential for same direction type accidents. Moving the stop line will greatly increase Ward Avenue sight distance to the east, while the Large Arrow sign will help to emphasize the "T" end character of the intersection.

Cost Estimate

The following costs relate only to the stop line relocation and new signs proposed above. It is recommended that the pavement marking improvements on Hamilton Avenue be completed along with the improvements recommended at Liberty Street and Kuser Road; see Figure B21.

Construction	$400.00
Engineering	-
Total	$400.00

HAMILTON SQUARE WHITEHORSE ROAD AND KUSER ROAD (Not Illustrated)

Existing Conditions

Hamilton Square Whitehorse Road experiences relatively light traffic, having peak hour volumes of less than 200 vehicles in either direction. Kuser Road has approximately the same demand and is controlled by STOP signs. Nevertheless, a total of 17 accidents occurred at the intersection during the three-year study period. Eleven of these were right angle type, and four were same direction type accidents. Topographic features limit the sight distance for motorists across all corners except the southeast.

Proposed Improvements

It is recommended that the following improvements be made:

- Install a flashing signal flashing amber to Hamilton Square Whitehorse Road traffic and flashing red to Kuser Road traffic.
- On each of the Kuser Road approaches, install a second STOP sign at the intersection and a STOP AHEAD sign in advance of the intersection.
- Install Cross Road signs on Hamilton Square Yardville Road in advance of the intersection.
- Place the word STOP on the pavement in advance of the stop line on each of the Kuser Road approaches.
- On the northeast and southwest corners, clear the area of vegetation and complete the necessary grading to provide a sight distance of 500 feet to the north and south from a stopped position on each of the Kuser Road approaches.

Benefit

The flashing signal and Advance Warning signs will provide greater visual impact for approaching motorists, thereby encouraging appropriate response to the proposed traffic control at the intersection. A reduction in the right angle accident potential is expected. The clear sight triangles will afford an additional measure of safety by providing a greater opportunity to see opposing traffic.

Cost Estimate

Construction	$4,300.00
Engineering	500.00
Total	$4,800.00

HAMILTON SQUARE WHITEHORSE ROAD AND KLOCKNER ROAD (Not Illustrated)

Existing Conditions

STOP signs on Klockner Road presently control traffic at its intersection with Hamilton Square Whitehorse Road. The sight distance on all approaches is unrestricted; nevertheless, the three-year accident total of 27 is high in view of the relatively low volume of traffic using the intersection. Nineteen of the accidents were right angle type, two resulting in fatalities.

Proposed Improvements

It is recommended that the following improvements be made:

- Install flashing signals with flashing amber to Hamilton Square Whitehorse Road and flashing red to Klockner Road.
- Install STOP AHEAD signs on Klockner Road in advance of the intersection.
- Install Cross Road signs on Hamilton Square Whitehorse Road in advance of the intersection.
- Paint the word STOP on the pavement in advance of the stop line on each of the two Klockner Road approaches.

Benefit

The proposed improvements are all aimed at increasing driver awareness of the intersection and of the necessity of stopping. It is anticipated that the potential for right angle accidents will be greatly reduced.

Cost Estimate

Construction	$4,000.00
Engineering	500.00
Total	$4,500.00

PARK AVENUE AND SCHILLER AVENUE (Not Illustrated)

Existing Conditions

Schiller Avenue intersects Park Avenue as a one-way eastbound street; up until recently Schiller Avenue had been a two-way street west of Park Avenue. Schiller Avenue is 30 feet wide; Park Avenue is 40 feet wide and controlled by STOP signs at Schiller. A review of accidents indicates that, of a total of 23 in three years, 20 were of the right angle type. Traffic volumes during a 4:00 to 6:00 P.M. count (before the change to one-way operation west of Park Avenue) showed a total of 681 vehicles on the Park Avenue approaches, compared to 768 on Schiller; however, straight through traffic volumes on Park are greater than on Schiller.

Proposed Improvements

In view of the recent change in the operation of Schiller Avenue, an evaluation of traffic operations at the intersection cannot be made. Accordingly, no improvements are recommended.

SOUTH CLINTON AVENUE AND FETTER AVENUE (Not Illustrated)

Existing Conditions

Fetter Avenue intersects South Clinton Avenue at right angles with existing STOP sign control on Fetter Avenue. Parking controls include the prohibition of parking on the northbound approach of Fetter. Traffic volumes on Fetter Avenue are light, and no sight distance restrictions were noted, yet the three-year accident history indicated 19 right angle type accidents out of a total of 20 at the intersection.

Proposed Improvements

It is recommended that the following improvements be made:

- Install flashing signals with flashing amber to South Clinton Avenue and flashing red to Fetter Avenue.
- Install STOP AHEAD signs on Fetter Avenue in advance of the intersection.
- Install Cross Road signs on South Clinton Avenue in advance of the intersection.
- Paint the word STOP on the pavement in advance of the stop line on each of the two Fetter Avenue approaches.

Benefit

The proposed improvements are directed at increasing driver awareness of the intersection and of the necessity of stopping. It is anticipated that the potential for right angle accidents will be reduced.

Cost Estimate

Construction	$3,700.00
Engineering	500.00
Total	$4,200.00

Accident records indicate several between intersection locations on the TOPICS network where concentrations of accidents point to roadway deficiencies. The highway alignment (horizontal or vertical) was generally found to be a major factor contributing to a substandard or unsafe situation. At the crossing of Whitehead Road over the Assunpink Creek, however, the existing bridge was found to be too narrow to accommodate the existing and anticipated traffic demand.

Accordingly, recommendations are made in this section of the report for improvement of those locations where analysis of accident histories or roadway capacity indicates that relief can be achieved through the application of traffic engineering controls, or reconstruction of roadway deficiencies.

Locations discussed in this section of the report are as follows:

Cypress Lane
Klockner Road (between Kuser Road and U.S. Route 130)
Kuser Road (3000 feet east of Hamilton Square Whitehorse Road)
Whitehead Road over Assunpink Creek
Yardville Allentown Road (New Jersey Turnpike Overpass)

A sixth between intersection improvement which recommends the installation of signs at the Cornell Heights Bridge is covered in a separate section of the report.

CYPRESS LANE (Not Illustrated)

Existing Conditions

Cypress Lane is a narrow, lightly traveled road extending a distance of one and a half miles between Hamilton Avenue and Mercerville Whitehorse Road. At a point approximately 1000 feet west of Mercerville Whitehorse Road, the roadway curves sharply in a reverse curve which is signed with advance Turn signs in both directions. From Hamilton Avenue easterly for approximately one mile, utility poles line the south side of the road, generally less than two feet from the uncurbed edge of pavement. An analysis of the three-year accident history shows a total of ten, seven involving fixed objects; five of the ten accidents occurred at night.

Proposed Improvements

It is recommended that the following improvements be made:

- Paint white edge lines and yellow centerlines of a reflectorized material along Cypress Lane for its entire length.
- In advance of the reverse curve, replace the existing Turn signs with Reverse Turn signs.
- Install Large Arrow signs on each of the curves of the reverse curve for each direction of travel.

Benefit

The pavement markings will provide continuous delineation of the roadway, while also advising drivers of the locations where passing can be accomplished safely. The warning signs will mark the curves, warning drivers of the sharp alignment change, encouraging the need for further caution.

Cost Estimate

Construction	$2,700.00
Engineering	300.00
Total	$3,000.00

KLOCKNER ROAD, BETWEEN KUSER ROAD AND U.S. ROUTE 130 (Not Illustrated)

Existing Conditions

Approximately 2500 feet north of U.S. Route 130, Klockner Road crosses a single Penn Central Railroad track at grade. The Klockner Road grades slope downward from the grade crossing at approximately eight percent on the southerly approach and four percent on the northerly approach. Visibility is restricted along Klockner Road due to the sharp break-over angle of the roadway approaches at the track. Warning signs consist of Bump signs located 500 feet in advance of the crossing and Railroad Crossbuck signs at the crossing. In addition, a 40 mph speed limit sign facing northbound traffic is located just past the crossing.

Approximately 1000 feet south of the railroad, Klockner Road approaches a stream on an alignment which bends sharply just north of the stream crossing. The existing NARROW BRIDGE signs on both approaches are partially hidden by roadside vegetation, and a Turn sign is located approximately 300 feet north of the bridge.

The three-year accident history for this stretch of Klockner Road shows a total of six, including four involving fixed objects, one of which struck the bridge abutment.

Proposed Improvements

It is recommended that the following improvements be made:

- Regrade Klockner Road at the railroad crossing to provide a three percent grade south of the railroad tracks and a two percent grade north of the railroad tracks providing a crest vertical curve 300 feet long.
- Install a Curve sign with a 35 mph Advisory Speed plate 300 feet south of the stream crossing.
- Remove the existing Turn sign and install a Curve sign with a 30 mph Advisory Speed plate north of the stream crossing.
- Install a 12" x 36", Type 3 object marker on the right side of each of the bridge abutments.

Benefit

Rebuilding the vertical curve at the railroad approach will increase visibility (stopping sight distance of 275 feet) and decrease the potential for vehicles losing control on the sharp break-over angle, reducing the potential for off-the-road accidents. The Curve signs and the object markers on the bridge abutments will reduce the potential for vehicles striking the abutments by providing safe speed guidelines and also by emphasizing the physical hazard.

Cost Estimate

Construction	$19,500.00
Engineering	2,300.00
Total	$21,800.00

KUSER ROAD, 3000 FEET EAST OF HAMILTON SQUARE WHITEHORSE ROAD (Not Illustrated)

Existing Conditions

Kuser Road bends abruptly at the entrance to the Italian-American Club. As a result, the stone wall at the entrance to the club has been hit at least twice in three years; one accident caused two fatalities. The curves on the approaches are signed with advance Curve signs and Advisory Speed plates, but the painted edge line and centerline are worn and not readily visible.

Proposed Improvements

It is recommended that the following improvements be made:

Install a Large Arrow sign approximately 100 feet east of the club entrance on the south side of Kuser Road, facing westbound traffic. Install a second Large Arrow sign on the most westerly wall of the entrance, also facing westbound traffic.

Benefit

The renewal of pavement markings will provide a clearer outline of the curve, reducing the potential for head-on and fixed object type accidents. The Large Arrow signs will also help to clearly define the curve and the entrance wall.

Cost Estimate

Construction	$300.00
Engineering	-
Total	$300.00

WHITEHEAD ROAD OVER ASSUNPINK CREEK (Not Illustrated)

Proposed Improvements

In conjunction with the proposed improvement of the intersection of Whitehead Road and Sweet Briar Avenue (see Figure B17), it is also proposed to reconstruct the existing bridge over the Assunpink Creek. West of the two-lane bridge, Whitehead Road is four lanes in width. However, east of the bridge through the Sweet Briar Avenue intersection, Whitehead Road is only two lanes in width. Moreover, virtually all of the traffic from Sweet Briar Avenue, and 90% of the traffic westbound on Whitehead Road, is oriented toward the bridge.

At present, traffic back-ups principally occur during peak hours of operation on the Sweet Briar approach and on the eastbound approach of Whitehead Road. Relief can only be achieved by a joint improvement of the intersection and bridge over Assunpink Creek.

It is proposed to provide a cartway on the reconstructed bridge 50 feet in width compared to its present 30-foot width. Its length will be approximately 110 feet. Because the existing structure is approximately 40 years old, improvements may logically take the form of complete replacement.

Cost Estimate

Construction	$363,000.00
Engineering	44,000.00
Total	$407,000.00

YARDVILLE ALLENTOWN ROAD AT NEW JERSEY TURNPIKE OVERPASS (Not Illustrated)

Existing Conditions

The Yardville Allentown Road overpass of the New Jersey Turnpike has been the scene of nine accidents, five involving fixed objects, two same direction type, and two head-on collisions, one of which was a fatal accident. Three of the accidents occurred during wet or icy conditions. The vertical curve of the overpass permits a sight distance of 275 feet which provides safe stopping for 40 mph speeds. Just west of the overpass, a portion of the westbound lane ends abruptly at the intersection of Uncle Pete's Road.

Proposed Improvements

The following improvements are recommended:

- Provide edge striping and delineators (50 feet on center) along the two sides of the roadway for a distance of 1000 feet on either side of the bridge. Transition the northerly edge line, west of the bridge, to meet the offset at Uncle Pete's Road.
- Install BRIDGE FREEZES BEFORE ROAD signs on each approach.
- Install three 18" x 18", Type 1 object markers at the offset west of the bridge facing westbound traffic.
- Install ROAD NARROWS sign in advance of the offset facing westbound traffic.

Benefit

The BRIDGE FREEZES BEFORE ROAD signs will alert motorists to possible skidding dangers, and better delineation of the roadway will be provided by the pavement markings and delineators.

Cost Estimate

Construction	$700.00
Engineering	100.00
Total	$800.00

The New Jersey Department of Transportation maintains two noninterconnected signal systems in Hamilton Township. The signals on U.S. Route 206 and N.J. Route 33 both operate on 90-second background cycles which provide a balanced progression capability that functions 24 hours a day. The principal limitations of these systems are their insensitivity to the directional variation in traffic flows and their dependence upon signal coordination through synchronous motors.

With the availability of leased telephone lines and multiplexing techniques, interconnected coordination of traffic signals is relatively inexpensive. Therefore, consideration has been given to including as many signals as possible within the several systems that were studied.

Traffic volume data was reviewed at existing and proposed signal locations to determine when meaningful variations in the directional distribution of traffic warranted special consideration. Six signal systems are proposed and are shown on Figure B23. Systems A and B will replace the existing systems on the two State highways described above, while the other four systems will provide traffic progression along County arterials.

It is noted that each signal system is geared to the provision of progressive traffic movement along an arterial. However, nearby signals on cross streets have been included in the systems wherever proximity to an arterial signal suggests coordinated operation.

System A: N. J. Route 33-Nottingham Way

Two principal patterns emerge in reviewing traffic volume data along Route 33. During the morning commuter period, the predominant flow of traffic is in the direction of Trenton. Thereafter, flows tend to be balanced with only a slight outbound surge in the evening. Accordingly, it is recommended that two system programs be provided, one with offsets accommodating the weekday morning inbound directional demand from 7:00 A.M. to 9:00 A.M., and the other with offsets for balanced traffic flows from 9:00 A.M. to midnight on weekdays and from 7:00 A.M. to midnight on weekends. A 90-second background cycle is proposed except during the early morning hours (midnight to 7:00 A.M.) when each signalized intersection is to operate independently (minimum artery green).

System A includes eight signalized intersections along Route 33 (George Dye Road to Klockner Road) and two signalized intersections along Nottingham Way at East State Street and Ward Avenue. Since a STOP sign at Greenwood Avenue controls eastbound Nottingham Way traffic, progression through the section of highway between Klockner Road and Ward Avenue will principally relate to westbound traffic.

Several signals in proximity to Route 33 and Nottingham Way are proposed to be included in System A. Thus, coordination will be maintained along the cross streets in the form of balanced progression during each of the two system programs. The cross street signals to be included with System A are at the following intersections:

1) Hamilton Square Yardville Road and Nottingham Way
2) Mercerville Whitehorse Road and Nottingham Way
3) Hamilton Avenue and Klockner Road
4) East State Street and Johnston Avenue
5) East State Street and Whitehead Road
6) Greenwood Avenue (Route 33) and Johnston Avenue

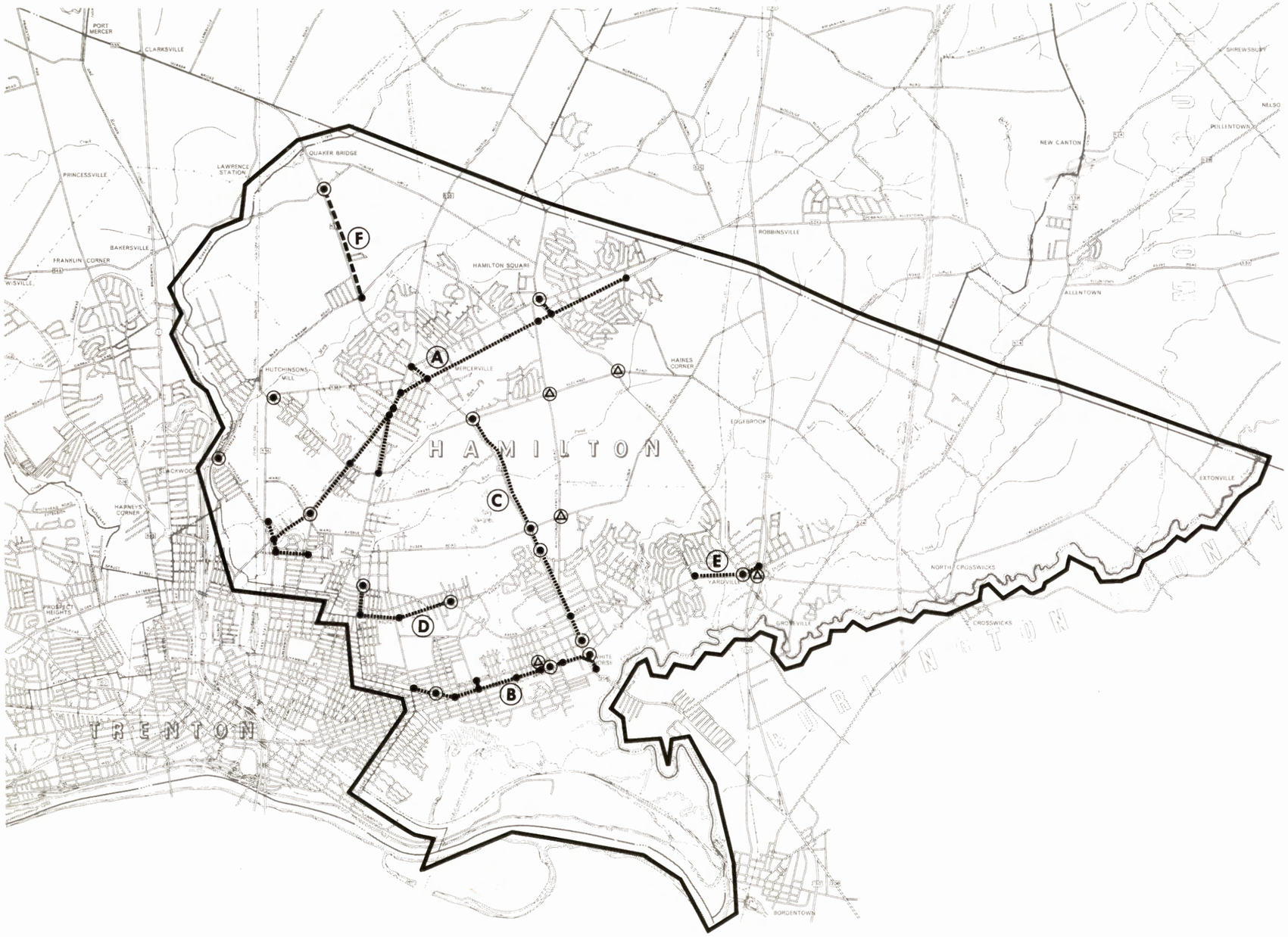
System B: U.S. Route 206

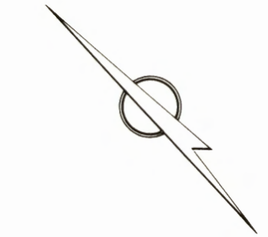
Traffic volume characteristics indicate inbound directional flows during the morning commuter period and essentially balanced flows throughout the rest of the day along U.S. Route 206, South Broad Street. Accordingly, it is recommended that two system programs be provided, as proposed for Route 33, one with offsets favoring the directional morning demand (from 7:00 A.M. to 9:00 A.M.) and the other with offsets accommodating a balanced flow situation. A 90-second background cycle is proposed from 7:00 A.M. to midnight with free operation during the early morning hours.

It is proposed that System B begin at the Route 206/Chambers Street intersection and extend to Route 206 at Ruskin Avenue. Six existing signalized intersections and two proposed signals are to be included. In addition, nearby signals at the following three intersections are also proposed for balanced progression during both System B programs:

1) Chambers Street and Cedar Lane
2) Chambers Street and South Clinton Avenue
3) Park Avenue and South Clinton Avenue

Figure B23





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SCALE IN FEET

Legend

- EXISTING TRAFFIC SIGNAL (28)
- PROPOSED TRAFFIC SIGNAL (15)
- PROPOSED FLASHING SIGNAL (5)

PROPOSED SIGNAL SYSTEMS:

- INTERCONNECTED
- NON-INTERCONNECTED

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area III

TRAFFIC SIGNALS AND SIGNAL SYSTEMS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

System C: White Horse Avenue-Mercerville Whitehorse Road

Traffic flows along White Horse Avenue-Mercerville Whitehorse Road fall into three distinct patterns: highly directional northbound during the morning peak period (7:00 A. M. to 9:00 A. M.), highly directional southbound during the evening commuter period (4:00 P. M. to 6:00 P. M.), and essentially balanced flows at other times. Three offset programs corresponding to these patterns are recommended. A 90-second background cycle from 7:00 A. M. to midnight, and free operation at other times, is also proposed for System C.

System D: South Clinton Avenue

It is proposed to coordinate the three signalized intersections along South Olden Avenue, at Liberty Street, Cedar Lane, and Arena Drive. Three methods of operation are recommended: a 90-second background cycle during weekday mornings (7:00 A. M. to 9:00 A. M.) with directional offsets favoring Trenton-bound traffic, a 90-second cycle with offsets for balanced flow for weekday evenings (4:00 P. M. to 6:00 P. M.), and a 70-second cycle with offsets for balanced flow at all other times.

A nearby signal at the Liberty Street/Newkirk Avenue intersection will be included in System D. Offsets for balanced flow at all times are recommended for Liberty Street.

System E: South Broad Street-Yardville Allentown Road

Three signalized intersections are included in proposed System E: South Broad Street at Sunnybrae Boulevard, South Broad Street at Yardville Allentown Road, and Yardville Allentown Road at Route 156.

It is recommended that a program for balanced traffic flow be provided with a 90-second cycle during the weekday commuter periods of travel (7:00 A. M. to 9:00 A. M. and 4:00 P. M. to 6:00 P. M.), with a 70-second cycle and balanced flow offsets at all other times.

System F: Mercerville Quakerbridge Road

It is recommended that the two proposed signals on Mercerville Quakerbridge Road, at Sloane Avenue-Flock Road and at Youngs Road, be operated as a noninterconnected system with coordination achieved through synchronizing devices. A 90-second background cycle is proposed daily during the period from 7:00 A. M. to 7:00 P. M. During the remaining 12 hours, it is recommended that the signals go on free operation.

Benefit

The benefits that will accrue to motorists will largely depend on the proportion of the signal "green" time or the "through band width" that can be designed for the progressive movement of traffic for each of the proposed programs of the respective signal systems. While reductions in travel delays are anticipated, benefits in terms of safety will also result through minimizing the stopping traffic, thereby reducing the potential for same direction accidents.

Cost Estimate

The following estimates include costs for equipment, engineering, and estimated annual costs for a pair of leased telephone lines for each of the interconnected signal systems. Since systems A and B are principally on State highways, no estimates were prepared for equipping or operating them, except that equipment costs were estimated for the County installations within the two systems.

	Initial Cost (Equipment)	Annual Cost (Leased Lines)
System A	$ 5,000.00	$ -
System B	2,500.00	-
System C	5,000.00	60.00
System D	4,500.00	50.00
System E	3,500.00	30.00
System F	1,500.00	-
Subtotal	$22,000.00	$140.00
Engineering	3,000.00	-
TOTAL	$25,000.00	$140.00

Objective

This section of the report deals, in a general manner, with those sections of the TOPICS study network that were found to have capacity limitations, or other operational deficiencies, including those observed at large traffic generators. In some instances, the proposed intersection improvements, presented elsewhere in this report, will serve as a partial answer to the problem. The following recommendations are offered as additional measures toward obtaining relief. In other instances, substantial relief will only be realized when major roadway improvements, beyond the scope of the TOPICS program, are undertaken.

The recommendations made in this section of the report primarily consist of the signing and enforcing of existing parking regulations and the adoption of new No Stopping or Standing regulations where necessary along selected roadways. It is noted that signs regulating parking along a roadway must be placed at intervals no greater than 250 feet to be considered effective and acceptable in terms of legal requirements.

Operational Evaluation

U.S. Route 206, South Broad Street

U.S. Route 206 is one of the most heavily traveled roads in Mercer County serving as an arterial highway between the City of Trenton and points east and south. Its location through the older, more developed section of Hamilton Township also identifies the highway as a major urban street that must accommodate local traffic and abutting residential and commercial development. Accordingly, parking along the highway is in great demand. The principal impediments to traffic are the restrictions imposed by parked vehicles and the regulated stops at signalized intersections.

Several intersection improvements are proposed elsewhere in the report which will offer some relief. The removal of parking, both for short periods and on a permanent basis, was considered and rejected as impractical. On the other hand, the construction of the Route 29 Freeway pending in the not too distant future, and the anticipated diversion of traffic to that facility from U.S. Route 206, will provide meaningful relief.

Independence Mall

Traffic operations at the Independence Mall were surveyed. The shopping center is located on the south side of U.S. Route 206, just west of Trebor Drive, and has a parking capacity of approximately 1300 vehicles. The principal operating problem occurs at the intersection of U.S. Route 206 and Trebor Drive where all left turns into Independence Mall are made. Proposed improvements at this location are discussed elsewhere in the report. At the main drive to the center, midway between Oldfield Avenue and Trebor Drive, it is recommended that a KEEP RIGHT sign be posted on the channelizing island to guide exiting motorists.

N.J. Route 33

The character of N.J. Route 33 varies from a typical urban street lined with residences along Greenwood Avenue to a three-lane roadway with shoulders and strip type commercial development in the Mercerville area of Hamilton Township. Traffic volumes exceed roadway capacity as a result of inadequate width, intersection delay, and the restrictions imposed by traffic at the commercial driveways. The latter also contribute notably to the accident incidence along Route 33.

Several other intersection improvements have also been proposed that will afford partial relief in terms of better traffic flow and reduced accident potential. Only major reconstruction of the highway, however, will result in meaningfully improved operations. Studies currently in progress by the New Jersey Department of Transportation are directed toward proposing a type of facility commensurate with the traffic needs of N.J. Route 33.

Hamilton Plaza

Hamilton Plaza, a shopping center of approximately 900-car parking capacity, is located on Route 33 in the vicinity of Hamilton Square. Its somewhat remote location from the more heavily concentrated activities in the Mercerville area affords the center more fluid operations, and therefore fewer operational problems. No recommendations, therefore, are offered for Hamilton Plaza.

Mercerville Center

Mercerville Center is located at the intersection of Route 33 and Mercerville Whitehorse Road and can accommodate approximately 500 parked vehicles. Three drives from the highway serve the center in addition to a fourth from the cross road. The Route 33 driveway closest to Mercerville Whitehorse Road is heavily used by eastbound vehicles that often queue up toward the intersection as they wait to turn left into the center. It has been recommended that this drive be modified in conjunction with the intersection improvements proposed for Route 33 and Mercerville Whitehorse Road.

Atlantic Avenue

Atlantic Avenue is a narrow local street connecting N.J. Route 33 (Greenwood Avenue) and Hamilton Avenue. Although traffic is generally not heavy, the observed parking practices on the west side of Atlantic Avenue, in the vicinity of the Hamilton Avenue intersection, create an impediment to two-way traffic flow. An existing 100-foot stopping and standing prohibition along this side of the street is unsigned. Accordingly, it is recommended that this regulation be properly signed and enforced.

Cedar Lane

Cedar Lane is a moderately traveled local street with the principal concentration of traffic occurring between Newkirk Avenue and South Olden Avenue. An existing ordinance prohibits parking on both sides of Cedar Lane between Newkirk Avenue and Pittman Avenue. This regulation is inadequately signed, however, and the resulting parking has been observed to cause friction and delay to moving traffic. Accordingly, it is recommended that the existing regulation be properly signed and enforced.

East State Street

Delays along East State Street occur primarily between Johnston Avenue and Whitehead Road with the principal restrictions to traffic taking place at the intersections. As outlined elsewhere in the report, intersection improvements have been proposed which will provide some relief at Johnston Avenue, Nottingham Way, and Whitehead Road. Present regulations prohibit parking along the west side of East State Street from 8:00 A.M. to 10:00 A.M., daily. It is recommended that this restriction be lifted and that a No Stopping or Standing ordinance be adopted from 7:00 A.M. to 9:00 A.M. along the east side and from 4:00 P.M. to 6:00 P.M. along the west side of East State Street between Johnston Avenue and Whitehead Road.

Hamilton Avenue

Hamilton Avenue is one of the major east-west arteries in Hamilton Township, accommodating heavy traffic volumes throughout the day, particularly during the morning and evening peak hours. Volumes are highest between Klockner Road and Liberty Street. Existing stopping and standing regulations are intermittent, covering only small segments of the roadway. It is recommended that No Stopping or Standing be ordained on both sides of Hamilton Avenue between Liberty Street and Klockner Road in conjunction with the proposed channelization in the Liberty Street-Kuser Road area as recommended elsewhere in the report.

Hughes Drive

Hughes Drive is a narrow, moderately traveled local road between Mercer Street and Mercerville Quakerbridge Road. Parking is presently prohibited on both sides, between Youngs Road and Mercerville Quakerbridge Road. Due to its narrow width and the lack of shoulders, No Stopping or Standing regulations are proposed on both sides throughout the length of Hughes Drive (Mercer Street to Youngs Road).

Klockner Avenue

Klockner Avenue, between East State Street Extension and N. J. Route 33 (Nottingham Way), is a heavily traveled road with the Cornell Heights Bridge to the north accounting for much of the traffic demand. Although the west side of Klockner Avenue is presently signed for No Parking, the regulation is not ordained. The No Stopping or Standing regulation in effect in the vicinity of Route 33 is not sufficient to provide for the adequate flow of traffic throughout this section of Klockner Avenue. Accordingly, it is recommended that the existing No Parking regulation along the west side be changed to No Stopping or Standing. It is also proposed that along the east side a No Stopping or Standing regulation be ordained from 7:00 A.M. to 7:00 P.M. between East State Street and Nottingham Way.

Liberty Street

Liberty Street, between South Olden Avenue and Newkirk Avenue, is narrow and extensively traveled during commuter hours. As a consequence, parking on the north side causes friction and delay, although stopping and standing is presently prohibited along the south side.

It is recommended that stopping and standing be prohibited on the north side of Liberty Street from 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. The proposed regulation is to begin at Klein Avenue, one block west of Newkirk Avenue, and terminate at South Olden Avenue, thereby permitting parking for those residents between Newkirk Avenue and Klein Avenue who are without driveways.

Nottingham Way

The western section of Nottingham Way, from the township line to Roberts Avenue, lies in an industrial area. The existing stopping and standing prohibition on both sides of Nottingham Way is inadequately signed throughout this area. Accordingly, adequate signing is recommended to discourage the impediment to traffic caused by occasional parked vehicles. It was also observed that, where the road dips under the Penn Central Railroad bridge, it becomes icy on occasion, and some vehicles encounter difficulties negotiating the grade. Therefore, it is recommended that sand or cinders be provided in roadside containers for such conditions.

Between Roberts Avenue and Ward Avenue, traffic is heavy and very directional during the peak hours of travel. Accordingly, No Stopping or Standing regulations are proposed along the north side of Nottingham Way between 7:00 A.M. and 9:00 A.M. and along the south side between 4:00 P.M. and 6:00 P.M.

The section of Nottingham Way from Mercerville Quakerbridge Road east to N. J. Route 33 is a major County Road that serves as an important collector street and, to some degree, as a relief road for Route 33. From Jonathan Drive east to Hamilton Square Yardville Road, the street is narrow and has several shallow curves. Accordingly, present parking practices restrict the flow of traffic. Furthermore, existing regulations are intermittent and inadequately signed. Therefore, it is recommended that stopping and standing be prohibited along the south side of Nottingham Way from Jonathan Drive to Hamilton Square Yardville Road.

Paxson Avenue

Paxson Avenue extends from Mercerville Edinburg Road to Nottingham Way and is a collector street which to some degree is used by through traffic. Presently, parking is prohibited between Nottingham Way and Florister Avenue, but signing is inadequate and parked vehicles have been observed. Thus, it is recommended that the existing regulation be properly signed.

South Olden Avenue

South Olden Avenue is a major crosstown street through Trenton which carries a heavy volume of traffic. Present parking practices along both sides of the street cause traffic friction and travel delays, especially along the section of roadway between Hamilton Avenue (at the Trenton city line) and Newkirk Avenue. This area is heavily residential and few homes have driveways for off-street parking. Hence, long term parking prohibitions are impractical.

Accordingly, it is recommended that stopping and standing be prohibited on the north side of South Olden Avenue between the hours of 7:00 A.M. and 9:00 A.M. and on the south side between 4:00 P.M. and 6:00 P.M., from Hamilton Avenue to Newkirk Avenue. It is noted, however, that the south side of South Olden Avenue, between Hamilton Avenue and Liberty Street, lies within the City of Trenton. Accordingly, the cooperation of the City is necessary for implementation of this regulation.

Whitehead Road

Whitehead Road is a heavily traveled two-lane arterial extending in a southerly direction from U.S. Route 1, over the Penn Central Railroad tracks, to East State Street. Much of the traffic is comprised of trucks operating from the industrial area in the Nottingham Way-East State Street district. During the evening peak hour, southbound traffic experiences long traffic delays at the Sweet Briar Avenue and East State Street intersections. Improvements to these intersections have been proposed. In addition, it is recommended that the existing No Stopping or Standing regulation in the vicinity of East State Street on both sides of Whitehead Road be extended northward to the township line.

Benefit

The principal benefit of imposing parking controls along restricted sections of roadway will be to increase roadway capacity, thereby minimizing travel delay. The regulation of parking has been proposed on certain streets where traffic volumes are not high. The effect will be to permit greater maneuverability, thereby reducing the potential for accidents. Whereas some inconvenience may result to some drivers from implementation of the proposed parking ordinances, it is anticipated that the advantages realized in terms of reduced traffic friction will be great when applied to all the motorists that will benefit from improved traffic operations.

Cost Estimate

The following estimate covers the cost of installing approximately 300 signs for the regulation of parking at those locations discussed on the preceding pages.

Construction	$3,500.00
Engineering	400.00
Total	$3,900.00

Realistic Speed Limits

Speed limits are posted to guide drivers in their operation of motor vehicles. If the limit is too high, the dangerous driver is unchecked in his pursuit of speed to the detriment of others. If the limit is too low, drivers will ignore it, and the value of the posted limit as a guide to safe travel will be undermined. Only with realistic speed zoning can the demands of safety, speed, and comfort be merged into a working balance.

Realistic limits are a reflection of certain constants which make up the physical characteristics of a roadway. These include alignment of the roadway, pavement and lane width, presence of shoulders, curbs and sidewalks, roadside development, and distance to vertical obstructions. Obviously, the influence of each of these on travel speeds cannot be measured separately. But the speed that a safe driver chooses at any location is a reflection of all these conditions combined.

Realistic speed limits, therefore, will allow the typical safe driver to travel at his accustomed speed while excluding the few unsafe drivers, who, as violators, can then be subject to apprehension and the penalties prescribed by law. Speed limits are not a tool for effecting substantial changes in the pattern of speeds along a roadway, since the speed of most vehicles will remain unchanged. Proper limits, however, do tend to lower the highest speeds and raise the lowest ones, resulting in more uniform traffic flows and safer driving conditions.

Two roadways in Hamilton Township were selected for survey and analysis, Hamilton Avenue and Ward Avenue. No speed limits are presently posted on either road, and the statutory speed limits applicable to them appear to be unrealistic.

The Survey

The survey was conducted under the best available weather conditions and involved three distinct procedures. Along stretches of roadway where motorists can travel relatively unrestricted, spot speed checks were taken with radar from a vehicle parked inconspicuously on the side. These observations were limited to off-peak hours when traffic was free-flowing. The 85th percentile speed was then computed for each study location and posted on a map for analysis in conjunction with the speed check results at other locations on the same road. The final proposed speed limit for the roadway was then determined on the basis of a comprehensive review of all the posted data.

The second procedure involved determination of the safe travel speed along the curved sections of the study roadways. With the aid of a ball bank indicator, a driver and a recorder traversed each location several times to determine the comfortable and safe travel speed at which each of the curves could be negotiated. Independent ball bank surveys were made in each direction of travel.

After the initial engineering analysis was completed and tentative speed limit and warning signs were selected, a field check was made to determine the exact location of the proposed signs. A field run(s) in each direction was then made to determine the necessity for complementary devices such as School Advance and School Crossing signs.

Proposed Improvements

As a result of the engineering surveys and analyses described above, it is recommended that new speed limits be ordained on Hamilton Avenue and Ward Avenue. It is also proposed to erect appropriate speed limit and warning signs along the study roadways in accordance with the following sign schedules. Advisory Speed signs are proposed for use with the warning signs where appropriate. Each listing describes the proposed sign legend and location, and its designation as shown in the current "Manual on Uniform Traffic Control Devices for Streets and Highways." The replacement of existing signs - such as school signs - that do not conform to the Manual is proposed.

Benefit

Realistic speed limits will tend to be observed voluntarily since they coincide with the speeds assumed by the majority of drivers. Proper posting of realistic speed limits will also tend to reduce the higher speeds, resulting in more uniform traffic flows and safer operating conditions. Finally, the advance warning signs and advisory speeds will provide additional guides for motorists at hazardous locations, affording further aids toward safer operations.

Cost Estimate

Construction	$3,200.00
Engineering	400.00
Total	$3,600.00

HAMILTON AVENUE

Study Section Characteristics

Limits: South Olden Avenue to Nottingham Way

Length: 2.1 miles

Assumed Direction: West-East

Roadway Geometrics and Controls:

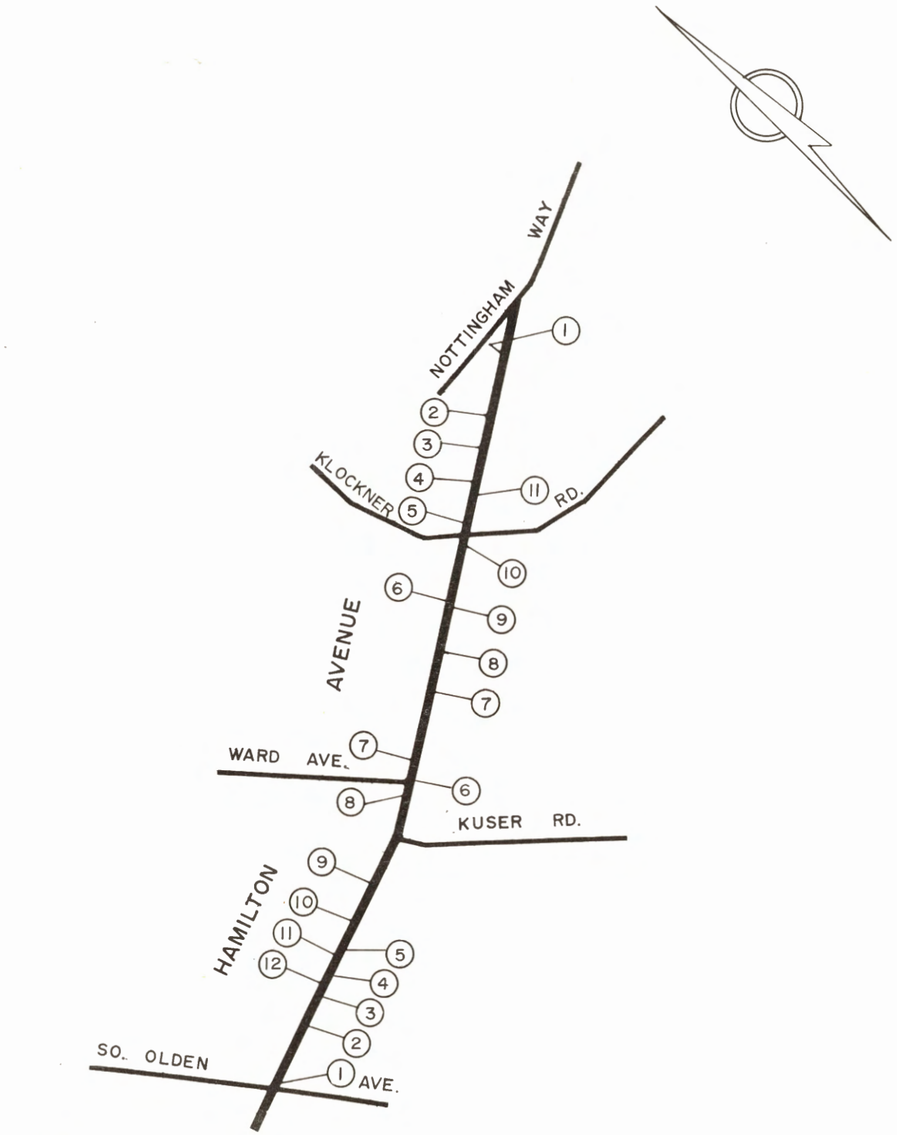
Width	40 feet, curbed
Alignment	Straight except for one minor curve
Controls	Traffic signals at Nottingham Way, Klockner Avenue, and South Olden Avenue. Other intersecting roads are STOP sign controlled.
Parking	Permitted
Speed Limit	Statutory 25 mph

Land Use: Residential and Business

School: Nottingham Junior High School located on the northwest corner of the intersection of Hamilton Avenue and Klockner Avenue. Athletic field fronts Hamilton Avenue.

Recommended Speed Limit

Nottingham Way to Ward Avenue: 40 mph
Ward Avenue to South Olden Avenue: 35 mph
School: 25 mph when children are present



SIGN LOCATIONS

HAMILTON AVENUE

Sign Schedule: Eastbound Direction

Sign	Type	Location
1) SPEED LIMIT 35	R2-1	230' east of Olden Avenue (35' east of Pole 60899HM)
2) SPEED LIMIT 35	R2-1	25' west of Francis Avenue (45' east of Pole 60787HM)
3) School Advance	S1-1	25' west of Pole A60783HM
4) School Crossing	S2-1	Southwest corner of Hamilton Avenue/Newkirk Avenue (70' east of Pole S60902HM)
5) SPEED LIMIT 35	R2-1	405' east of Newkirk Avenue (45' east of Pole E60908HM)
6) SPEED LIMIT 40	R2-1	56' east of Leuckel Street (opposite Pole A61320HM)
7) SPEED LIMIT 40	R2-1	65' east of Bentley Avenue (51' east of Fire Hydrant 10)
8) School Advance	S1-1	35' east of Cypress Lane (50' west of Pole A63605HM on opposite side)
9) SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT (Assembly)	S4-3 R2-1 S4-2	Opposite Athletic Field (opposite Pole A65932HM)
10) School Crossing	S2-1	Southwest corner of Hamilton Avenue/Klockner Avenue mounted on traffic signal pedestal
11) SPEED LIMIT 40	R2-1	Opposite Pole 67809HM

Sign Schedule: Westbound Direction

Sign	Type	Location
1) SPEED LIMIT 40	R2-1	440' west of Nottingham Way (46' west of Pole 60407HM)
2) SPEED LIMIT 40	R2-1	107' west of Madison Avenue (20' east of Pole 60417HM)
3) School Advance	S1-1	15' west of Pole A65203HM
4) SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT (Assembly)	S4-3 R2-1 S4-2	20' east of Pole 67809HM
5) School Crossing	S2-1	Northeast corner of Hamilton Avenue/Klockner Avenue (20' east of Pole S)
6) SPEED LIMIT 40	R2-1	25' west of Pole A65932HM
7) REDUCED SPEED AHEAD	R2-5a	390' east of Ward Avenue (20' west of Pole 61323HM)
8) SPEED LIMIT 35	R2-1	150' west of Ward Avenue (25' east of Pole 61276HM)
9) SPEED LIMIT 35	R2-1	110' east of Johnston Avenue (25' east of Pole 60915HM)
10) School Advance	S1-1	50' east of Pole A60909HM on the opposite side
11) School Crossing	S2-1	26' west of Pole E70529
12) SPEED LIMIT 35	R2-1	200' west of Atlantic Avenue (21' east of Pole 65367HM)

WARD AVENUE

Study Section Characteristics

Limits: Hamilton Avenue to East State Street Extension

Length: 1.3 miles

Assumed Direction: North-South

Roadway Geometrics and Controls:

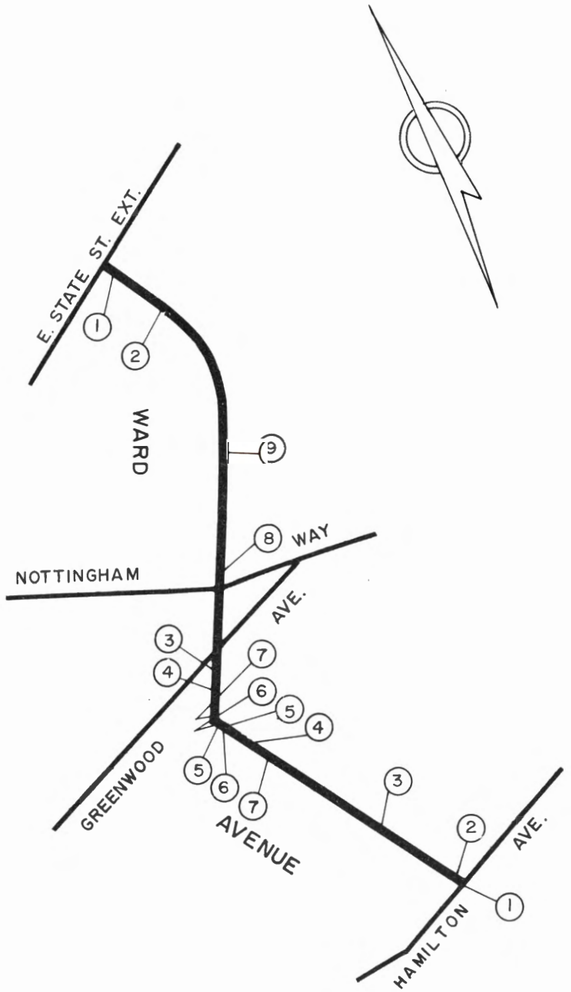
Width	Hamilton Avenue to Greenwood Avenue 26 feet, curbed; Greenwood Avenue to East State Street 46 to 50 feet, curbed.
Alignment	One severe turn
Controls	Ward Avenue is STOP sign controlled at East State Street Extension, Nottingham Way, Greenwood Avenue, and Hamilton Avenue.
Parking	Generally permitted, but few parked vehicles observed.
Speed Limit	Statutory 25 mph

Land Use: Residential and Industrial

School: Greenwood Elementary School located on the southwest corner of the intersection of Ward Avenue and Greenwood Avenue. School faces Greenwood Avenue. Statutory school zone speed in existence.

Recommended Speed Limit

Hamilton Avenue to East State Street Extension: 40 mph
School: None required because curved roadway alignment necessitates reduced speeds.



SIGN LOCATIONS

WARD AVENUE

Sign Schedule: Northbound Direction

Sign	Type	Location
1) Double Arrow	W1-7	Opposite Ward Avenue center line on south side of Hamilton Avenue (22' west of Pole 10670HM)
2) SPEED LIMIT 40	R2-1	180' north of Hamilton Avenue (20' south of Pole E65416HM)
3) SPEED LIMIT 40	R2-1	830' north of Hamilton Avenue (50' north of Pole E61400HM)
4) a) Right Turn (oversize)	W1-1	In place of existing sign (45' south of Pole E60298HM)
b) 15 mph Advisory Speed plate	W13-1	Mounted beneath sign 4.a.
5) School Advance	S1-1	In place of existing SCHOOL sign
6) Right Arrow	W1-6	On west side (15' north of Pole E67814HM)
7) Right Arrow	W1-6	On west side (30' north of Pole E67814HM)
8) SPEED LIMIT 40	R2-1	220' north of Nottingham Way (38' north of Pole 70214HM)
9) a) Left Curve	W1-2	400' south of curve (20' south of Pole 70218HM)
b) 35 mph Advisory Speed plate	W13-1	Mounted beneath sign 9.a.

Sign Schedule: Southbound Direction

Sign	Type	Location
1) SPEED LIMIT 40	R2-1	Opposite Pole BT1274HM
2) SPEED LIMIT 40	R2-1	Opposite Pole 70218HM
3) School Advance	S1-1	In place of existing SCHOOL sign
4) a) Left Turn (oversize)	W1-1	166' south of Greenwood Avenue (400' north of turn)
b) 10 mph Advisory Speed plate	W13-1	Mounted beneath sign 4.a.
5) Left Arrow	W1-6	On west side (15' south of Pole E67814HM)
6) Left Arrow	W1-6	On west side (30' south of Pole E67814HM)
7) SPEED LIMIT 40	R2-1	174' north of Richland Avenue (opposite Pole E60297HM)

Existing Conditions

Mercer Metro, the principal bus operator in Mercer County, assigns eight of its 11 routes in Hamilton Township. These routes extend from the City of Trenton along two principal corridors - to the southeast along South Broad Street and South Olden Avenue and to the northeast along East State Street, Greenwood Avenue-Nottingham Way, and Hamilton Avenue. These corridors embrace the most populated areas of the Township; thus, the roadways traversed by the buses are also among the most heavily traveled in Hamilton.

For the most part, bus stops in the Township are not identified by signs or other markings. Hence, bus drivers stop in response to patron demand. Where bus stops are identified, the signing is generally old and illegible, and, typically, existing bus stops are too short, or not located to the best advantage relative to overall traffic operating considerations.

Proposed Improvements

The following improvements are recommended relative to the proposed bus stops listed in Table C of the Appendix:

- Establish all proposed bus stops by local ordinance, and by State regulation on State highways.

- Provide bus stops of the following minimum dimensions:*

Corner, Near Side	- 105 feet
Corner, Far Side	- 100 feet
Mid-Block	- 135 feet

- Provide bus stops along South Broad Street, between Lalor Street and White Horse Avenue, 40 feet longer than the above minimum standards.

- Provide a NO PARKING BUS STOP sign at each end of all proposed bus stops.

*New Jersey Department of Transportation standards.

Benefit

Providing bus stops of the lengths proposed will permit the easy maneuvering of buses, thereby encouraging their proper use. The extended bus stop dimensions proposed for South Broad Street will permit two buses to stop simultaneously, thus accommodating the concentrated activity of buses and other traffic that presently operate on the highway. The use of far side bus stops wherever practical will minimize conflicts between buses and crossing pedestrians, as well as conflicts between buses and right turning vehicles. It is also anticipated that the proposed signing will readily identify the bus stops to patrons and parking motorists.

Cost Estimate

Construction	$5,600.00
Engineering	600.00
Total	$6,200.00

All existing Hamilton Township traffic and parking ordinances were reviewed relative to their legal authority. Those found to be unapproved were examined with respect to their need for maintaining the full potential of the street network in relation to the demands of traffic. Appropriate recommendations were then formulated toward repealing or seeking the approval of these ordinances.

The benefits to be derived in obtaining approval of the ordinances discussed herein are not immediately obvious. They relate, however, to the desirability of providing uniformly credible traffic regulation that will be enforced on the one hand and respected on the other, a necessary condition in providing the safe and orderly movement of traffic.

Parking

It is recommended that the following existing Parking ordinance be repealed:

- East State Street Extension: south side, along the front of the G.E. building, Stopping or Standing prohibited.

It is recommended that the following ordained Parking regulations be submitted to the New Jersey Department of Transportation for approval:

- East State Street Extension: both sides, 8:00 A.M. to 4:00 P.M., school days; No Stopping or Standing from the easterly line of Stratford Avenue to the westerly line of Nottingham Way.

- Independence Avenue: west side, No Stopping or Standing from the northerly curb line of Trebor Drive to the southerly curb line of Lake Avenue.

- Yardville Hamilton Square Road: west side, 8:00 A.M. to 4:00 P.M., school days; No Stopping or Standing from a point 1315 feet north of the northerly curb line of Klockner Road to a point opposite the northerly line of Estates Boulevard.

It is recommended that the following Parking ordinances be adopted superseding inconsistent existing ordinances and be submitted to the New Jersey Department of Transportation for approval:

- Arena Drive: both sides, No Parking between South Olden Avenue and White Horse Avenue as presently signed.

- Nottingham Way: both sides, 8:00 A.M. to 4:00 P.M., school days; No Stopping or Standing from 430 feet east of the easterly curb line of Jonathan Drive to 175 feet west of the westerly curb line of Gregory Drive.

Stop Intersection

It is recommended that the following Stop Street ordinance be submitted to the New Jersey Department of Transportation for approval:

- Englewood Boulevard and Hempstead Road. STOP signs to be mounted on the Hempstead Road approaches.

Speed Limits

It is recommended that the following Speed Limit ordinances be submitted to the New Jersey Department of Transportation for approval:

- East State Street Extension, adopted 3/30/65

- Sloane Avenue and Flock Road, adopted 7/6/65

- Lamberton Road, adopted 5/18/65

- Yardville Hamilton Square Road:

40 mph - South Broad Street to center of Queens Gate Road

45 mph thence to center of Estates Boulevard

50 mph thence to 1150 feet south of center of Klockner Road

45 mph thence to N. J. Route 33 except at Junior High School and High School 30 mph when children are present

30 mph thence to Nottingham Way

Shortly after the Mercer County Areawide TOPICS Study commenced in December, 1970, officials of Mercer County and Hamilton Township requested early study of the Cornell Heights Bridge, a structure spanning the main line of the Penn Central Railroad at Hutchinsons Mill near the westerly edge of Hamilton. The request was a culmination of events that focused on operating conditions at the bridge and included petitions by citizens groups, meetings with the Public Utilities Commission and, more recently, the New Jersey Department of Transportation.

The bridge is one of four railroad spans which permit vehicular traffic to cross the four miles of main line track located within the Township. The most northerly span at Youngs Road is located 1.7 miles to the north, while the structures at Whitehead Road and Nottingham Way are located 1.4 and 1.8 miles to the south. Thus, by virtue of its location, the Cornell Heights Bridge is the most accessible of all the crossings to many commuters and residents of Hamilton and the adjoining Township of Lawrence.

This section of the report outlines the procedures and findings relative to an investigation conducted to appraise existing traffic operation and to define the nature and extent of any safety and capacity deficiencies in the Cornell Heights Bridge and its approaches.

Existing Conditions

The Cornell Heights Bridge spans four main line tracks and two spur tracks of the Penn Central Railroad. The structure can be classified as a through girder type, with a length of approximately 100 feet between abutments, a width of 24 feet, and a depth of nine feet. The deep bridge girders, which extend over seven feet above the deck, severely limit the sight distance of drivers. A 20-foot wide bridge cartway serves two-way traffic and is flanked by curbs; a safety walk extends along the northerly side. In elevation, the bridge is approximately 25 feet above the tracks, and its alignment is at right angles to the railroad.

The westerly approach of the structure extends in an almost straight line from the bridge to Carlisle Avenue at a downgrade of approximately five percent. At a distance of about 100 feet from the westerly abutment of the bridge, a second approach descends at a grade of about seven percent in a southerly direction to Sweet Briar Avenue, parallel to the railroad tracks. The paved widths of the two westerly approaches are 20 to 22 feet, and both are flanked by steel beam guard rails.

The east side of the bridge also has two approaches with grades of five to six percent, paved widths of 20 to 22 feet, and guard rail treatment similar to that on the west side. The easterly approaches, however, are parallel to the tracks (right angles to the bridge) and located only 40 feet east of the east abutment. A roadway, parallel to and east of the bridge approaches, permits motorists to bypass the approaches when traveling between Klockner Avenue and Sloane Avenue.

Traffic Volumes

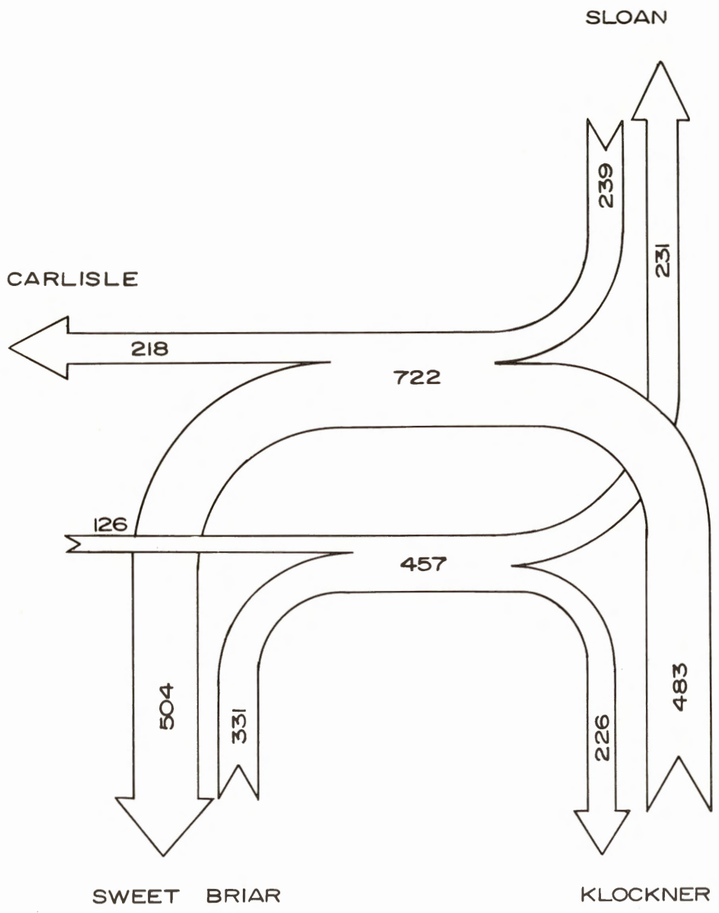
Counts taken at the bridge show that the morning peak hour occurs between 7:30 and 8:30 A.M., when 722 westbound vehicles and 457 eastbound vehicles were observed. The principal movement during the morning is northbound from Klockner Avenue, westbound across the bridge, and thence southbound to Sweet Briar (see Figure B24). The evening peak hour flow of traffic occurs between 4:30 and 5:30 P.M., when 891 eastbound and 451 westbound vehicles were observed, with the major flow northbound from Sweet Briar, eastbound across the bridge, and thence southbound to Klockner.

Based on the analysis of traffic volume data taken at the nearby Klockner Avenue/East State Street intersection, it is estimated that the traffic on the Cornell Heights Bridge has increased from 10,000 vehicles a day in 1967 to 12,500 in 1970.

Travel Delay

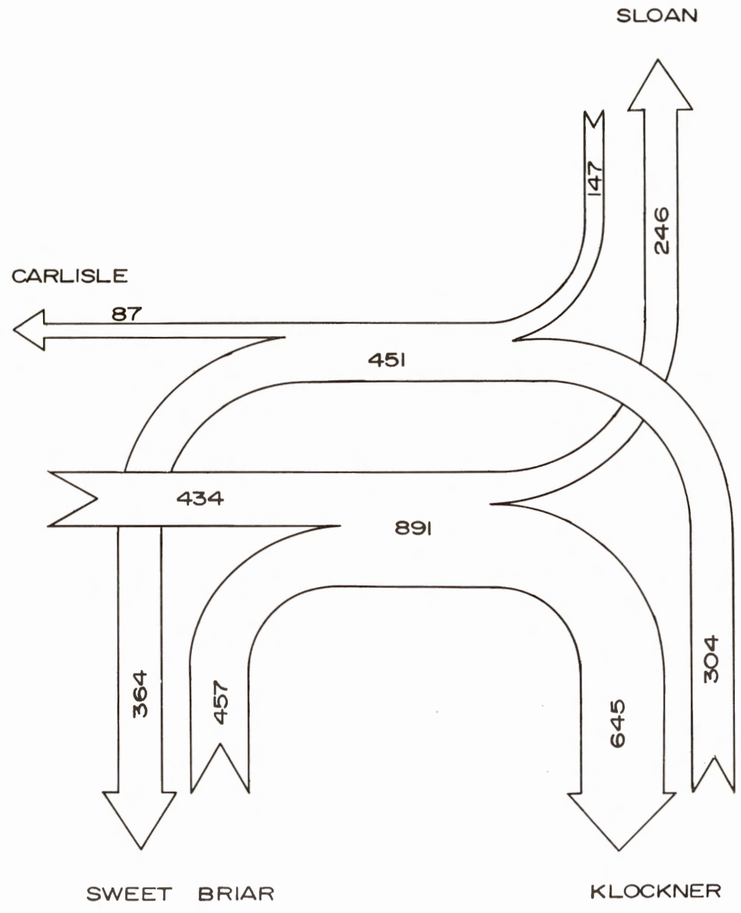
Typically, vehicles traveling during the noncommuter hours can negotiate the bridge and its approaches with minimal delay. But, during the peak periods of travel, motorists are subject to traffic congestion of varying degrees. Trial runs of travel time under free-flow conditions showed that a trip across the bridge (from the foot of one approach to the foot of another on the opposite side) takes from 29 to 34 seconds. Delays, defined as the additional time required for motorists to make the crossing (expressed in terms of vehicle-minutes) were observed from a survey vehicle during the periods of peak traffic flow. Principally, delays occur to eastbound vehicles during the evening commuter hour from 4:30 to 5:30 P.M. These delays are primarily caused by the heavy traffic volumes, compounded by the uncontrolled conflict between Sweet Briar Avenue traffic and Carlisle Avenue traffic. The lack of any traffic control tends to favor motorists on the Carlisle Avenue approach, at the expense of the Sweet Briar movement. This is illustrated by the observed average delay from 4:30 to 5:00 P.M. of 1.32 minutes for 285 vehicles on the Carlisle approach, compared to 3.40 minutes average delay for 229 vehicles on the Sweet Briar approach. Summing up the delays observed during the 3:30 to 6:00 P.M. survey period, it is noted that a total of 2259 vehicle-minutes of delay were endured by eastbound motorists and 338 vehicle-minutes by those traveling westbound.

Figure B24



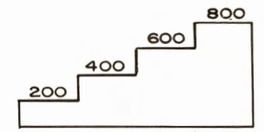
MORNING PEAK

7:30 AM TO 8:30 AM



EVENING PEAK

4:30 PM TO 5:30 PM



AREAWIDE TOPICS STUDY

Mercer County, N.J.

PEAK VOLUMES

Cornell Heights Bridge
Hamilton Township

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

Vehicle Back-up

Vehicle back-ups were also recorded in the evening on the Carlisle and Sweet Briar approaches on the west side of the bridge. The maximum number of observed waiting vehicles was 32 on the Sweet Briar approach and 24 on the Carlisle Avenue approach, for a total of 56 standing vehicles at 4:35 P.M. (see Figure B25). Using an average of 22 feet per vehicle, the queues were estimated to extend for about 700 feet on Sweet Briar and about 525 feet on Carlisle.

Accidents

There were 12 reported motor vehicle accidents on the bridge and bridge approaches during the three-year period of 1968 through 1970. Only one accident involved a vehicle other than a passenger car, that being a head-on collision between a car and a truck on the bridge. Of the accidents reported, four were head-on, four were of the right angle type, two involved fixed objects, one was of the same direction type, and one involved a left turning vehicle. The rather low accident record is attributable to a combination of conditions, chief among them being the very low vehicular speeds on the bridge and its approaches during periods of heavy demand.

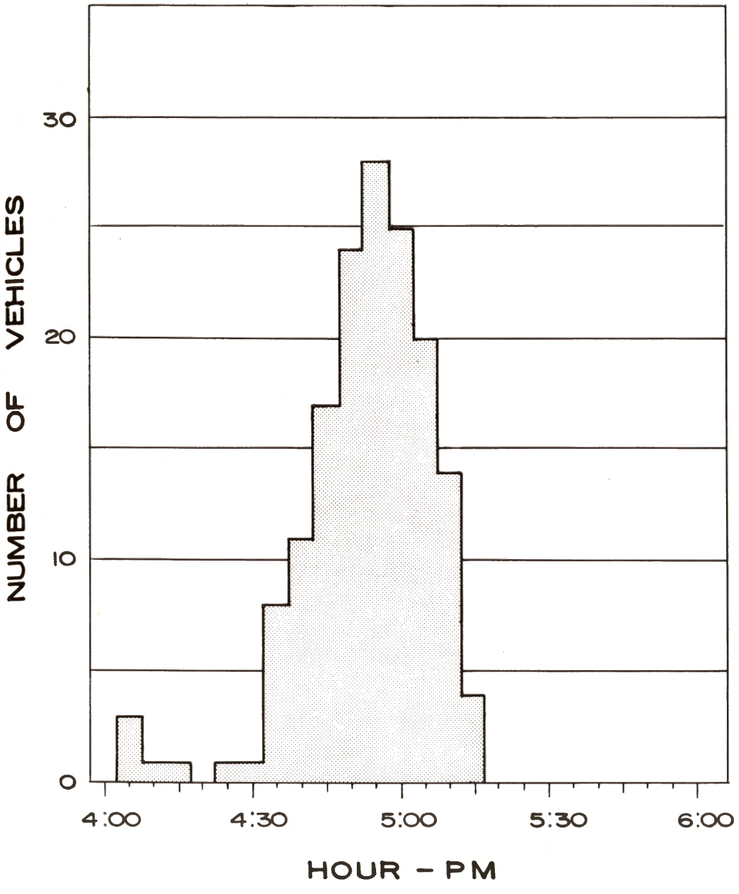
Bridge Capacity

The capacity of a section of roadway is influenced by a variety of elements, including roadway width, shoulder width, distance to vertical obstructions, grades, alignment, et al. At the Cornell Heights Bridge, the principal factors affecting its capacity are the cartway width and lateral clearances, deficiencies which are compounded by the approach alignment and grades.

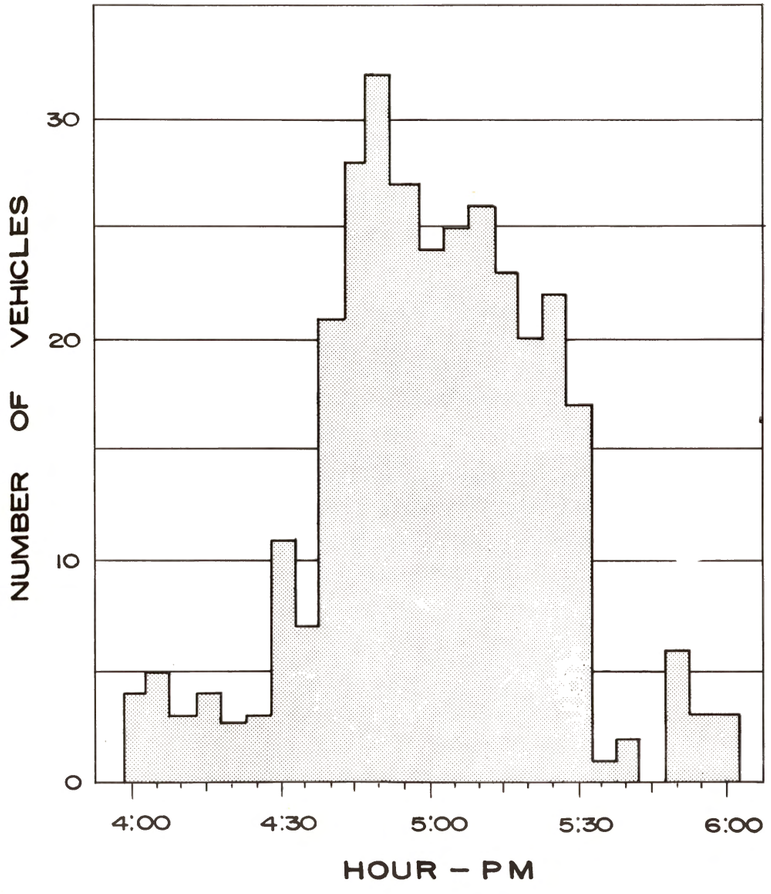
During the evening peak hour, when eastbound vehicles are backed up on the west approaches, "forced flow" conditions prevail which permit a maximum flow over the bridge of approximately 1350 vehicles (Level of Service E, or ultimate capacity). The limitation imposed upon greater traffic flow is a result of the influence of the factors described above. If relatively stable flow were to be maintained during the peak periods with little delays and satisfactory operating speeds as defined by Level of Service C (design level), it is estimated that the two-way service volume would be limited to 1000 vehicles per hour.

The improvement of the approaches, together with the elimination of any intersections in proximity to the bridge, would raise the service volume for Level of Service C to 1300 vehicles per hour - approximately equal to the present "forced flow" volume. The bridge structure itself, however, would still be inadequate in terms of the actual traffic

Figure B25



CARLISLE AVENUE
APPROACH



SWEET BRIAR AVENUE
APPROACH

AREAWIDE TOPICS STUDY
Mercer County, N.J.

VEHICLE BACK-UP
Cornell Heights Bridge
Hamilton Township

NEW JERSEY DEPARTMENT OF TRANSPORTATION
September 1972 Travers Associates Consultants

demand, estimated to be in the order of 1600 vehicles per hour. It is noted that the present demand is significantly greater than indicated by the traffic counts since the bridge and its approaches now meter the traffic flows, only permitting them to reach the 1350 vehicles per hour level.

It is noted too that, if the bridge approaches were improved without replacement of the structure, higher traffic speeds would prevail, and it is judged that the accident experience would reflect a greater incidence of head-on and fixed object (bridge girders) type accidents.

Accordingly, it is concluded that the Cornell Heights Bridge can be aptly defined as a "crucial bottleneck." As such, the existing structure should be replaced with one meeting modern acceptable design criteria.

Design Considerations

Considerations that must be studied in the development of a plan for the new railroad-highway grade separation vary from the number of traffic lanes required to the topographic features in the immediate area of the existing structure. But, perhaps of initial concern is the location of the new bridge in relation to the present structure. A site to the north would require the crossing of four railroad tracks instead of six, while a site to the south would favor the desire line of the heaviest existing traffic movements, from Klockner to Sweet Briar and return.

Land use considerations include recognition of the existing and projected industrial development in the area, as well as the extensive residential uses west of the present bridge site. Moreover, existing topography will greatly influence the locations of acceptable bridge approaches.

Future Interstate Route 295 will attract traffic along a new transportation corridor, with the result that proposed interchanges with local roadways are expected to attract additional traffic and alter existing traffic patterns. This prospect, as well as the extension of the Trenton Freeway (Route 1 Expressway), is a traffic planning consideration that must be examined in any comprehensive study of a new railroad crossing. It is noted, too, that the new campus of the Mercer County Community College, located approximately three miles east of the Cornell Heights Bridge, is expected to open in the fall of this year. This development will generate new traffic over the railroad crossing.

Summary and Conclusions

The traffic engineering study of the Cornell Heights Bridge, completed as an Early Implementation project, has determined that the existing structure is an impediment to traffic flow. Accordingly, a replacement of the bridge has been recommended.

A new grade separation including realigned approaches, however, is a project expected to represent a substantial capital cost. Accordingly, it is concluded that an in-depth engineering study is required to insure a satisfactory design of the bridge and its approaches. Such a study is beyond the scope of the Mercer County Areawide TOPICS Study.

Moreover, the New Jersey Department of Transportation, in conjunction with the Federal Highway Administration, has reviewed the findings of the study and has ruled that reconstruction of the bridge cannot be undertaken under the TOPICS program. Recognizing the need for a new bridge, however, the Department of Transportation has authorized a feasibility study that will proceed under another State program.

As an interim measure, the following temporary controls are recommended.

Temporary Traffic Control

Various traffic schemes involving traffic rerouting, one-way operation, and turn prohibitions have been examined in an attempt to temporarily improve existing operating conditions in proximity to the Cornell Heights Bridge. However, none of the schemes produced benefits that were not outweighed by disadvantages.

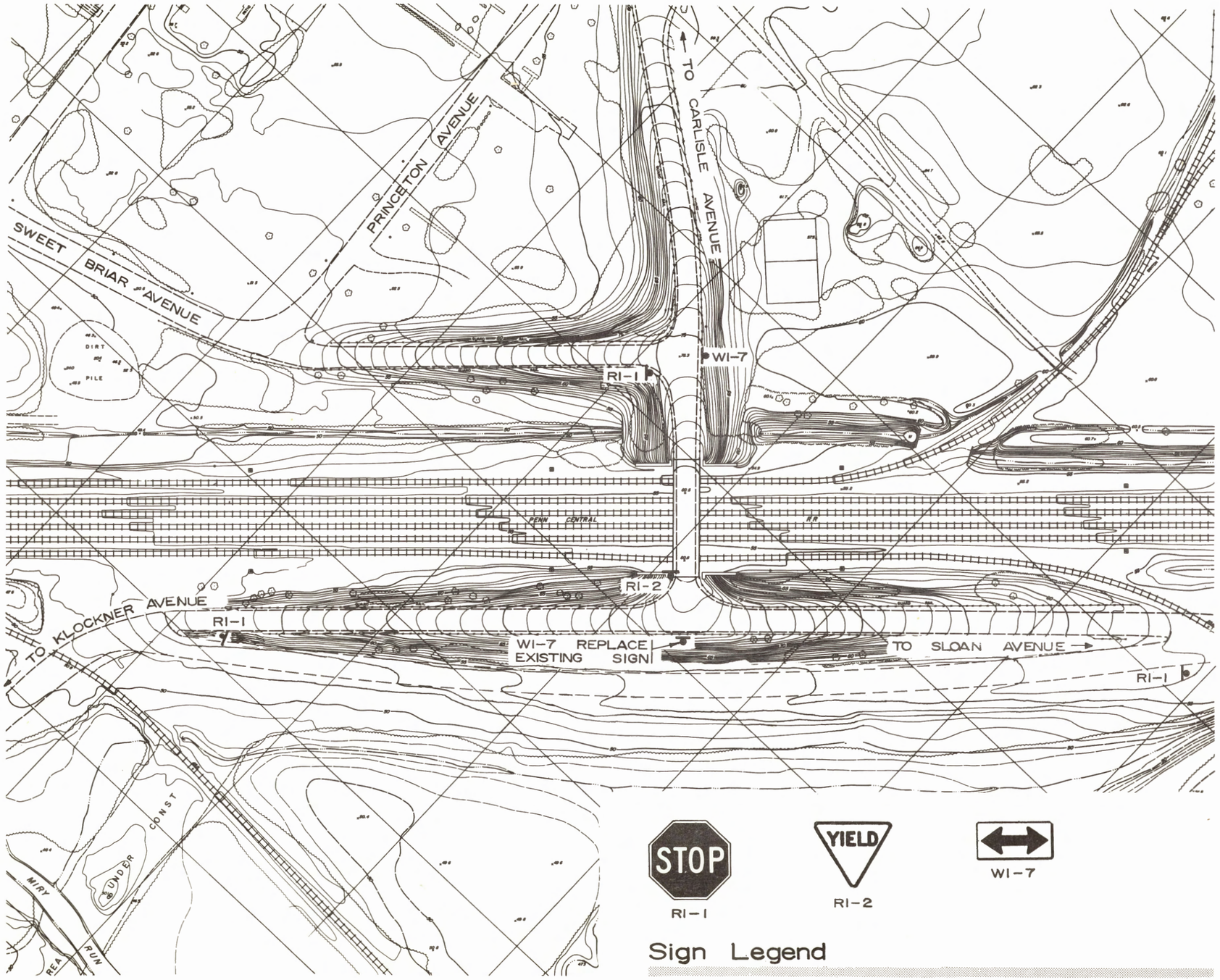
The major improvements described herein are needed to alleviate capacity deficiencies relating to peak hour traffic flows. But, during off-peak hours, when capacity is not critical, potential traffic hazards relate to the lack of traffic control. Hence, the installation of STOP and YIELD signs have been recommended (see Figure B26) to assign the right-of-way at intersections in proximity to the bridge.

Cost Estimate

The following estimate relates only to the proposed temporary traffic control measures:

Construction	$450.00
Engineering	50.00
Total	$500.00

Figure B26



Sign Legend

0 100 200

SCALE IN FEET

NOTE :

SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS"

AREAWIDE TOPICS STUDY

Mercer County, N.J.

PROPOSED SIGNS

Cornell Heights Bridge
Hamilton Township

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

APPENDIX

Table	Description	No. Pages
A	Accident History At Intersections 1968-1970	2
B	Traffic Signal and Flashing Signal Locations	2
C	Proposed Bus Stops	7

TABLE A

ACCIDENT HISTORY AT INTERSECTIONS 1968-1970

Intersection	Number of Accidents PD	PI	F	Total
U.S. Rte. 206, S. Broad St./White Horse Ave.	134	23		157
U.S. Rte. 206/Park Ave.	54	23		77
S. Clinton Ave./Park Ave.	27	31		58
Klockner Ave./E. State St. Ext.	24	26		50
White Horse Ave./Arena Dr.	41	8		49
N.J. Rte. 33/Mercerville Whitehorse Rd.	31	14		45
Mercerville Edinburg Rd./Hughes Dr.	25	16		41
N.J. Rte. 33/Klockner Ave.	21	15		36
White Horse Ave./S. Clinton Ave.	18	17		35
U.S. Rte. 206/Homestead Ave.-Hobson Ave.	23	9		32
Mercerville Quakerbridge Rd./Youngs Rd.	20	11	1	32
Nottingham Way/Ward Ave.	18	14		32
N.J. Rte. 33/Hamilton Ave.	21	10		31
Hamilton Ave./Klockner Rd.	17	14		31
N.J. Rte. 156/S. Broad St.	14	16		30
Nottingham Way/Mercerville Quakerbridge Rd.	25	5		30
U.S. Rte. 206/Rowan Ave.	20	9		29
N.J. Rte. 33/Nottingham Way	21	8		29
N.J. Rte. 33/Hamilton Square Whitehorse Rd.	15	14		29
U.S. Rte. 206/Beech Ave.-Trebor Dr.	16	12		28
U.S. Rte. 206/Ruskin Ave.	18	9	1	28
S. Olden Ave./Arena Dr.	17	10	1	28
Hamilton Square Whitehorse Rd./Klockner Rd.	11	14	2	27
Liberty St./Newkirk Ave.	16	11		27
Mercerville Whitehorse Rd./Kuser Rd.	16	11		27
N.J. Rte. 33/Ward Ave.	18	8		26
Mercerville Whitehorse Rd./Klockner Rd.	12	14		26
U.S. Rte. 206/Chambers St.	14	11		25
S. Broad St./Arena Dr.	17	7	1	25
S. Broad St./Yardville Allentown Rd.	13	11	1	25
U.S. Rte. 206/Dewey Ave.	13	10	1	24
Chambers St./S. Clinton Ave.	17	7		24
E. State St./Nottingham Way	20	3		23
Park Ave./Schiller Ave.	13	10		23
U.S. Rte. 206/Woodside Ave.	15	7		22
N.J. Rte. 33/Hamilton Square Yardville Rd.	11	11		22
Hamilton Square Yardville Rd./Klockner Rd.	14	6	2	22
U.S. Rte. 206/Cedar La.	12	9		21
U.S. Rte. 206/Sewell Ave.	11	9		20
U.S. Rte. 206/Harrison Ave.	16	4		20
U.S. Rte. 206/Thropp Ave.	9	11		20
S. Clinton Ave./Fetter Ave.	8	12		20
N.J. Rte. 33 (Greenwood Ave.)/Nottingham Way	14	5		19
N.J. Rte. 33/Norway Ave.	12	6		18
U.S. Rte. 206/Buchanan Ave.	12	5		17
U.S. Rte. 206/Fetter Ave.-Harcourt Dr.	9	8		17
N.J. Rte. 33/Concord Ave.	9	8		17
Hamilton Ave./Ward Ave.	13	4		17
Hamilton Square Whitehorse Rd./Kuser Rd.	8	9		17
Mercerville Quakerbridge Rd./Sloane Ave.-Flock Rd.	7	10		17
Newkirk Ave./Cedar La.-Leonard Ave.	8	8	1	17
S. Olden Ave./Liberty St.	12	5		17
S. Olden Ave./Cedar La.	14	3		17
N.J. Rte. 33/Winslow Ave.	11	5		16
E. State St./Johnston Ave.	6	10		16
Nottingham Way/Hamilton Square Yardville Rd.-Mercer St.	10	6		16
U.S. Rte. 206/Rennie St.	9	6		15
Arena Dr./Central Ave.	10	5		15
Cedar La./Sylvan St.	6	9		15
S. Broad St./Synnybrae Blvd.	7	8		15
N.J. Rte. 33/Deerwood Dr.	10	4		14
E. State St./Whitehead Rd.	13	1		14
Mercerville Edinburg Rd./Flock Rd.	9	5		14
Nottingham Way/E. State St. Ext.	10	4		14
S. Broad St./Coleridge Rd.	7	6	1	14
U.S. Rte. 130/N.J. Rte. 156 (N. Intersection)	8	5		13
N.J. Rte. 33/Weston Ave.	8	5		13
N.J. Rte. 156/Yardville Allentown Rd.	9	4		13
Chambers St./Cedar La.	11	2		13
Hamilton Square Yardville Rd./Kuser Rd.	4	9		13
Nottingham Way/Roberts Ave.	11	2		13
S. Broad St./Highland Ave.	7	6		13
Arena Dr./Gropp Ave.	9	3		12
S. Broad St./Lakeside Blvd.	7	5		12
S. Clinton Ave./Beech Ave.	8	4		12
White Horse Ave./Orchard Ave.	11	1		12
U.S. Rte. 206/New Cedar La.	8	3		11
U.S. Rte. 206/Mary St.	8	3		11

PD: Property Damage PI: Personal Injury F: Fatal

TABLE A (Continued)

ACCIDENT HISTORY AT INTERSECTIONS 1968-1970

Intersection	Number of Accidents PD	PI	F	Total
U.S. Rte. 206/Lake Ave.	6	5		11
U.S. Rte. 206/Samdin Blvd.	5	6		11
U.S. Rte. 206/Churchill Ave.	4	7		11
U.S. Rte. 206/Maple Shade Ave.	9	2		11
Chambers St./Lily St.	9	2		11
Notingham Way/Johnston Ave.	8	2	1	11
Schiller Ave./Sewell Ave.	8	3		11
Schiller Ave./Rowan Ave.	7	4		11
S. Broad St./Gropp Ave.	4	7		11
U.S. Rte. 206/Hunter Ave.	6	4		10
N.J. Rte. 33/Johnston Ave.	5	5		10
N.J. Rte. 33/Meade Dr.	4	6		10
N.J. Rte. 33/Grayson Ave.	8	2		10
Arena Dr./Rheeves Ave.	6	4		10
Hamilton Ave./Johnston Ave.	9	1		10
Mercerville Whitehorse Rd./S. Olden Ave.	7	3		10
Mercerville Whitehorse Rd./Cypress La.	8	2		10
Nottingham Way/Karl Suess Dr.	8	2		10
S. Broad St./Winding Way	4	6		10
S. Broad St./Oak La.	6	4		10
S. Olden Ave./Newkirk Ave.-Patterson Ave.	7	3		10
U.S. Rte. 206/Samuel St.	5	4		9
U.S. Rte. 206/Lida St.	8	1		9
U.S. Rte. 206/Crosswicks Creek Bridge	4	5		9
N.J. Rte. 33/Woodlawn Ave.	7	2		9
N.J. Rte. 33/Crest Ave.	4	5		9
Cedar La./Woolsey Ave.	9			9
E. State St. Ext./Ward Ave.	5	4		9
Nottingham Way/Paxson Ave.	2	7		9
S. Clinton Ave./Lida St.	7	2		9
U.S. Rte. 206/Colonial Ave.	5	3		8
N.J. Rte. 33/Massachusetts Ave.	5	3		8
N.J. Rte. 33/Buttonwood Dr.	5	3		8
N.J. Rte. 33/Vincent Ave.	4	4		8
N.J. Rte. 33/Shady La.	5	3		8
N.J. Rte. 33/George Dye Rd.	5	3		8
Chambers St./Lida St.	5	3		8
Hamilton Ave./Cypress La.	2	6		8
Hamilton Square Whitehorse Rd./Goeke Dr.	5	3		8
Klockner Rd./Kuser Rd.	6	2		8
S. Broad St./Hempstead Rd.	8			8
S. Clinton Ave./Cedar La.	6	2		8
Sunnybrae Blvd./Argonne Ave.	3	5		8
U.S. Rte. 206/Oldfield Ave.	6	1		7
U.S. Rte. 206/Maddock Ave.	1	6		7
U.S. Rte. 206/Redwood Ave.	5	2		7
U.S. Rte. 206/Parent Ave.	5	2		7
N.J. Rte. 33/Chewalla Dr.	2	5		7
N.J. Rte. 33/Herbert Ave.	4	3		7
Arena Dr./Woodside Ave.	5	2		7
Hamilton Ave./Atlantic Ave.	4	3		7
Hamilton Ave./Newkirk Ave.	5	2		7
Hamilton Ave./Norway Ave.	6	1		7
Hamilton Ave./Liberty St.	3	4		7
Mercerville Quakerbridge Rd./Clearview Ave.	7			7
Park Ave./Genesee St.	5	2		7
U.S. Rte. 206/Joseph St.	2	4		6
N.J. Rte. 33/Donald Dr.	4	2		6
N.J. Rte. 33/Clifford Ave.	4	2		6
N.J. Rte. 33/Limewood Dr.	4	2		6
Arena Dr./Toronita Ave.	5	1		6
Arena Dr./Taylor Ave.	3	3		6
Chambers St./Genesee St.	3	3		6
Hamilton Ave./Pacific Ave.	5	1		6
Hamilton Ave./Madison Ave.	5	1		6
Hamilton Ave./Saybrook Ave.	5	1		6
Nottingham Way/Warner Dr.	3	2	1	6
Nottingham Way/Lander Ave.	3	3		6
Nottingham Way/Park La.	5	1		6
S. Broad St./Main St.-Groveville Allentown Rd.	4	2		6
S. Clinton Ave./Mary St.	1	5		6
S. Clinton Ave./Samdin Blvd.	2	4		6
S. Clinton Ave./Thropp Ave.	3	3		6
S. Clinton Ave./Redwood Ave.	3	3		6
S. Clinton Ave./Woodside Ave.	3	3		6
S. Clinton Ave./Homestead Ave.	3	2	1	6
S. Olden Ave./Watson Ave.	5	1		6
S. Olden Ave./Wert Ave.	5	1		6
Stenton Court/Lalor St.	6			6
Sweet Briar Ave./Rutgers Ave.	3	3		6
White Horse Ave./Locust Ave.	4	2		6

TABLE B

TRAFFIC SIGNAL AND FLASHING SIGNAL LOCATIONS

INTERSECTION	STATUS	IMPROVEMENT	DESIGN DRAWING
Existing Signals			
U.S. Route 206/Chambers Street	Approved	Proposed	
U.S. Route 206/Park Avenue	Approved	Proposed	
U.S. Route 206/Beech Avenue-Trebor Drive	Approved	Proposed	
U.S. Route 206/Fetter Avenue-Harcourt Drive	Approved	Proposed	
U.S. Route 206/Homestead Avenue-Hobson Avenue	Approved	Proposed	
U.S. Route 206/Ruskin Avenue	Approved	None	
N.J. Route 33/Johnston Avenue	Approved	None	
N.J. Route 33/Klockner Avenue	Approved	Proposed	
N.J. Route 33/Hamilton Avenue	Approved	Proposed	
N.J. Route 33/Concord Avenue	Approved	Proposed	
N.J. Route 33/Nottingham Way-Winslow Avenue	Approved	Proposed	
N.J. Route 33/Mercerville Whitehorse Road	Approved	Proposed	
N.J. Route 33/Hamilton Square Whitehorse Road	Approved	None	
N.J. Route 33/Hamilton Square Yardville Road	Approved	None	
N.J. Route 33/George Dye Road	Approved	None	
N.J. Route 156/Yardville Allentown Road	Approved	Proposed	
Chambers Street/Cedar Lane	Unauthorized	Proposed	
East State Street/Johnston Avenue	Authorized/Unapproved	Proposed	
East State Street/Nottingham Way	Authorized/Unapproved	Proposed	B10
East State Street/Whitehead Road	Authorized/Unapproved	Proposed*	B11
Hamilton Avenue/Klockner Road	Authorized/Unapproved	None	
Mercerville Quakerbridge Road/Sloane Avenue-Flock Road	Authorized/Unapproved	Proposed	B6
Nottingham Way/Mercerville Quakerbridge Road	Authorized/Unapproved	Proposed	
South Broad Street/Sunnybrae Boulevard	Authorized/Unapproved	None	
South Clinton Avenue/Park Avenue	Authorized/Unapproved	None	
South Olden Avenue/Liberty Street	Authorized/Unapproved	Proposed	
South Olden Avenue/Cedar Lane	Authorized/Unapproved	Proposed	
White Horse Avenue/Arena Drive	Approved	Proposed	

*To be improved by the County of Mercer outside of the TOPICS program.

TABLE B (Continued)

TRAFFIC SIGNAL AND FLASHING SIGNAL LOCATIONS

INTERSECTION	STATUS	IMPROVEMENT	DESIGN DRAWING
Proposed Signals			
U.S. Route 206/Dewey Avenue		Proposed	
U.S. Route 206, South Broad Street/White Horse Avenue		Proposed	B2
Chambers Street/South Clinton Avenue		Proposed	B12
Klockner Avenue/East State Street Extension		Proposed	B8
Liberty Street/Newkirk Avenue		Proposed	B13
Mercerville Quakerbridge Road/Youngs Road		Proposed	B7
Mercerville Whitehorse Road/South Olden Avenue		Proposed	B3
Mercerville Whitehorse Road/Kuser Road	Authorized	Proposed	B4
Mercerville Whitehorse Road/Klockner Road	Authorized	Proposed	B5
Nottingham Way/Ward Avenue		Proposed	B14
Nottingham Way/Hamilton Square Yardville Road-Mercer Street		Proposed	B15
South Broad Street/Yardville Allentown Road		Proposed	B16
South Olden Avenue/Arena Drive		Proposed	B9
Whitehead Road/Sweet Briar Avenue		Proposed	B17
White Horse Avenue/South Clinton Avenue-Locust Avenue		Proposed	B18
Proposed Flashing Signals			
N.J. Route 156/South Broad Street		Proposed	B20
Hamilton Square Whitehorse Road/Kuser Road		Proposed	
Hamilton Square Whitehorse Road/Klockner Road		Proposed	
Hamilton Square Yardville Road/Klockner Road		Proposed	B22
South Clinton Avenue/Fetter Avenue		Proposed	

TABLE C

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE K, L, V	
U.S. Route 206, South Side	
Annabelle Avenue	Far Side
New Cedar Lane	Mid Block (160' East)
Sewell Avenue	Far Side
Harrison Avenue	Far Side
Buchanan Avenue	Far Side
Park Avenue	Far Side
Lake Avenue	Far Side
Oldfield Avenue	Far Side
Trebor Drive	Near Side
Churchill Avenue	Far Side
Harcourt Drive	Far Side
Dewey Avenue	Far Side
Homestead Avenue	Far Side
Colonial Avenue	Far Side
Parent Avenue	Far Side
ROUTE K, L, V	
U.S. Route 206, North Side	
White Horse Avenue	Far Side
Colonial Avenue	Far Side
Hobson Avenue	Far Side
Dewey Avenue	Far Side
Fetter Avenue	Far Side
Maddock Avenue	Far Side
Churchill Avenue	Far Side
Beech Avenue	Far Side
Lillian Avenue	Far Side
Lake Avenue	Far Side
Park Avenue	Far Side
Mary Avenue	Far Side
Chambers Street	Far Side
Lily Street	Far Side
Samuel Street	Far Side

	Bus Stop Type
ROUTE K	
South Broad Street, South Side	
White Horse Avenue	Mid Block (150' East)
Gropp Avenue	Far Side
Hempstead Road	Mid Block (350' West)
Arena Drive	Near Side
Lakeside Boulevard	Near Side
Highland Avenue	Far Side
Winding Way	Far Side
Kim Valley Road	Far Side
Kirby Lane	Far Side
Oak Lane	Far Side
Yardville Groveville Road	Far Side
N. J. Route 156	Far Side
Pilgrim Way	Far Side
Groveville Allentown Road	Far Side
Pettyridge Road	Far Side
ROUTE K	
South Broad Street, North Side	
Hamilton Square Yardville Road	Far Side
Oak Lane	Far Side
Sunnybrae Boulevard	Far Side
Argonne Avenue	Far Side
Coleridge Avenue	Far Side
Lakeside Boulevard	Far Side
Arena Drive	Far Side
Hempstead Road	Far Side
Gropp Avenue	Far Side
ROUTE K	
Dewar Drive, West Side	
Margo Place	Far Side

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE K	
Longwood Drive, North Side	
Pettyridge Road	Far Side
ROUTE K	
Llewellyn Place, North Side	
Krueger Place	Far Side
ROUTE K	
Groveville Allentown Road, West Side	
Richbell Drive	Far Side
ROUTE K	
Yardville Groveville Road, North Side	
Groveville Allentown Road	Far Side
Garden Apartment Street	Far Side
N. J. Route 156	Near Side
ROUTE L	
White Horse Avenue, East Side	
South Broad Street	Far Side
South Clinton Avenue	Far Side
Exton Avenue	Far Side
Arena Drive	Far Side
Magnolia Avenue	Far Side

	Bus Stop Type
ROUTE L	
Mercerville Whitehorse Road, East Side	
Hamilton Square Whitehorse Road	Far Side
Quimby Avenue	Far Side
Godfrey Avenue	Far Side
South Olden Avenue	Far Side
ROUTE L	
Kuser Road, North Side	
Mercerville Whitehorse Road	Far Side
ROUTE L	
Mercerville Whitehorse Road, West Side	
South Olden Avenue	Far Side
Godfrey Avenue	Far Side
Quimby Avenue	Far Side
Knapp Avenue	Far Side
ROUTE L	
White Horse Avenue, West Side	
Spruce Street	Far Side
Arena Drive	Far Side
Exton Avenue	Far Side
South Clinton Avenue	Far Side
ROUTE R	
Chambers Street, West Side	
William Street	Far Side

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE R	
Chambers Street, East Side	
Genesee Street	Far Side
South Clinton Avenue	Far Side
William Street	Far Side
Cedar Lane	Far Side
Brown Avenue	Far Side
ROUTE R	
South Clinton Avenue, South Side	
Lily Street	Far Side
Rennie Street	Far Side
ROUTE R	
Mary Street, West Side	
South Clinton Avenue	Far Side
ROUTE R	
Genesee Street, North Side	
Rennie Street	Far Side
ROUTE X	
South Olden Avenue, South Side	
Liberty Street	Far Side
East Franklin Street	Far Side
Edmund Street	Far Side
Cedar Lane	Far Side
Hartley Avenue	Far Side
Ryan Avenue	Far Side
Wert Avenue	Far Side

	Bus Stop Type
ROUTE X	
South Olden Avenue, North Side	
Arena Drive	Far Side
Newkirk Avenue	Far Side
Hartley Avenue	Far Side
Cedar Lane	Near Side
Gridley Avenue	Far Side
Beal Avenue	Far Side
ROUTE X	
Arena Drive, South Side	
South Olden Avenue	Far Side
Tennyson Drive	Far Side
Taylor Avenue	Far Side
Rheeves Avenue	Far Side
Churchill Avenue	Far Side
Fetter Avenue	Far Side
Woodside Avenue	Far Side
Colonial Avenue	Far Side
White Horse Avenue	Far Side
ROUTE X	
Arena Drive, North Side	
Copperfield Drive	Far Side
Hempstead Road	Far Side
Gropp Avenue	Far Side
White Horse Avenue	Far Side
Colonial Avenue	Far Side
Woodside Avenue	Far Side
Bradford Avenue	Far Side
Churchill Avenue	Far Side
Rheeves Avenue	Far Side
Taylor Avenue	Far Side
Tennyson Drive	Far Side

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE X	
Gropp Avenue, East Side	
Arena Drive	Far Side
Martha Drive	Far Side
Benson Lane	Far Side
ROUTE X	
Englewood Boulevard, South Side	
Gropp Avenue	Far Side
ROUTE X	
Hempstead Road, West Side	
Englewood Boulevard	Far Side
ROUTE X	
Lakeside Boulevard, South Side	
Hempstead Road	Far Side
Martha Drive	Far Side
Tantum Drive	Far Side
ROUTE P	
N. J. Route 33 (Greenwood Avenue), South Side	
Massachusetts Avenue	Far Side
Connecticut Avenue	Far Side
Johnston Avenue	Far Side
Scammell Avenue	Far Side
Dickinson Avenue	Far Side
Ward Avenue	Mid Block (200' South)

	Bus Stop Type
ROUTE P	
N. J. Route 33 (Nottingham Way), South Side	
Donald Drive	Far Side
Chewalla Drive	Far Side
Klockner Road	Far Side
Sterling Avenue	Far Side
Mead Drive	Far Side
ROUTE P, T	
N. J. Route 33 (Nottingham Way), South Side	
Hamilton Avenue	Far Side
Crescent Avenue	Far Side
ROUTE P, T	
N. J. Route 33 (Nottingham Way), North Side	
Winslow Avenue	Far Side
Concord Avenue	Far Side
ROUTE P	
N. J. Route 33 (Nottingham Way), North Side	
North Hamilton Avenue	Far Side
Wegner Avenue	Far Side
Klockner Avenue	Far Side
Buttonwood Drive	Far Side

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE P N. J. Route 33 (Greenwood Avenue), North Side	
Nottingham Way	Far Side
Ward Avenue	Far Side
Joan Terrace	Far Side
Johnston Avenue	Far Side
Connecticut Avenue	Far Side
Massachusetts Avenue	Far Side
ROUTE P, T Nottingham Way, South Side	
N. J. Route 33	Far Side
East State Street Extension	Far Side
Mercerville Whitehorse Road	Near Side, P Route Only
ROUTE P Nottingham Way, South Side	
Berkley Avenue	Far Side
Shady Lane	Far Side
Birtin Avenue	Far Side
Lander Drive	Far Side
Deerwood Avenue	Far Side
Elementary School	Mid Block (opposite school)
Gregory Drive	Far Side
Herbert Avenue	Far Side
Hamilton Square Whitehorse Road	Far Side
Aberfoyle Drive	Far Side
Crest Avenue	Far Side
Sunset Boulevard	Far Side
George Dye Road	Far Side
Mario Drive	Far Side

	Bus Stop Type
ROUTE P Nottingham Way, North Side	
Mario Drive	Far Side
Forman Drive	Far Side
Sunset Boulevard	Far Side
North Crest Avenue	Far Side
Acres Drive	Far Side
Baptist Church	Mid Block (opposite church)
Mercer Street	Far Side
Park Lane	Far Side
Paxson Avenue	Far Side
Elementary School	Mid Block (opposite school)
Jonathan Drive	Far Side
Lander Drive	Far Side
Wilson Avenue	Far Side
Audrey Place	Far Side
ROUTE P, T Nottingham Way, North Side	
Mercerville Quakerbridge Road	Far Side
East State Street	Far Side
ROUTE S East State Street, East Side	
North Logan Avenue	Far Side
Norway Avenue	Mid Block (250' South)
Johnston Avenue	Far Side
Nottingham Way	Far Side
Olivia Avenue	Near Side
Amtico Company Entrance	Mid Block (opposite door)

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE S	
East State Street, West Side	
Nottingham Way	Far Side
Johnston Avenue	Far Side
Union Camp Company Entrance	Mid Block (opposite door)
ROUTE S	
Ward Avenue, West Side	
East State Street	Far Side
Speedway Entrance	Mid Block (opposite driveway)
ROUTE S	
Nottingham Way, North Side	
Ward Avenue	Far Side
Karl Suess Drive	Far Side
ROUTE T	
Hamilton Avenue, South Side	
Perry Avenue	Far Side
Charlotte Avenue	Far Side
Newkirk Avenue	Far Side
Haslach Avenue	Near Side
Kuser Road	Far Side
Leuckel Avenue	Far Side
Pope Avenue	Far Side
Cypress Lane	Far Side
Klockner Road	Far Side
Madison Avenue	Far Side
Laveer Avenue	Far Side
Saybrook Avenue	Far Side

	Bus Stop Type
ROUTE T	
Hamilton Avenue, North Side	
N. J. Route 33 (Nottingham Way)	Far Side
Mead Drive	Far Side
Salem Place	Far Side
Klockner Road	Far Side
Donald Drive	Far Side
Pope Avenue	Far Side
Ward Avenue	Far Side
Kuser Road	Near Side
Haslach Avenue	Far Side
Norway Avenue	Far Side
Atlantic Avenue	Far Side
ROUTE T	
Mercerville Quakerbridge Road, East Side	
Nottingham Way	Far Side
Wittenborn Avenue	Far Side
Holt Avenue	Far Side
ROUTE T	
Mercerville Quakerbridge Road, West Side	
Sloane Avenue	Far Side
Collins Avenue	Far Side
Holt Avenue	Far Side
Sadie Avenue	Far Side

TABLE C (Continued)

PROPOSED BUS STOPS

	Bus Stop Type
ROUTE T	
Sloane Avenue, North Side	
Mercerville Quakerbridge Road	Far Side
Alexander Avenue	Far Side
Cornell Heights Bridge, North Ramp	Far Side
ROUTE T	
Sloane Avenue, South Side	
Douglas Avenue	Far Side
ROUTE T	
Klockner Avenue, South Side	
East State Street	Far Side
Collier Avenue	Far Side
Linton Avenue	Far Side
Potter Avenue	Far Side
Smith Avenue	Far Side
Steinert Avenue	Far Side
ROUTE T	
Klockner Road, South Side	
N. J. Route 33 (Nottingham Way)	Far Side
Junior High School	Mid Block (opposite school)
ROUTE T	
Klockner Road, North Side	
Hamilton Avenue	Far Side
Belle Avenue	Far Side
ROUTE T	
Klockner Avenue, North Side	
N. J. Route 33 (Nottingham Way)	Far Side
Armour Avenue	Far Side
Potter Avenue	Far Side
Nebraska Avenue	Far Side
Collier Avenue	Far Side
East State Street Extension	Far Side
Cornell Heights Bridge, North Ramp	Near Side

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