VOLUME I

Princeton Borough
Princeton Township

Mercer County

New Jersey

Areawide TOPICS Study

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Princeton Borough
Princeton Township

Mercer County

New Jersey

Areawide TOPICS Study

Travers Associates, Inc.
December, 1972

County of Mercer
New Jersey Department of Transportation
Federal Highway Administration, U.S. Department of Transportation

TRAVERS
ASSOCIATES

1128 MAIN AVENUE • CLIFTON • NEW JERSEY 07011

CONSULTANTS
TRANSPORTATION AND
TRAFFIC ENGINEERING

AREA 201 - 365-0510

December 27, 1972

New Jersey Department of Transportation
1035 Parkway Avenue
Trenton, New Jersey 08625

Attention: Mr. George S. Horner, Acting Chief
Bureau of Local Federal Aid Programs

Re: Areawide TOPICS Study
Mercer County, New Jersey
Final Report: Report Area I

Gentlemen:

We submit herewith the first volume of our Final Report in relation to Report Area I of the Mercer County Areawide TOPICS Study; the other volumes relate to Report Area II and Report Area III. It is noted that Part A of each report is identical, describing data collection, survey, and evaluation procedures, and providing other study information of countywide scope. Part B of each report relates to the detailed proposals in the respective report areas.

Supporting data used in preparation of the reports have been bound and submitted under separate cover. The Technical Memoranda relative to Report Area I are as follows:

Traffic Signal Inventory
Intersection Counts
Motor Vehicle Accident Summaries
Speed Surveys
Off-Street Parking Inventory
Speed-Delay Survey

We should like to express our appreciation for the assistance we received to representatives of the County of Mercer, the New Jersey Department of Transportation, the Federal Highway Administration, the Borough of Princeton, the Township of Princeton, and others concerned with this effort.

Very truly yours,

TRAVERS ASSOCIATES, INC.

Warren Travers, P.E., President
John R. Cade, P.E., Project Manager
Jack A. Artale, P.E., Project Engineer

WT/JRC/JAA:mc

ACKNOWLEDGEMENTS

Funding for the project was made available by the County of Mercer, the New Jersey Department of Transportation, and the Federal Highway Administration.

The study was completed in cooperation with the Borough of Princeton, the Township of Princeton, and various offices of the contributing agencies.

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PART B
DETAILED PROPOSALS FOR REPORT AREA I

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.

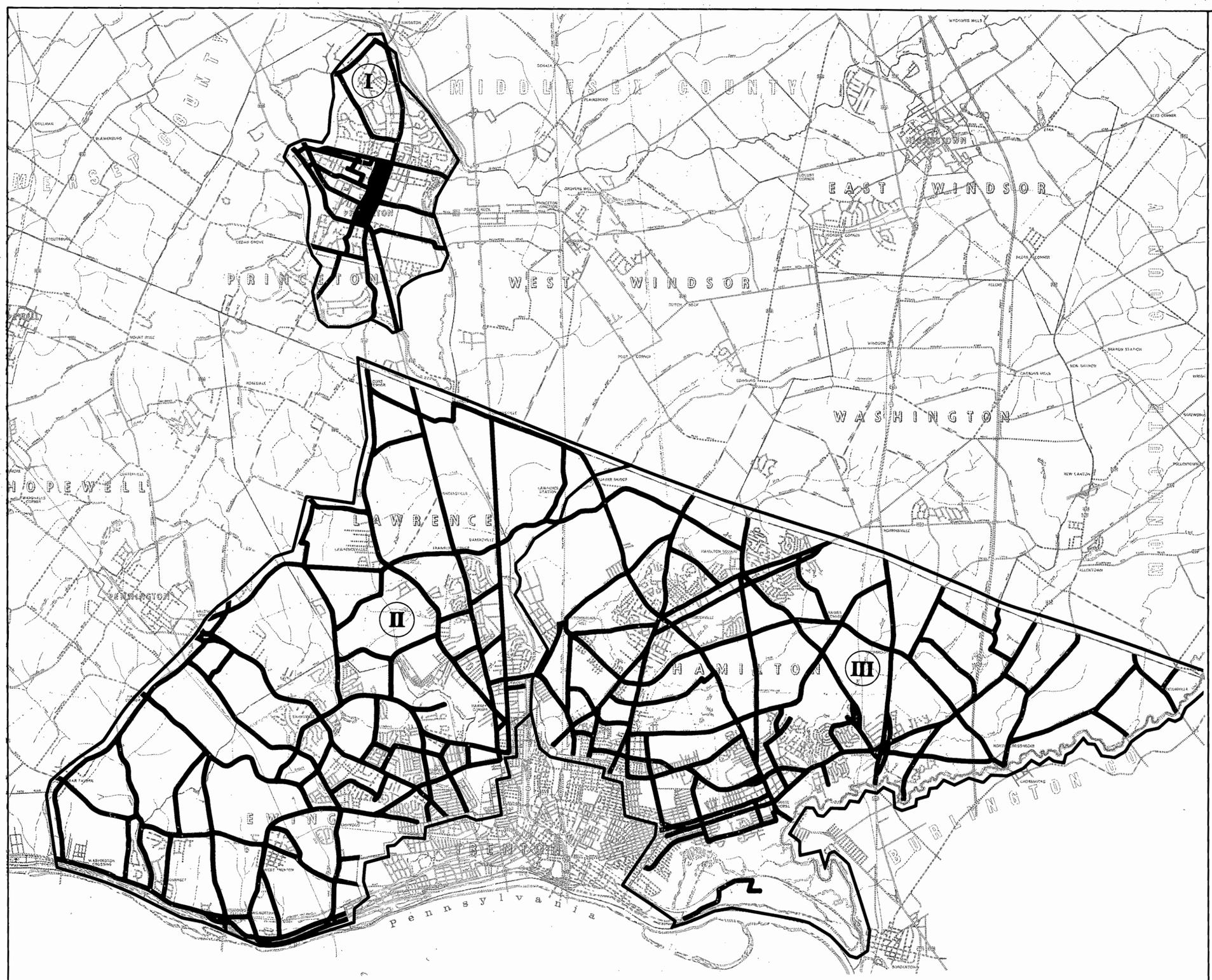
The recommendations presented herein are accompanied by existing conditions, deficiencies, proposed improvements, benefits, and estimates of costs. Functional design drawings have been prepared to illustrate the more complex improvements. Discussions relative to proposed improvements on State highways 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

Legend

I STUDY AREA

STUDY AREA BOUNDARY

STUDY ROADWAYS

AREAWIDE TOPICS STUDY

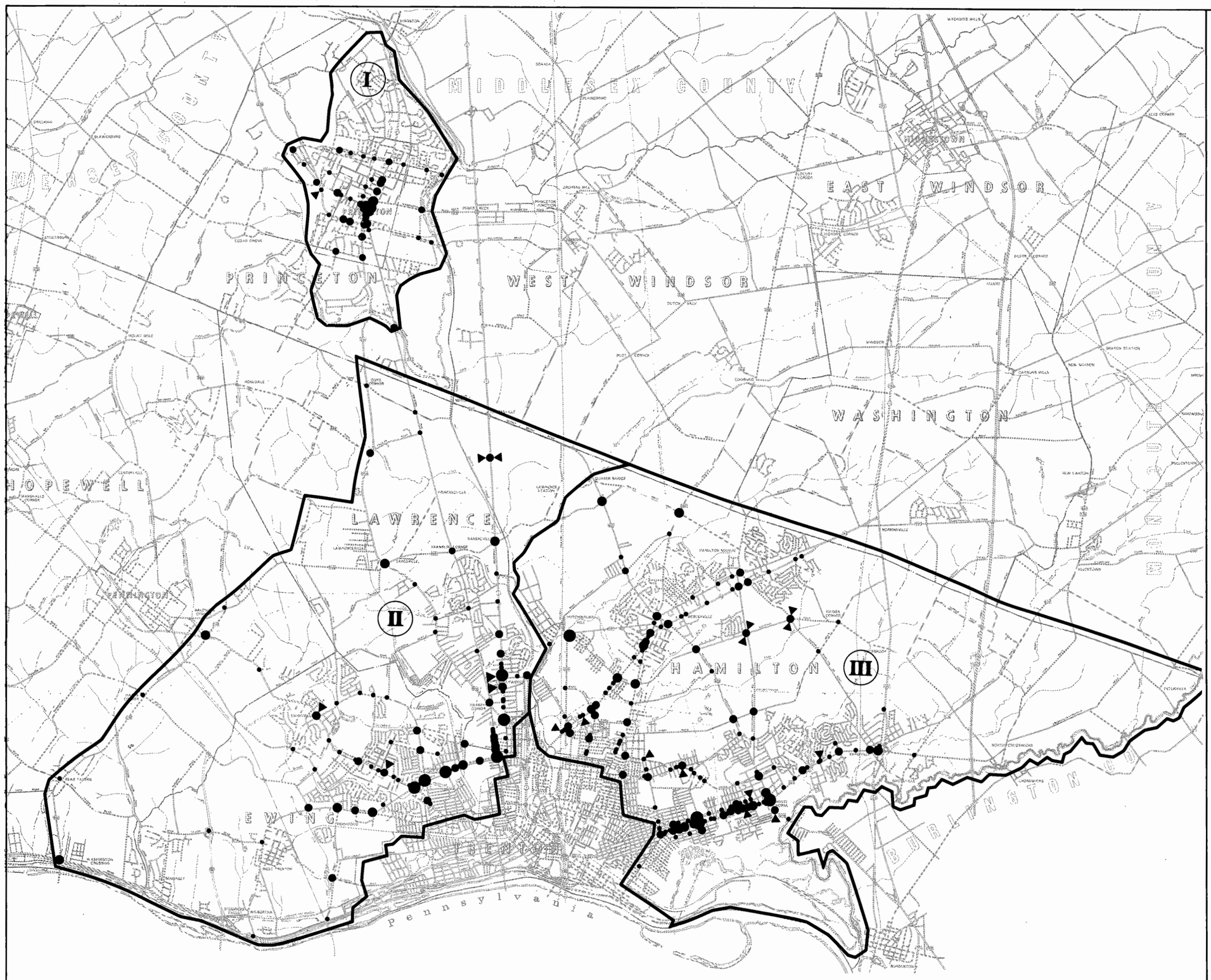
Mercer County, N.J.

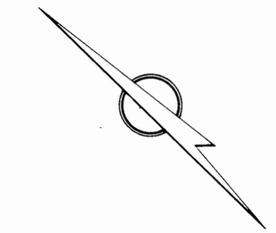
STUDY NETWORK

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

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

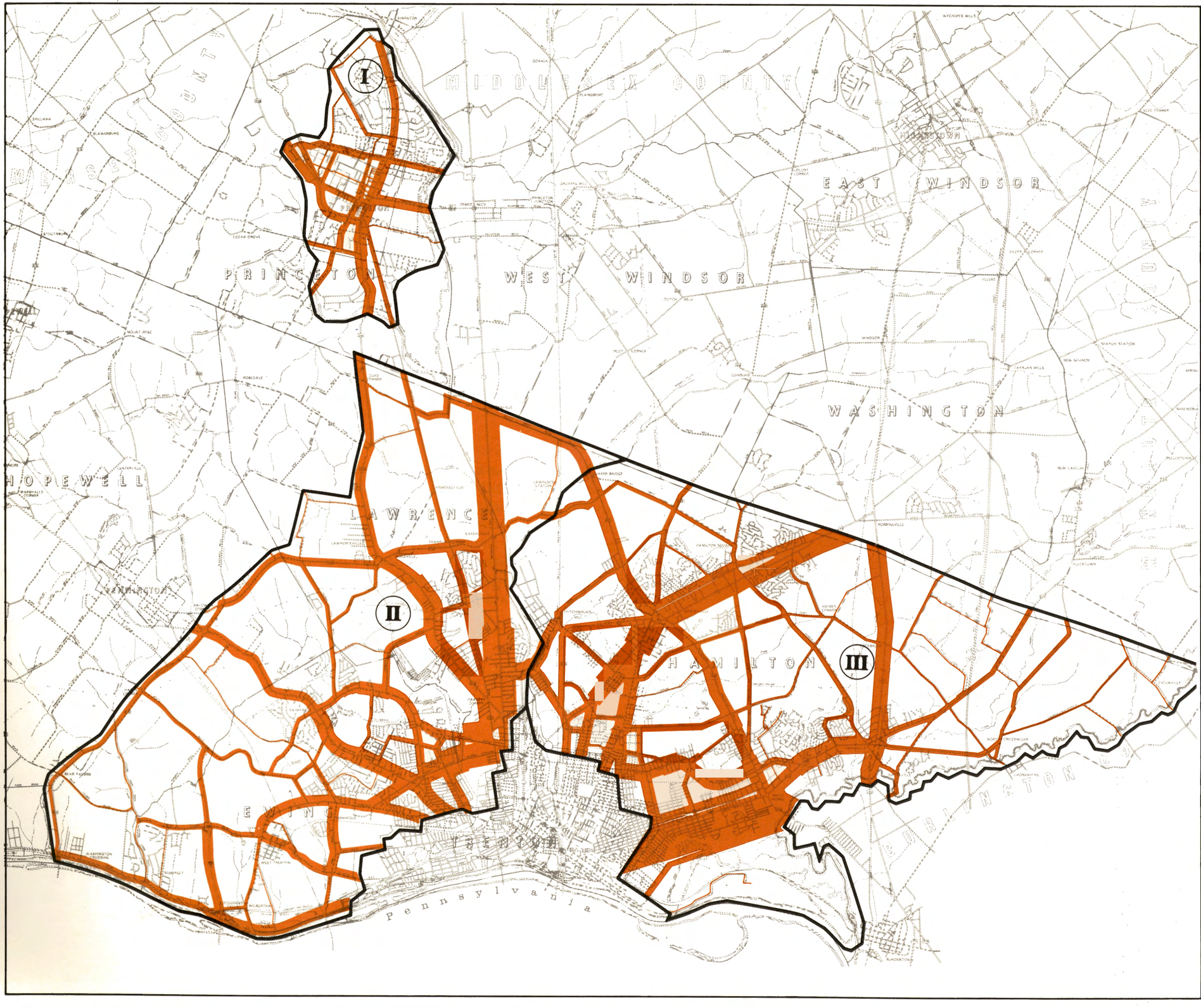
September 1972 Travers Associates Consultants

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 1980 VOLUMES

AREAWIDE TOPICS STUDY
Mercer County, N.J.

1975 TRAFFIC VOLUMES

NEW JERSEY DEPARTMENT OF TRANSPORTATION
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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

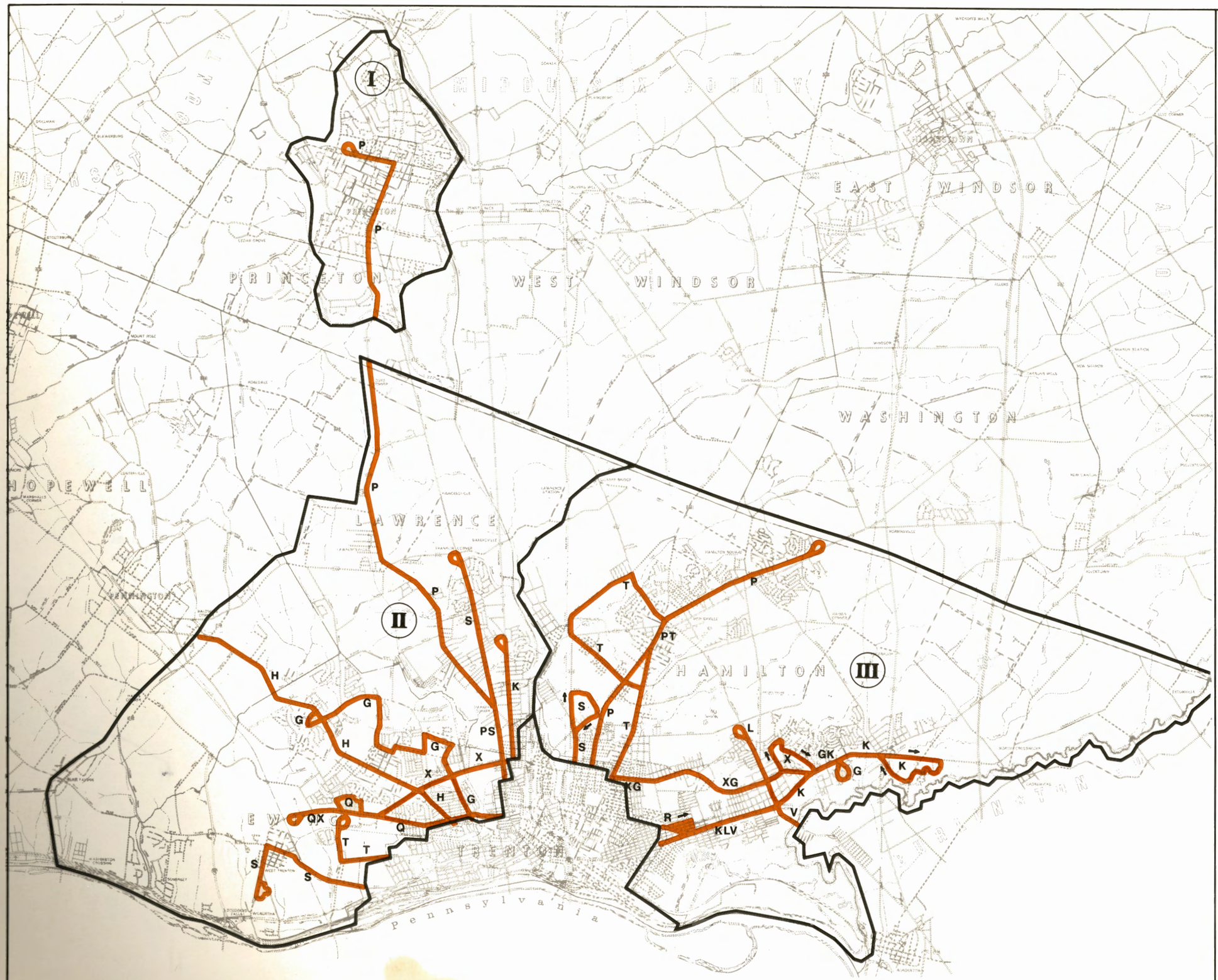
Field investigations indicated that most locations where buses stop are not identified, or are marked by signs that are worn with age. In many instances, maneuverability of buses is hampered due to insufficient length provided for the bus stop. The frictional effects of both bus operation and traffic 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.

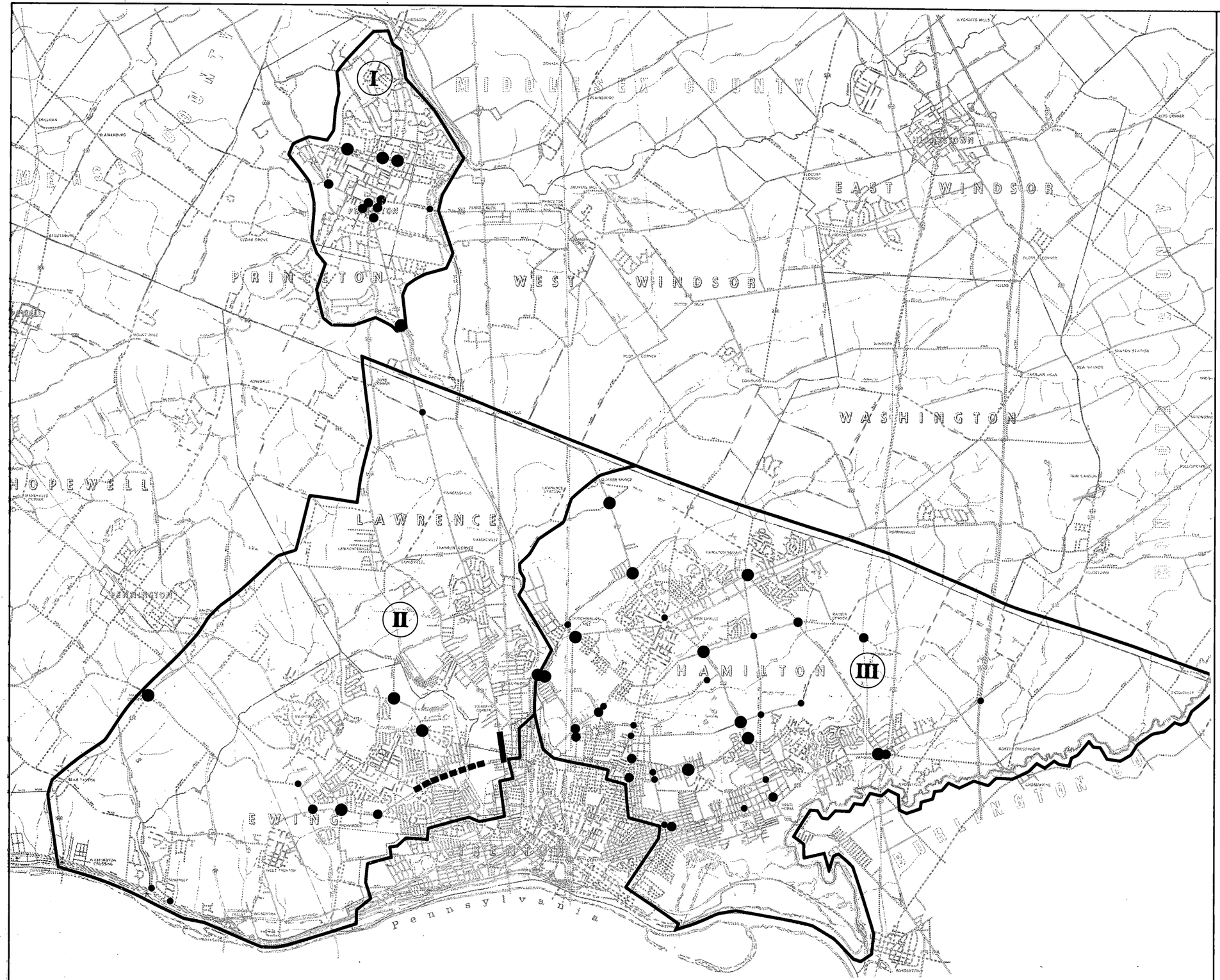
COST SUMMARY

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 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

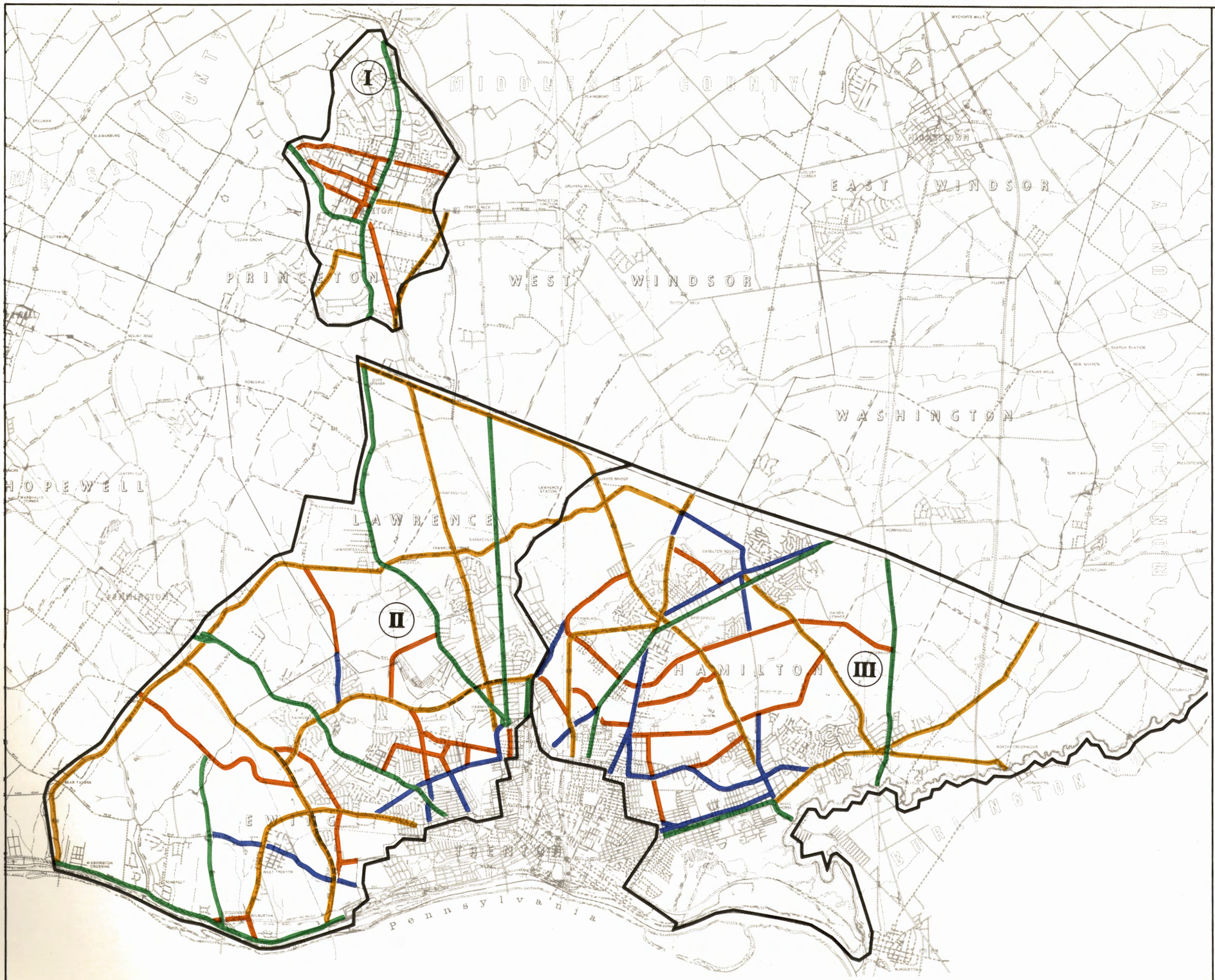
The recommended extension of the Federal Aid system as Primary Type II roadways is shown in orange in the illustration and has been chosen on the following basis:

- 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



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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 I

The Areawide TOPICS Study for Report Area I involved a total of 25 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 $831,000.00. 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 44 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 20 intersections which had a history of 15 or more accidents in three years was investigated.

The incidence of between intersection accidents was noted to be appreciably less than the incidence of accidents at intersections, and therefore of less significance in the overall accident analysis. One notable exception is Mercer Street over Stony Brook which has a history of accidents that emphasizes its physical deficiencies and need for improvement.

Only one fatal accident occurred in Report Area I during the three-year study period. The location of the accident (Route 206 near Valley Road) was investigated and recommended for improvement.

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. All but two of the eleven existing signalized intersections have been recommended for improvement, and another unsignalized intersection has been recommended for traffic signal control. The total cost of all scheduled signalized intersection improvements is estimated to be $193,800.00.* All proposed signalized intersection improvements as well as other projects are shown in Figure B1.

It is proposed to incorporate eight of the ultimate twelve signalized intersections within the proposed interconnected system on Route 27 (Nassau Street) which will include the two municipally owned signals in Princeton Borough. The cost of providing the signal system is estimated at $8,000.00. Signalized intersection improvements, together with signal system improvements, result in a total estimated cost of $201,800.00.

*Eight of the ten signalized intersection projects have been scheduled for improvement under the TOPICS program. The other two relate to State highway traffic and are not considered eligible for improvement at this time under the Department's guidelines. Existing and proposed traffic signal and flashing signal locations are listed in Table B of the Appendix.

CBD Parking

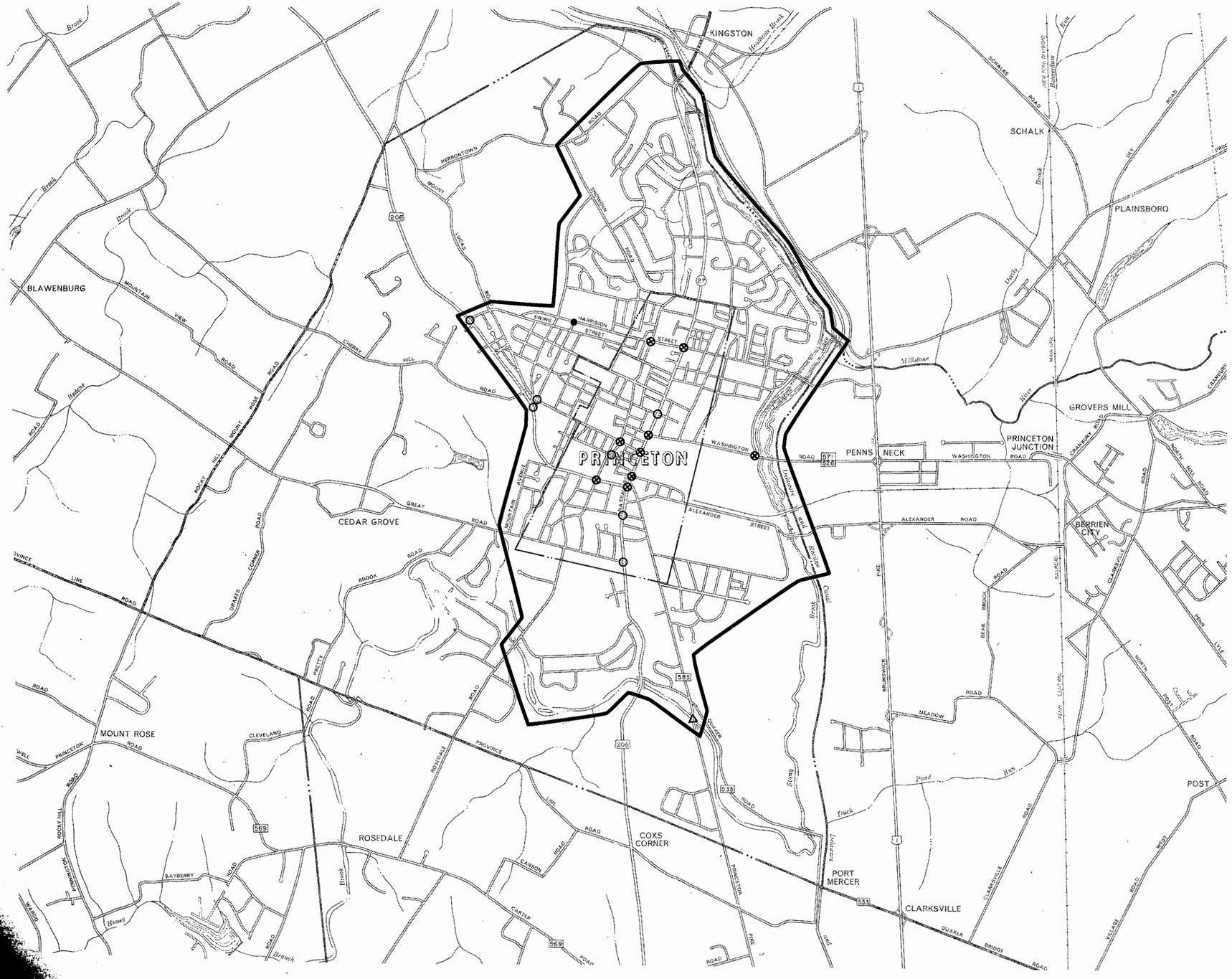
A major effort of the study included an inventory of existing parking facilities and parking usage surveys in the central business district of Princeton Borough and an analysis of their effect on traffic operations. As a result, the removal of curb parking at various locations has been recommended along with the relocation of several bus stops. The study concludes that most of the parking spaces that are proposed for removal are located in high demand areas and should be replaced with off-street facilities that are estimated to cost $217,000.00.

Other Street Improvements

A total of five improvements have been recommended at non-signalized intersections and include proposed flashing signal control, channelization, and sight distance improvements. All of these projects are scheduled for implementation. Another project proposes the reconstruction of the existing Mercer Street bridge over Stony Brook and includes improvement of the approaches to the bridge. Two additional scheduled projects relate to the regulation of traffic along sections of roadway and involve operational improvements through posting speed limits and upgrading bus stops.

The total estimated cost of the eight projects is $412,200.00. It is noted, however, that most of this ($392,000.00) is associated with one project, improvement of the Mercer Street bridge.

Figure B1



0 2,000 4,000 8,000

SCALE IN FEET

- EXISTING SIGNALIZED INTERSECTIONS (9)
- PROPOSED SIGNALIZED INTERSECTIONS (1)
- NON-SIGNALIZED INTERSECTIONS (7)
- BETWEEN INTERSECTION LOCATIONS (1)

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area 1

IMPROVEMENT LOCATIONS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

Existing Signalized Intersections

A total of eleven traffic signal installations are presently in operation in Report Area I. Of these, seven are located on the State highway system, two are under the jurisdiction of the County of Mercer, and two are Princeton Borough installations. All existing signalized intersections were investigated relative to their physical and operational adequacy.

Eight of the eleven installations in Report Area I utilize trombone type mast arms with horizontal signal mounting, while three installations, all relatively new, utilize vertically suspended signals. Vertically suspended signals have been proposed wherever signal hardware is recommended for replacement to be consistent with the newer installations. Moreover, the vertical mounting permits greater latitude in signal placement.

Guidelines established by the New Jersey Department of Transportation require that improvements on the State highway system not be scheduled as TOPICS projects at this time except where the principal beneficiary is local traffic. This guideline has been followed throughout the study, but clarification relative to proposed improvements on Route 27 (Nassau Street) is required since this State highway is unique.

Nassau Street is the spine of the central business district along which most of Princeton Borough's shops and many of its businesses are located. Furthermore, two other State highways, Route 1 and Route 206, are located in proximity to Nassau Street and are more or less parallel to it, thereby making it convenient for motorists desiring to bypass Nassau Street to do so. Accordingly, it is concluded that most of the Nassau Street traffic is local. Therefore, the four Nassau Street improvements recommended in this section of the report have been scheduled as TOPICS projects. Each has been illustrated and is located as follows:

N. J. Route 27/Mercer Street/University Place
N. J. Route 27/Witherspoon Street
N. J. Route 27/Washington Road-Vandeventer Avenue
N. J. Route 27/Harrison Street

The County is preparing to obtain State approval for the signal installation at the Elm Road/Rosedale Road-Cleveland Lane intersection. They have recently completed installation of loop detectors and are working toward passage of the required parking regulations. Approval will then be requested.

Recommendations for improvements to three other existing signal installations are presented in this section of the report. These involve the two municipally owned signals operated by Princeton Borough (which have been illustrated) and an unauthorized County signal (limited to description only) located as follows:

Harrison Street North/Hamilton Avenue
Witherspoon Street/Wiggins Street
Washington Road/Faculty Road

The trees that line the streets of Princeton are priceless relative to any replacement cost that might be associated with them. Accordingly, considerable effort was applied toward minimizing the destruction of trees with respect to the proposed improvements. Compensatory benefits in terms of improved roadway safety and capacity will be realized as a result of the removal of a few trees necessary for implementation of several of the projects.

Proposed Signalized Intersections

As a result of the Areawide TOPICS Study, the installation of traffic signals has been recommended at one intersection in Report Area I. It is proposed to control traffic at the Harrison Street North/Valley Road-Princeton Shopping Center intersection with a two-phase, semi-actuated traffic signal. The proposed roadway and signal improvements are illustrated and discussed in this section of the report.

N.J. ROUTE 27 (NASSAU STREET), MERCER STREET AND UNIVERSITY PLACE (Figure B2)

Existing Conditions

In the vicinity of Mercer Street and University Place, Nassau Street operates with three traffic lanes, the center lane of which is designated for westbound left turns except for a 50-foot section west of University Place. The latter is marked for eastbound left turns into Bank Street, a one-way northbound street. Observed traffic volumes entering Bank Street were light and include nine vehicles making left turns from Nassau Street during the evening peak hour.

The signal at Nassau Street-University Place presently operates on a fixed-time basis with two phases and an advance green interval to westbound Nassau Street motorists. All over-the-road signal heads are horizontally mounted on 10-foot mast arms. Traffic entering University Place from Mercer Street Extension is permitted to turn right or left on the same phase that University Place is given the "green," thus permitting right angle conflicts.

Accidents during the three-year study period totaled ten at the Nassau Street/University Place intersection, of which six were same direction type and three were right angle type. At the Nassau Street/Mercer Street intersection, six were right angle type and six were same direction type of the 15 total.

Proposed Improvements

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

- Retain the present phasing and the fixed-time operation of the traffic signals, and replace all signal hardware.
- Provide a channelizing island on Mercer Street at Nassau Street, and prohibit left turns from Mercer Street Extension into University Place through physical channelization and signing.
- Revise the left turn pavement markings on Nassau Street between Mercer Street and University Place to accommodate westbound traffic only.
- Extend the No Stopping and Standing regulation on Nassau Street and along the south side of Mercer Street Extension in accordance with the plan.

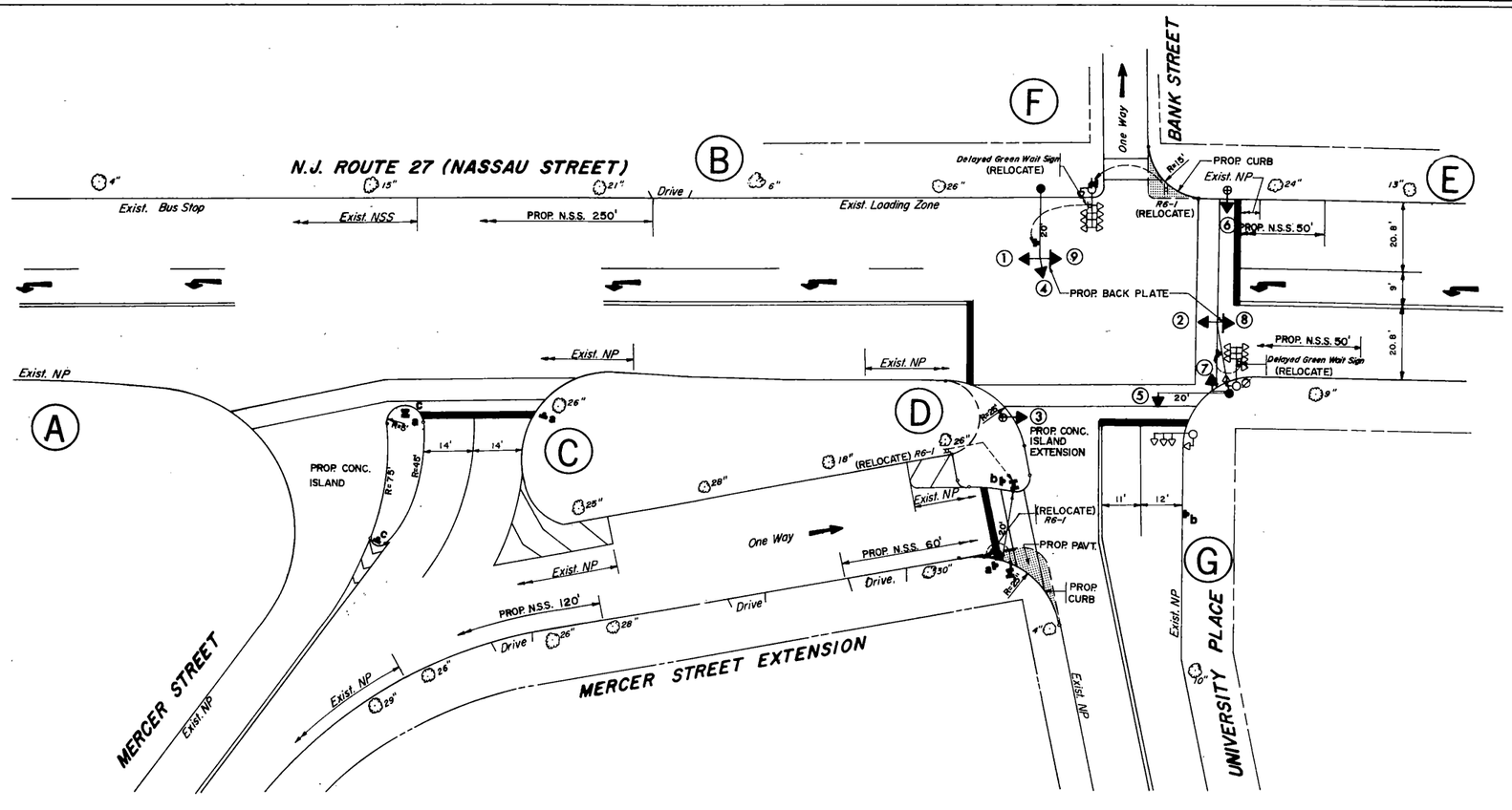
Benefit

The revisions at Mercer Street Extension will minimize the right angle conflict at University Place. Revisions to the pavement markings will permit the median lane on Nassau Street to be designated entirely for westbound vehicles turning left at University Place, Mercer Street, and Stockton Street, thus providing continuity to the flow of westbound traffic while minimizing conflicting movements. The channelization at Mercer Street will define the intersection more clearly while physically separating opposing traffic flows. It is also anticipated that upgrading the signal hardware will improve visibility of the signals, thereby encouraging better response from motorists.

Cost Estimate

Construction	$17,700.00
Engineering	2,100.00
Total	$19,800.00

Figure B2



0 20 40 80

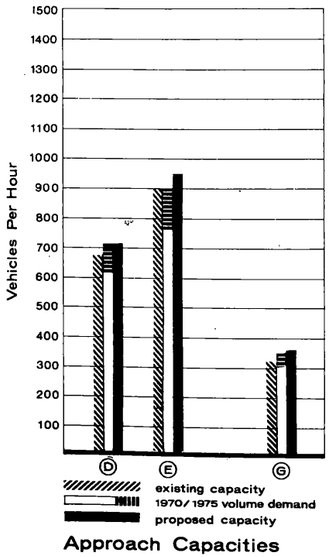
SCALE IN FEET

Notes

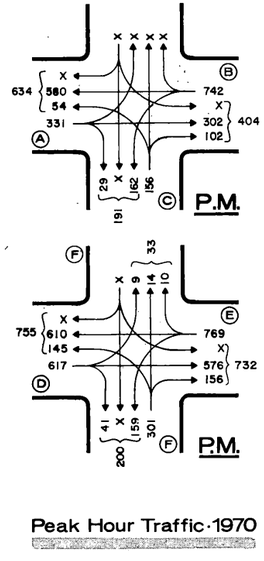
1. *Existing* noted by lower case lettering.
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS"
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING 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. THE PROPOSED SIGNAL LAYOUT IS SUBJECT TO REVISION BASED ON DETAILED STUDY BY N.J.D.O.T.
8. REMOVE EXISTING SIGNALS.

Legend

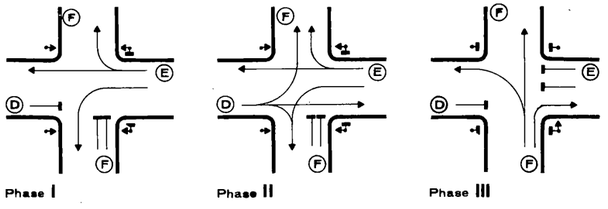
- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PPB. PROPOSED PEDESTRIAN PUSH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



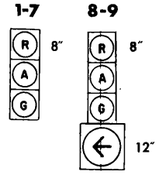
Approach Capacities



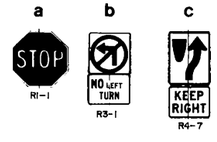
Peak Hour Traffic-1970



Signal Phasing



Signal Faces



Sign Legend

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area 1 • Princeton Borough

N.J. ROUTE 27 (NASSAU STREET)
MERCER STREET
UNIVERSITY PLACE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

N.J. ROUTE 27 (NASSAU STREET) AND WITHERSPOON STREET (Figure B3)

Existing Conditions

Parking is permitted on both sides of Witherspoon Street to within 45 feet of the intersection, and existing operations provide one traffic lane in each direction. Nassau Street is approximately 54 feet wide between curbs, and parking is permitted on both sides of the street except within the immediate area of the intersection. The existing signal operates on a two-phase, fixed-time basis with two over-the-road signal heads provided for Nassau Street on mast arms 10 feet long. During the evening peak hour, traffic volumes are at capacity level.

The six-foot wide crosswalks are crossed extensively by pedestrians throughout most of the day, and the three-year accident record indicates 23 of the same direction type, 12 involving fixed objects, and 11 involving pedestrians of a total of 59.

Proposed Improvements

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

- Retain the present two-phase, fixed-time operation of the traffic signals, replacing all traffic signal hardware and providing pedestrian signal indications.
- Increase the corner radii to 20 feet.
- Revise the existing pavement markings to include 10-foot wide crosswalks and a two-lane approach on Witherspoon Street.
- Institute No Stopping and Standing control along Witherspoon Street, and provide bus stops and a taxi stand on Nassau Street in accordance with the plan.

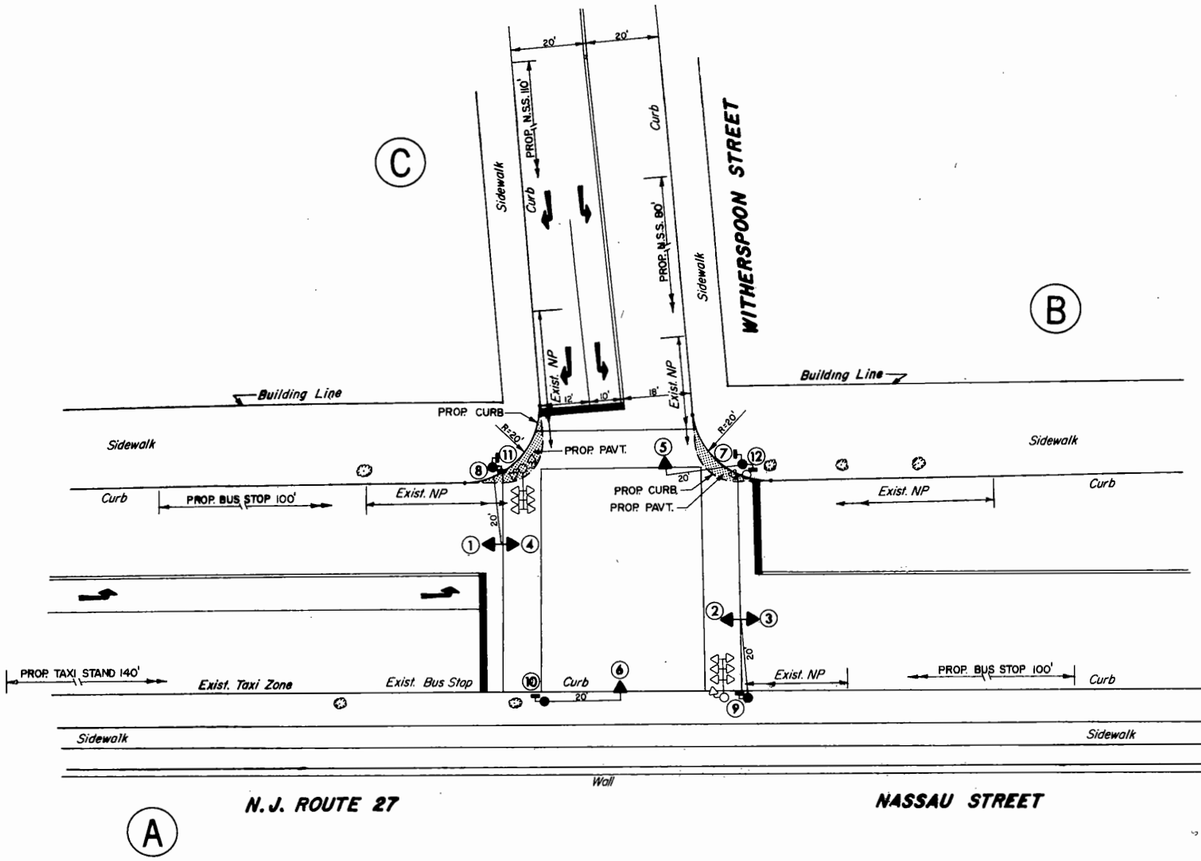
Benefit

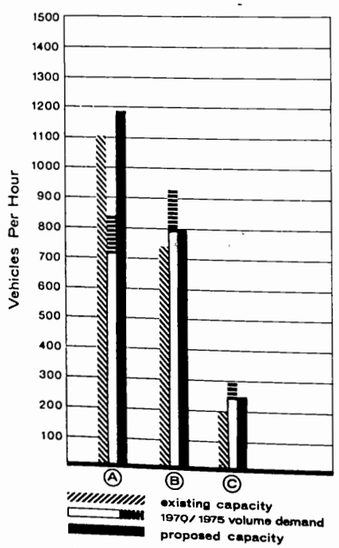
The improvement of the corner radii, the restriction of parking, and the re-marking of the Witherspoon Street approach will facilitate traffic movements at the intersection, thereby reducing delays and increasing capacity. The pedestrian signal indications will tend to encourage drivers to yield to pedestrians during the WALK interval of each phase, while also discouraging pedestrian crossings during the other portion of the signal cycle. Thus, it is anticipated that pedestrian accidents will be reduced. Improvement of signal visibility will result from the longer mast arms potentially reducing same direction accidents.

Cost Estimate

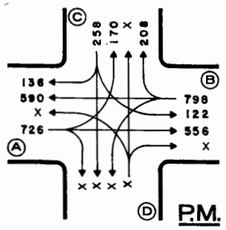
Construction	$16,900.00
Engineering	2,000.00
Total	$18,900.00

Figure B3

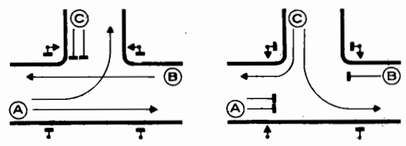




Approach Capacities



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. REMOVE EXISTING SIGNALS.
8. THE PROPOSED SIGNAL LAYOUT SUBJECT TO REVISION BASED ON DETAIL STUDY BY NJDOT.

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 I · Princeton Borough

N.J. ROUTE 27 (NASSAU STREET)
WITHERSPOON STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

N.J. ROUTE 27 (NASSAU STREET) AND WASHINGTON ROAD-VANDEVENTER AVENUE (Figure B4)

Existing Conditions

At Washington Road-Vandeventer Avenue, Nassau Street is 60 feet wide between curbs, west of the intersection, with parking permitted on both sides of the street and pavement markings indicating two traffic lanes. East of the intersection, Nassau Street is 56 feet wide with parking on both sides and markings for two approach lanes, one of which is designated for left turns. Washington Road and Vandeventer Avenue are both 30 feet in width, but offset approximately 22 feet from each other. On the cross streets, parking is only permitted on the west side of Vandeventer.

Traffic volumes exceed the capacity of the intersection during peak hours of flow, with left turns from Washington Road at more than 250 vehicles per hour and comparable right turns from Nassau at 300.

A total of 31 accidents were noted during the three-year study period, of which the majority were same direction type principally on Nassau Street.

The signal hardware consists of two over-the-road signal heads mounted horizontally on 10-foot long mast arms for Nassau Street and pedestal mounted signals for the side streets. Signal operation is two phase, fixed-time with an advance green interval given to Washington Road.

Proposed Improvements

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

- Retain the present phasing and fixed-time operation of the traffic signals and replace all signal hardware.
- At Nassau Street, widen Washington Road to 34 feet and Vandeventer Avenue to 40 feet.
- Provide bus stops on Nassau Street in accordance with the plan.

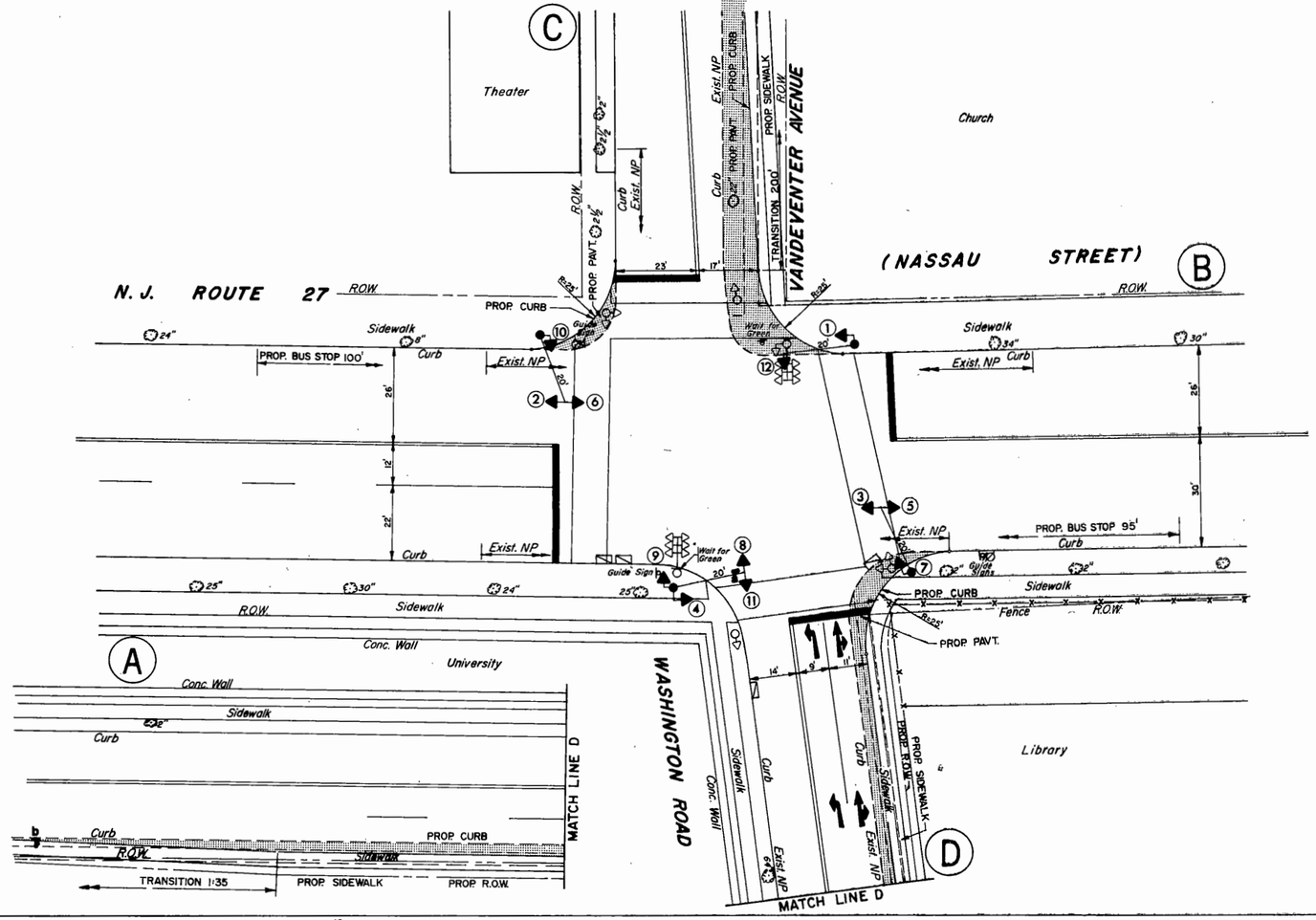
Benefit

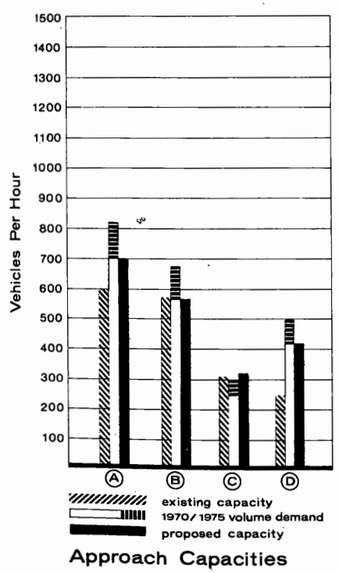
The roadway improvements will provide for an increase in intersection capacity while also reducing the offset between Washington Road and Vandeventer Avenue. Revisions to the signal hardware will afford greater visibility of the signals, thus providing potential safety benefits in terms of improved driver response.

Cost Estimate

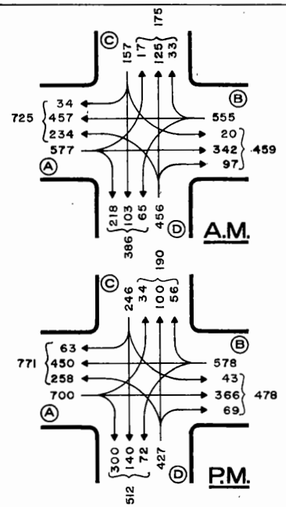
Construction	$26,000.00
Engineering	3,100.00
Total	$29,100.00

Figure B4

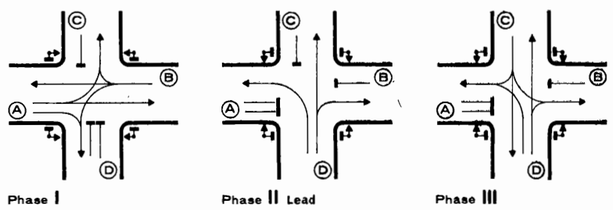




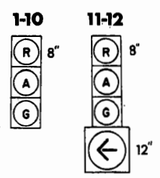
Approach Capacities



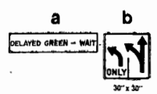
Peak Hour Traffic-1970



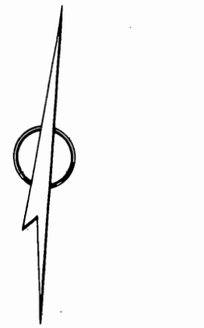
Signal Phasing



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. THE PROPOSED SIGNAL LAYOUT IS SUBJECT TO REVISION BASED ON A DETAILED STUDY BY THE N.J.D.O.T.
8. REMOVE EXISTING SIGNALS.

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 1 · Princeton Borough

N.J. ROUTE 27 (NASSAU STREET)
WASHINGTON ROAD
VANDEVENTER AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

N.J. ROUTE 27 (NASSAU STREET) AND HARRISON STREET (Figure B5)

Existing Conditions

Nassau Street and Harrison Street are each 30 feet in width, and parking is permitted only on the south side of Nassau east of the intersection. Existing corner radii are 15 feet or less, and pavement markings provide one lane on each of the Nassau Street approaches and two on the Harrison Street approaches (left turns in one lane and straight and right turns in the other). A semi-actuated signal installation controls traffic at the intersection.

Traffic volumes exceed the capacity of the intersection during the peak hours of flow, with left turns from the north approach of Harrison Street at more than 180 vehicles per hour. Of the 19 accidents noted during the three-year accident history, nine were of the same direction type and five were of the right angle type.

Proposed Improvements

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

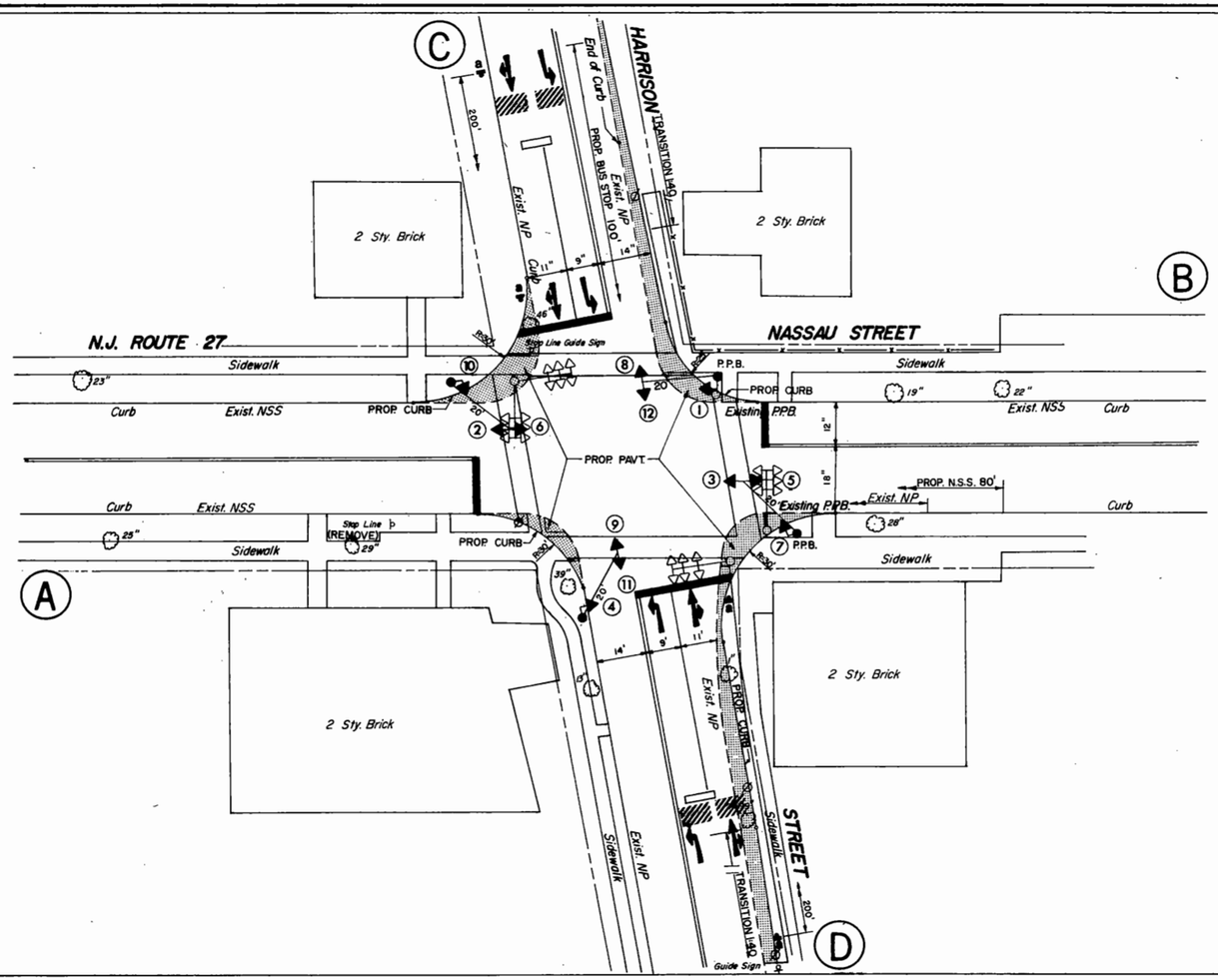
- Retain two-phase, semi-actuated traffic signal control and replace all signal hardware.
- Widen Harrison Street to 34 feet in the vicinity of Nassau Street and improve all corner radii.
- Extend the existing parking control on the south side of Nassau Street to a distance of 80 feet east of Harrison Street.

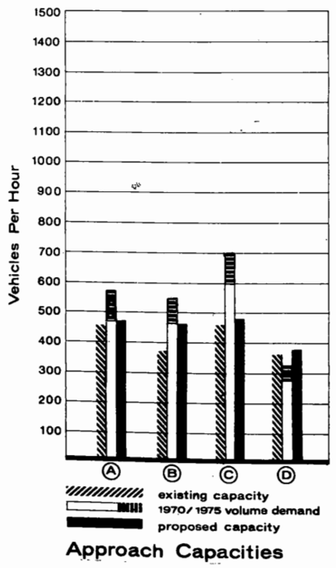
Benefit

The roadway widening will provide an increase in capacity, as will the improved corner radii, by permitting all vehicles, especially trucks, to negotiate turns more readily. The elimination of parking near the southeast corner will similarly facilitate traffic flow by providing greater maneuvering area at the intersection.

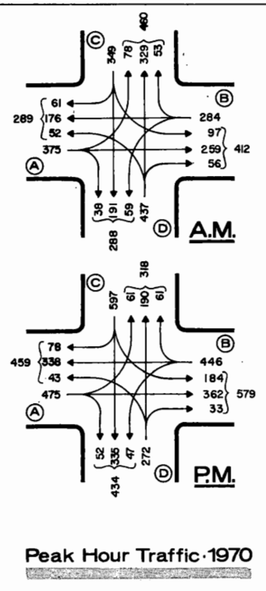
Cost Estimate

Construction	$27,700.00
Engineering	3,300.00
Total	$31,000.00

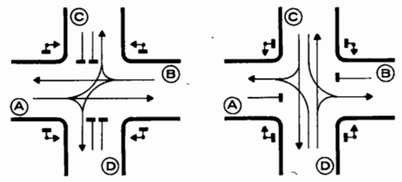




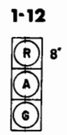
Approach Capacities



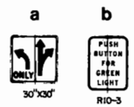
Peak Hour Traffic-1970



Signal Phasing



Signal Faces



Sign Legend

Figure B5

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 AND 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 LAYOUT IS SUBJECT TO REVISION BASED ON A DETAILED STUDY BY THE N.J.D.O.T.
8. REMOVE EXISTING SIGNALS.
9. 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
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED SIGN
- EXISTING SIGN
- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area I · Princeton Borough

N. J. ROUTE 27 (NASSAU STREET)
HARRISON STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

HARRISON STREET NORTH AND HAMILTON AVENUE (Figure B6)

Existing Conditions

At Hamilton Avenue, Harrison Street North is 30 feet wide south of the intersection and 35 feet wide north of the cross street. A curb extends along the easterly side of the street, and pavement markings provide two lanes on both approaches, one of which is designated for left turns only. Hamilton Avenue is 30 feet wide and meets Harrison Street North at a skew of approximately 20 degrees. Curbs extend along both sides of the street, and pavement markings on the two approaches are similar to those on Harrison, with one of the two approach lanes designated for left turns. The corner radii at the intersection range from a minimum of 12 feet to a maximum of 20 feet. Traffic volumes during peak hours of flow are at a level approximately equal to the capacity of the intersection. During the three-year study period, a total of 14 accidents was recorded of which nine were the right angle type.

Proposed Improvements

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

- Revise the present two-phase, fixed-time traffic signal operation to two-phase, semi-actuated operation and replace the traffic signal hardware in accordance with the plan.
- Widen the south leg of Harrison Street North to a width of 36 feet within the vicinity of Hamilton Avenue.
- Widen Hamilton Avenue to a width of 34 feet in the vicinity of Harrison Street North.

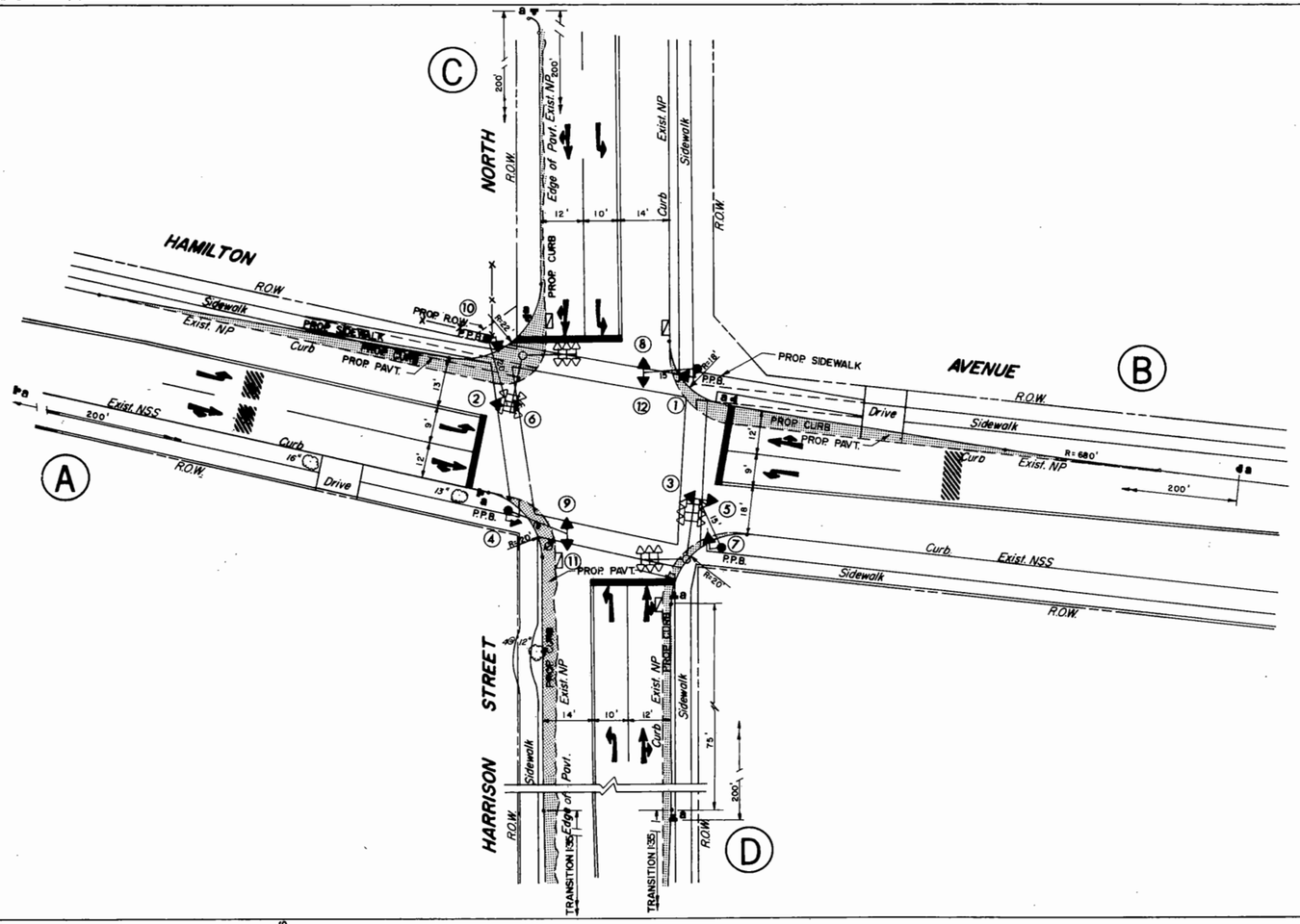
Benefit

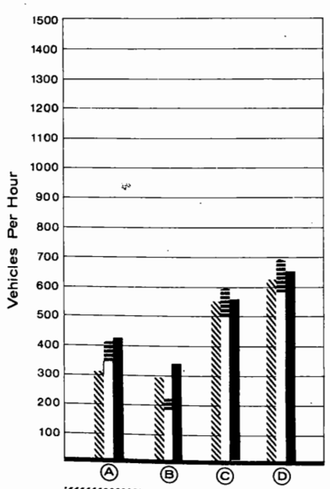
The widening of the intersection and the improvement of the corner radii will result in an increase in capacity. Moreover, the physical improvements will potentially reduce accidents by giving drivers greater maneuvering space, thereby minimizing erratic and hesitant movements. Revision to the signal operation will provide for greater efficiency of operations by allotting "green" time in a manner more consistent with demand.

Cost Estimate

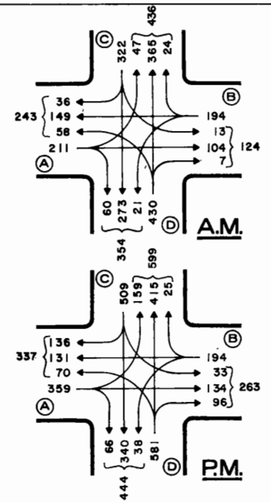
Construction	$27,200.00
Engineering	3,300.00
Total	$30,500.00

Figure B6

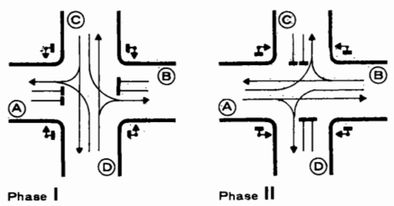




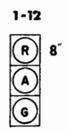
Approach Capacities



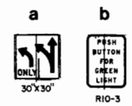
Peak Hour Traffic-1970



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 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
- P.P.B. PROPOSED PEDESTRIAN PUSH BUTTON
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- PROPOSED PAVEMENT

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area I • Princeton Borough

HARRISON STREET NORTH
HAMILTON AVENUE

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

WITHERSPOON STREET AND WIGGINS STREET (Figure B7)

Existing Conditions

Each of the approaches at the Witherspoon Street/Wiggins Street intersection presently operates with two approach traffic lanes, one of which, in each instance, is used by traffic making left turns. The cartway widths available for traffic, however, vary considerably since the curb-to-curb dimensions measure a maximum of 45 feet on the west leg of Wiggins to a minimum of 30 feet on the north leg of Witherspoon. Moreover, parking is permitted on both sides of the south leg of Witherspoon, and the easterly curb line of Witherspoon on either side of the intersection is offset in a manner requiring northbound traffic crossing Wiggins to jog to the left. Traffic is presently controlled by a two-phase, fixed-time signal.

Traffic volumes are at a level about equal to the capacity of the intersection, and the three-year accident history indicates a total of 29 accidents of which 20 were the right angle type. Sixteen of these involved westbound vehicles traveling on Wiggins, a factor which tends to substantiate field observations that the afternoon sun sometimes "blinds" motorists traveling toward the intersection in the westbound direction, thereby rendering it difficult, at times, for them to see and respond to the signal indications.

Proposed Improvements

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

- Retain the present two-phase, fixed-time operation of the traffic signals and relocate or replace all signal hardware in accordance with the plan.
- Revise the amber interval for Wiggins Street traffic from four to three seconds followed by a two-second, all-red interval.
- Widen Witherspoon Street to a width of 36 feet north of Wiggins Street.
- Increase the radii of the two easterly corners to 30 feet.
- Extend the existing parking controls on both sides of Witherspoon Street to a distance of 120 feet south of Wiggins Street.

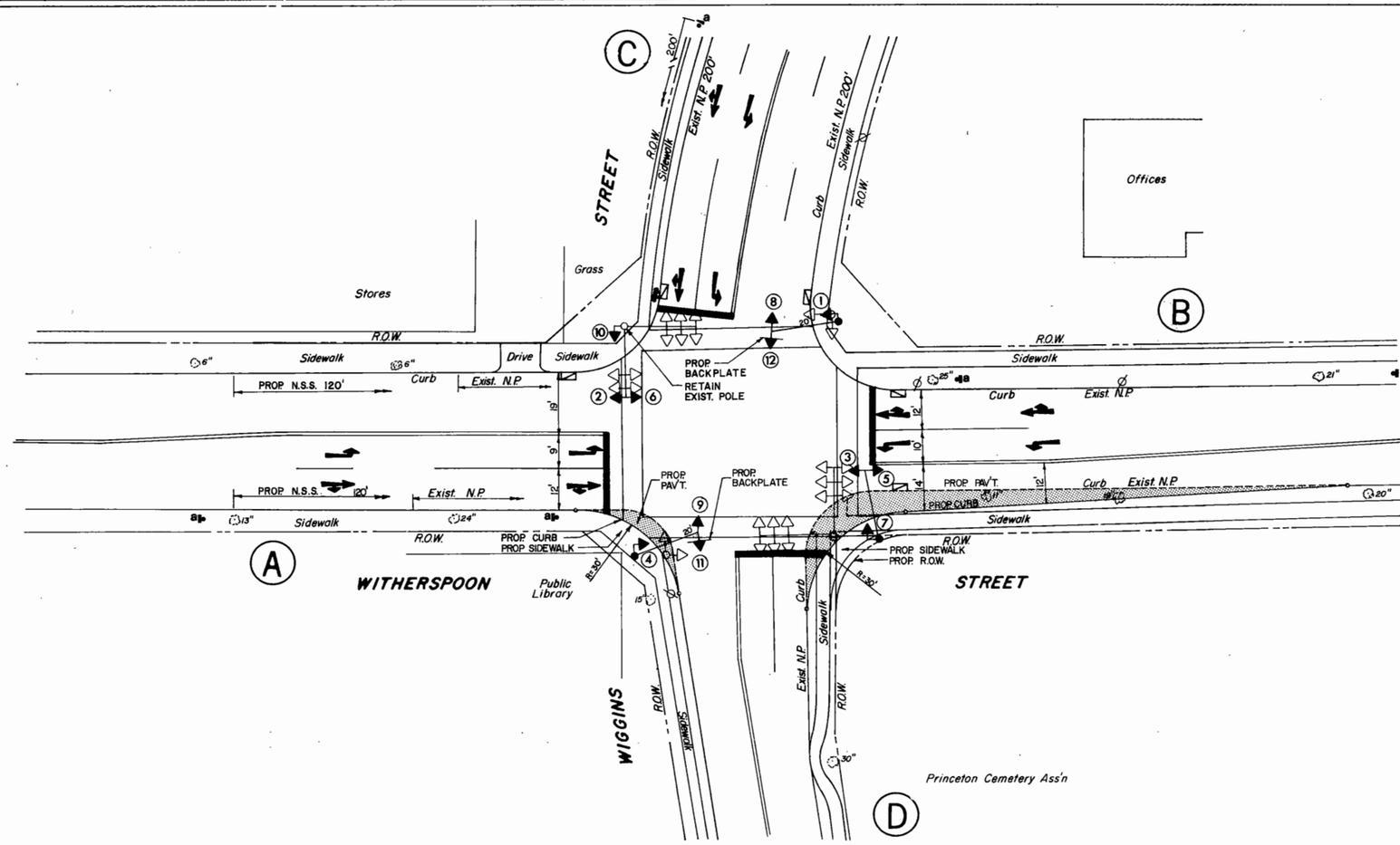
Benefit

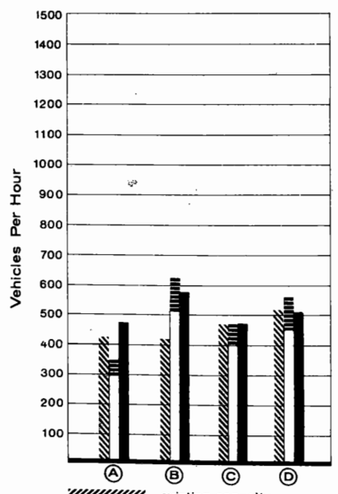
The widening of the north leg of Witherspoon Street will permit wider traffic lanes for both approaching and departing traffic, thereby facilitating traffic flow through the intersection and increasing capacity. A similar benefit in operations will result on the south leg from the removal of parking on the east side of Witherspoon. Reconstruction of the signal hardware, the addition of back plates, and the inclusion of the all-red interval will result in better compliance with the signal indications, thereby reducing the accident potential at the intersection.

Cost Estimate

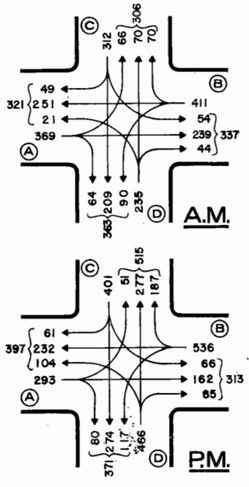
Construction	$17,700.00
Engineering	2,100.00
Total	$19,800.00

Figure B7

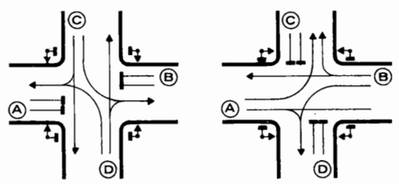




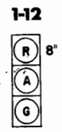
Approach Capacities



Peak Hour Traffic-1970

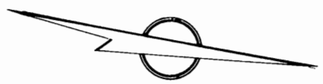


Signal Phasing



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 TRAFFIC SIGNALS EXCEPT WHERE OTHERWISE SHOWN.

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 I · Princeton Borough

WITHERSPOON STREET
WIGGINS STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION
September 1972 Travers Associates Consultants

HARRISON STREET NORTH AND VALLEY ROAD (Figure B8)

Existing Conditions

Harrison Street North along the frontage of the Princeton Shopping Center is a four-lane roadway with a 20-foot wide curbed median. Valley Road is 30 feet wide between curbs and is marked for two approach lanes at its intersection with Harrison Street North. Opposite Valley Road is a two-way access drive to the shopping center, which accommodates four operating lanes, two entering and two leaving, separated by a landscaped divider. A second shopping center driveway on Harrison Street North is located several hundred feet to the south. Traffic control consists of STOP signs on Valley Road and the shopping center driveway. Accidents totaled 28 for the three-year study period; 15 were of the right angle type and eight were same direction type.

Proposed Improvements

The New Jersey Department of Transportation has authorized traffic signal control at the Harrison Street North and Valley Road-Princeton Shopping Center intersection. Furthermore, present traffic volumes meet the Minimum Vehicular Volume Warrant for traffic signal control. Accordingly, the following improvements are recommended:

- Provide two-phase, semi-actuated signal control and install a three-phase controller to accommodate future left turn signaling.
- Widen Valley Road to 38 feet in the vicinity of Harrison Street North.
- Reconstruct the median island in Harrison Street North to provide left turn lanes.
- Relocate the existing concrete island in the shopping center driveway to provide three exiting lanes (this work to be completed by others).

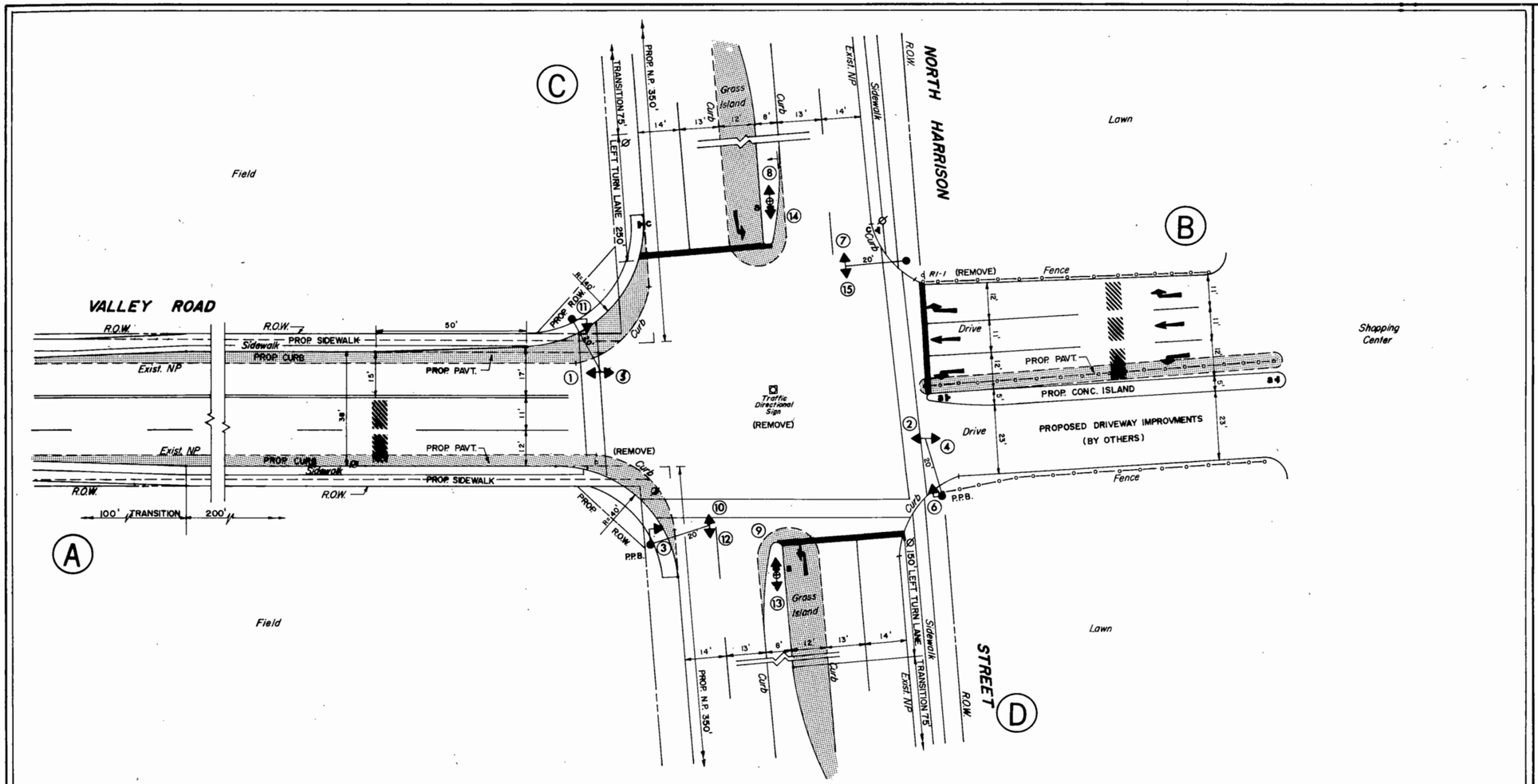
Benefit

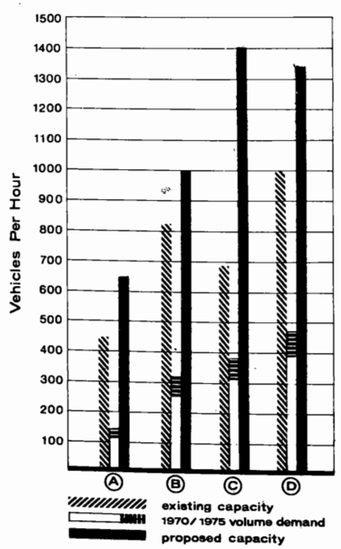
It is anticipated that traffic signal control will reduce the potential for right angle type accidents and that the median lanes will reduce the potential for same direction type accidents. The widening of Valley Road will facilitate movements out of, and into, Valley Road, thereby minimizing delays and the potential for side swipe type accidents.

Cost Estimate

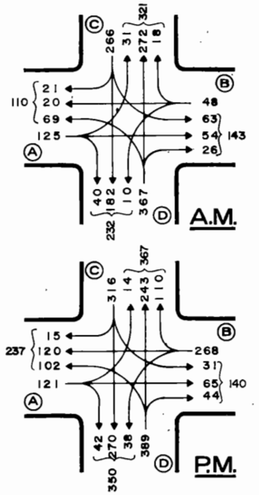
Construction	$37,200.00
Engineering	4,500.00
Total	$41,700.00

Figure B8

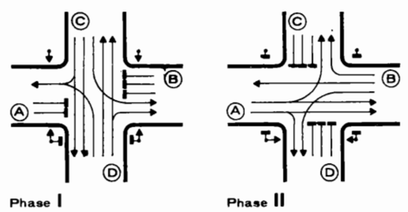




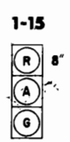
Approach Capacities



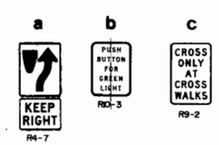
Peak Hour Traffic·1970



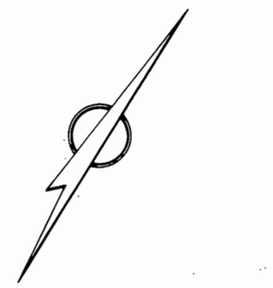
Signal Phasing



Signal Faces



Sign Legend



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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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
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- 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 1 · Princeton Township

HARRISON STREET NORTH
VALLEY ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

WASHINGTON ROAD AND FACULTY ROAD (Not Illustrated)

Existing Conditions

The traffic signal at Washington Road/Faculty Road presently operates as a two-phase, fixed-time installation, but has not received State authorization. Washington Road is approximately 36 feet in width and accommodates some 12,000 vehicles a day, while Faculty Road, 30 feet wide, accommodates approximately 5000 vehicles a day. The signal face located on the northwest corner facing eastbound traffic is hidden by vegetation as is the signal face on the northeast corner facing westbound traffic. It is also noted that the glare of the afternoon sun makes it difficult for westbound traffic to see the signals. The three-year accident history includes a total of 16, of which six were right angle type accidents and five were same direction type accidents.

Proposed Improvements

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

- Replace the existing controller with a two-phase, semi-actuated controller and install vehicle detectors on the Faculty Road approaches.
- Provide a three-second amber interval to Faculty Road followed by a two-second, all-red interval.
- Add back plates to the over-the-road signals facing Faculty Road traffic.
- Cut back vegetation to permit Faculty Road traffic to view all signal faces directed toward approaching traffic for a distance of 300 feet in advance of the intersection.

Benefit

Conversion of the signal operation from fixed-time to semi-actuated will minimize wasted "green" time, thereby increasing efficiency of the installation. The all-red interval will offer a greater margin of safety in terms of the clearance provided by the conflicting movements. The back plates and the cutting back of the vegetation will enhance the visibility of the signals, thereby encouraging better motorist response.

Cost Estimate

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

Six locations are discussed in this section of the report and involve five intersections and one between intersection improvement on the TOPICS network which are not traffic signal controlled and where signal control is not warranted. The locations described herein were found to be deficient in some manner, usually in relation to safety.

Improvement of the existing sight distance restrictions is recommended at one intersection, and flashing signals are proposed for three others. Another intersection improvement calls for new parking controls, and the final project discussed is the Mercer Street bridge structure over Stony Brook. Improvements are proposed at the following six locations, two of which are illustrated:

U.S. Route 206/Witherspoon Street/Valley Road (Illustrated)
Avalon Place-Wiggins Street/Chambers Street-John Street (Illustrated)
U.S. Route 206/Elm Road
U.S. Route 206/Library Place
N.J. Route 27/Moore Street
Mercer Street over Stony Brook

U.S. ROUTE 206 AND WITHERSPOON STREET AND VALLEY ROAD (Figure B9)

Existing Conditions

Valley Road meets U.S. Route 206 as a "T" type intersection and extends in an easterly direction intersecting Witherspoon Street-Mount Lucas Road approximately 200 feet east of Route 206. Between the two intersections, Valley Road is poorly defined as the bituminous pavement of the roadway blends with the paved parking area of the Princeton Township Municipal Building throughout most of its length on the south side, and with a 100-foot wide driveway on the north side. West of Witherspoon, the traveled way of Valley Road is 40 feet, and east of the intersection the pavement width reduces to 30 feet.

The three-year accident history of the Valley Road/Witherspoon Street-Mount Lucas Road intersection indicates a total of 23 accidents of which 18 were right angle type. Ten accidents were recorded on Route 206 in the vicinity of Valley Road which involved six fixed object type accidents and a head-on collision that resulted in a fatality. The latter and five of the fixed object type accidents occurred when the pavement was wet.

Proposed Improvements

It is recommended that the following improvements be made:

- Resurface Route 206 in the vicinity of Valley Road with skid resistant overlay as developed by the New Jersey Department of Transportation, and install delineators along both sides of Route 206 a minimum of 1000 feet in advance and beyond Valley Road.
- Place curbing and provide a 10-foot buffer area between the southerly edge of Valley Road and the Township parking lot.
- Provide channelizing islands on Valley Road at Route 206 and Witherspoon Street, and set back the southerly curb line of Valley Road east of Witherspoon Street.
- Install a flashing signal at the intersection with flashing red to Valley Road and flashing amber to Witherspoon Street and Mount Lucas Road.

Benefit

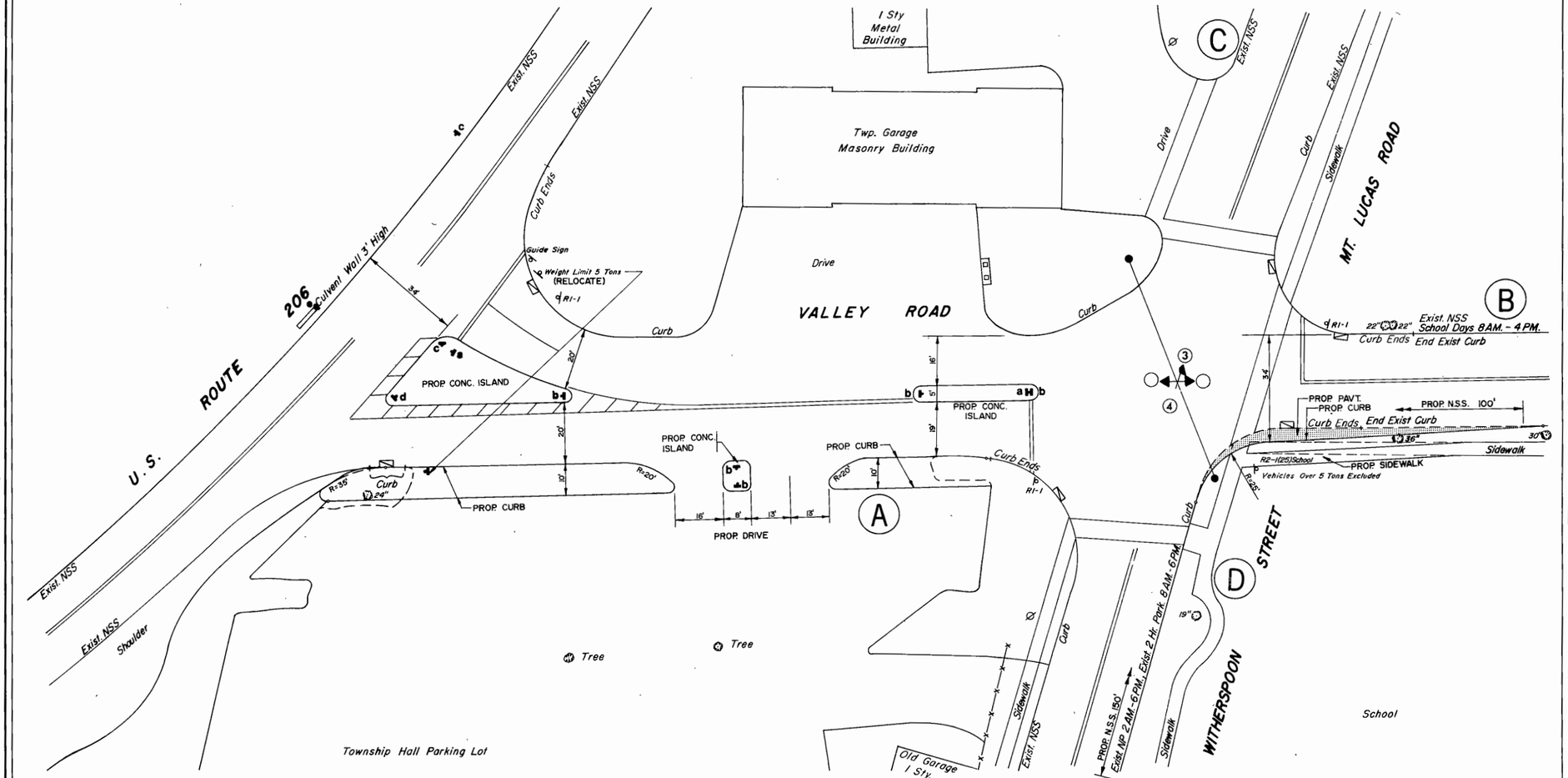
The resurfacing will reduce the apparent slipperiness of the Route 206 pavement, thereby reducing the potential for loss of vehicle control. The proposed channelizing islands and curbing will clearly define the approaches and southerly edge of Valley Road, thereby serving to organize traffic flows and discourage hazardous maneuvers. The flashing signal will provide added visual identification of the intersection warning motorists of the need to exercise caution, thereby reducing the potential for right angle type accidents.

Cost Estimate

In keeping within the program guidelines relative to improvements on State roadways, the cost estimate relates only to cost of improvements on Valley Road and Witherspoon Street. Final determination of the eligibility of the various construction items for TOPICS funding shall be made during the design phase.

Construction	$8,600.00
Engineering	1,100.00
Total	$9,700.00

Figure B9



0 20 40 80

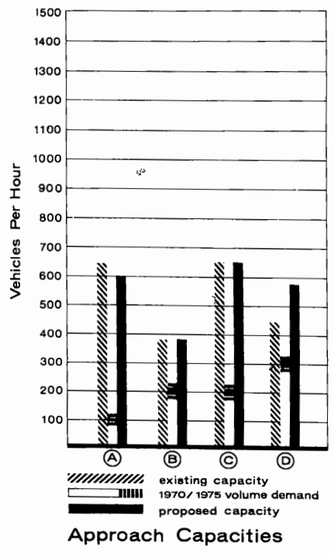
SCALE IN FEET

Notes

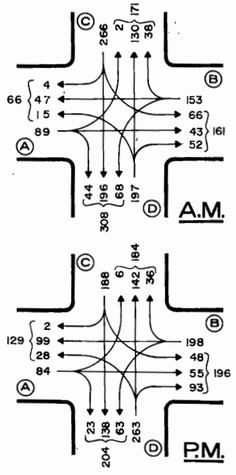
1. Existing noted by lower case lettering.
2. PROPOSED NOTED BY UPPER CASE LETTERING.
3. SIGN DESIGNATIONS WITH THE PREFIX R OR W REFER TO SIGNS DESCRIBED IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
4. ALL EXISTING SIGNS ARE TO REMAIN UNLESS OTHERWISE NOTED.
5. PARKING 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.

Legend

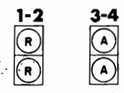
- PROPOSED SIGNAL POLE
- PROPOSED PEDESTAL
- EXISTING SIGNAL POLE OR PEDESTAL
- EXISTING UTILITY POLE
- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
- EXISTING INLET
- PROPOSED PRESSURE DETECTOR
- EXISTING PRESSURE DETECTOR
- PROPOSED LOOP DETECTOR
- EXISTING LOOP DETECTOR
- PRB PROPOSED PEDESTRIAN PUSH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



Approach Capacities

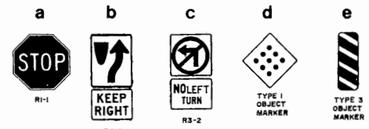


Peak Hour Traffic-1970



FLASHING SIGNALS

Signal Faces



Sign Legend

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area 1 • Princeton Township

U.S. ROUTE 206
WITHERSPOON STREET
VALLEY ROAD

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

AVALON PLACE-WIGGINS STREET AND CHAMBERS STREET-JOHN STREET (Figure B10)

Existing Conditions

Avalon Place is the extension of Wiggins Street and is on a sharp reverse curve alignment at its intersection with Chambers Street and John Street. West of the intersection, Avalon is 30 feet wide between curbs and accommodates two lanes of traffic; to the east, the street width is 44 feet and provides for four traffic lanes. John Street is a one-way street away from the intersection. The Chambers Street approach is channelized, permitting uncontrolled right turns into Wiggins, but no physical divider separates opposing traffic. This somewhat unconventional channelization is confusing to some motorists who have been observed turning left into Chambers by going around the westerly island.

The four-hour traffic count indicates existing volumes that are near the level required by the Minimum Vehicular Volume Warrant for traffic signal control. Although no accidents have been recorded at the intersection for the three-year investigative period, observations indicate a potentially hazardous condition. Chambers Street motorists desiring to go straight or turn left have available sight distance of approximately 85 feet to the west, and therefore cannot see eastbound vehicles until approaching traffic is virtually at the intersection.

Proposed Improvements

In addition to the regulatory speed and warning signs proposed along Avalon Place-Wiggins Street, presented elsewhere in the report, the following improvements are also recommended:

- Reconstruct the channelization.
- Realign the westerly curb line of Chambers Street and improve the radius at the southwest corner.
- Clear a sight triangle on the southwest corner of all physical objects (except selected trees) to a maximum height of 30 inches above the pavement to provide a sight distance of 250 feet to the west from the position of a stopped vehicle on the Chambers Street approach.

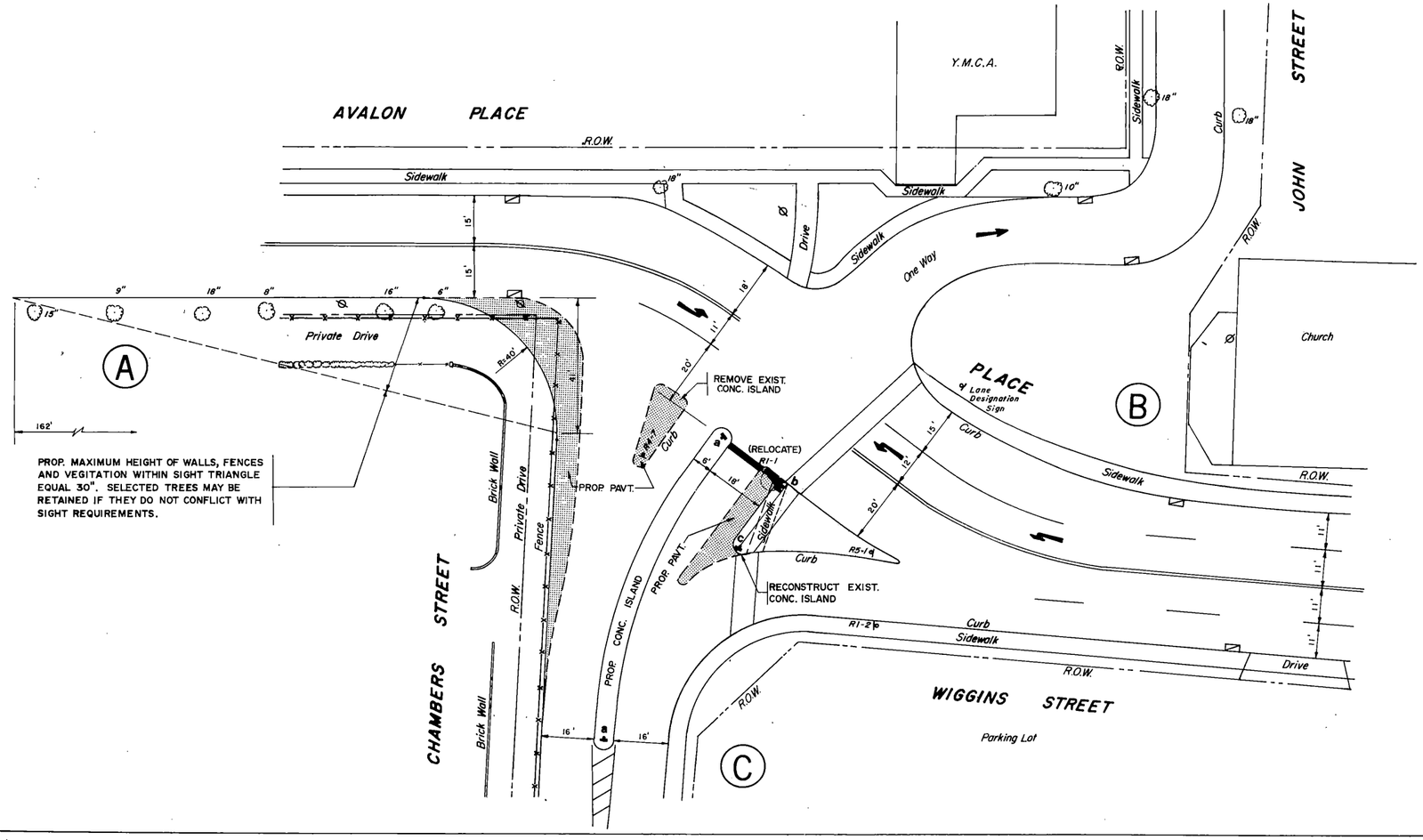
Benefit

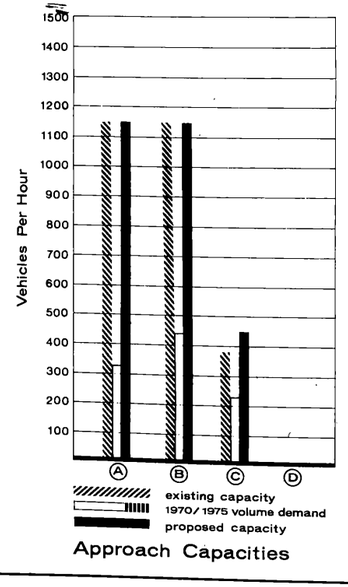
The channelization changes will clearly delineate the center of the Chambers Street roadway and provide a positive separation between opposing flows of traffic, minimizing the potential for side swipes or head-on collisions. The channelization will also eliminate the present confusion to Wiggins Street motorists when turning into Chambers. The provision of clearing the proposed sight triangle will reduce the potential for right angle accidents.

Cost Estimate

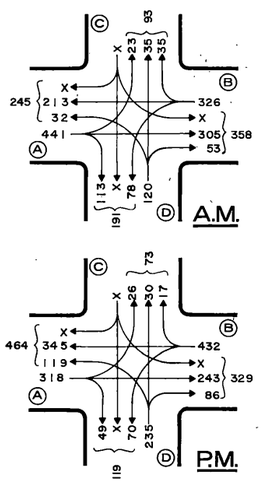
Construction	$5,300.00
Engineering	700.00
Total	$6,000.00

Figure B10

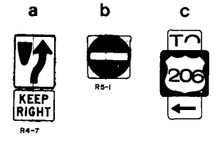




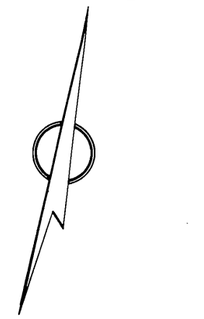
Approach Capacities



Peak Hour Traffic-1970



Sign Legend



Notes

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Legend

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- PROPOSED SIGNAL FACE
- EXISTING SIGNAL FACE
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- 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 1 • Princeton Borough

AVALON PLACE - WIGGINS STREET
CHAMBERS STREET
JOHN STREET

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

U.S. ROUTE 206 (STOCKTON STREET) AND ELM ROAD (Not Illustrated)

Existing Conditions

Elm Road is a two-lane roadway that meets Route 206 as a "T" intersection. The 30-foot wide highway also generally operates with two traffic lanes, but is marked at Elm Road with a supplemental eastbound left turn lane. STOP signs control Elm Road traffic and guide signs are directed to motorists using all three approaches. A four-hour afternoon traffic count indicated hourly volumes ranging from 144 to 228 vehicles on the Elm Road approach with more than half the vehicles turning right. The three-year accident history indicates 11 right angle type and seven same direction type accidents of the 26 total.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide flashing signal control with flashing red to Elm Road and flashing amber to Route 206.
- Paint a stop line on the Elm Road approach.

Benefit

The flashing signal will provide added visual identification of the intersection while warning motorists of the need to exercise caution, thereby reducing the potential for right angle type accidents. It is anticipated that the potential for same direction type accidents on Route 206 will also be reduced by virtue of the additional advance warning that will be given to approaching motorists on the State highway.

Cost Estimate

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

U.S. ROUTE 206 (STOCKTON STREET) AND LIBRARY PLACE (Not Illustrated)

Existing Conditions

At Route 206, the north leg of Library Place is offset from the south leg by approximately five feet. STOP signs control traffic entering the highway, but it is noted that the sign located on the south approach is partially hidden by the trunk of a tree. A four-hour afternoon traffic count indicated a maximum hourly volume of 88 vehicles on the north approach of Library Place and 38 vehicles on the south approach. A review of the three-year accident history indicates a total of 19, involving seven same direction type, four right angle type, three left turn accidents, three fixed object type, and two head-on collisions.

Proposed Improvements

It is recommended that the following improvements be made:

- Provide flashing signal control with flashing red to Library Place and flashing amber to Route 206.
- Provide a supplementary STOP sign on the southwest corner of the intersection facing northbound Library Place traffic.
- Provide STOP AHEAD signs in advance of each of the Library Place approaches.

Benefit

The flashing signal will provide added visual identification of the intersection while warning motorists of the need to exercise caution, thereby reducing the potential for right angle type accidents. It is anticipated that the potential for same direction type accidents on Route 206 will also be reduced by virtue of the additional advance warning that will be given to approaching motorists on the State highway.

Cost Estimate

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

N.J. ROUTE 27 (NASSAU STREET) AND MOORE STREET (Not Illustrated)

Existing Conditions

Moore Street is 27 feet wide and meets Nassau Street as a "T" intersection. Traffic on Moore Street is controlled by a STOP sign, and parking is permitted on the west side of Moore Street within 75 feet of Nassau Street. Parked vehicles on the north side of Nassau Street, west of the intersection, tend to obscure the line of sight of motorists stopped on the Moore Street approach. A four-hour afternoon traffic count indicated hourly volumes ranging from 127 to 159 vehicles on the Moore Street approach with approximately two-fifths of the traffic turning left. The three-year accident history includes a total of 18, of which 11 were same direction type, four involved fixed objects, and three were right angle type.

Proposed Improvements

It is recommended that the following improvements be made:

- Prohibit the stopping and standing of vehicles on the west side of Moore Street for a distance of 140 feet from the northerly curb line of Nassau Street, eliminating three parking spaces.

- Prohibit the stopping and standing of vehicles on the north side of Nassau Street for a distance of 35 feet from the westerly curb line of Moore Street, eliminating one parking space.

Benefit

The elimination of parked or standing vehicles on Moore Street will effectively widen the approach, thereby reducing traffic friction and the potential for side swipe type accidents. The parking prohibition on Nassau Street will improve sight distance to motorists stopped on Moore, thereby reducing the potential for right angle type accidents.

Cost Estimate

(No funds required.)

MERCER STREET OVER STONY BROOK (Not Illustrated)

Existing Conditions

Just south of Quaker Road, at the southerly boundary of the study area, Mercer Street assumes a reverse curve alignment as it crosses over Stony Brook. The bridge structure is a stone arch with a cartway approximately 22 feet wide and a severe vertical curve cresting at the center of the span. The combined horizontal alignment of the roadway and profile of the structure severely limits the sight distance and the speed of travel. Advance warning signs indicate the curved alignment and give an advisory speed of 20 mph in both directions. Beyond the bridge to the north, the posted speed limit is 45 mph, and to the south, 50 mph. The three-year accident history indicates that, of the total of 18 which occurred at or in the vicinity of the bridge, nine accidents involved fixed objects and four were head-on collisions. At least one head-on collision prior to the study period resulted in a fatality.

Proposed Improvements

It is recommended that the following improvements be made:

- Realign Mercer Street at Stony Brook in accordance with geometric standards compatible with prevailing approach traffic speeds.
- Construct a new two-lane bridge structure over Stony Brook to County standards.

It is noted that the existing stone arch structure has significant historical value. Accordingly, it is recommended that it be retained and, if desired, dedicated as a monument.

Benefit

The realignment of Mercer Street and the construction of a new bridge structure over Stony Brook will permit motorists to travel safely at speeds consistent with those beyond the bridge, thereby reducing the potential for fixed object and head-on type accidents.

Cost Estimate

Final determination of the eligibility of the proposed improvements for TOPICS funding shall be made during the design phase.

Construction	$350,000.00
Engineering	42,000.00
Total	$392,000.00

This section of the report relates to a study of parking in the Central Business District of Princeton Borough. It includes the collection of data relative to the existing supply and usage of parking and an analysis of the effect of parking on traffic operations. Curb parking, off-street parking, bus stops, loading zones, and taxi stands were the chief elements of the inventory and analysis processes.

The Central Business District Defined

For the purpose of the study, the Central Business District of Princeton Borough was defined for the TOPICS study as the area bounded by Nassau Street, Harrison Street North, Hamilton Avenue-Wiggins Street-Avalon Place, and Bayard Lane. In the strict sense, the CBD is a smaller area than defined by these limits with an easterly boundary coinciding more or less with Maple Street.

On the other hand, some of the activity normally associated with the CBD spills over beyond these limits. Accordingly, the study was expanded to include parking facilities that are directly related to the CBD or were considered to be of significant interest. As indicated in Figure B11, the CBD was subdivided into several zones or precincts for the purposes of the study as follows:

- Zone A is defined as that part of the CBD west of Chambers Street and includes a relatively small portion of business and commercial facilities concentrated in the vicinity of Bank Street. Curb parking along Monument Drive, Stockton Street, Mercer Street, and University Place was included in the parking study, as well as adjacent off-street parking lots, because of its proximity to the CBD. The three YMCA lots in Block 16 were also inventoried, but then dropped from further consideration in the parking analysis because of the restrictions imposed on their use and their remoteness from the active sector of the CBD.

- Zone B includes that portion of the CBD between Chambers Street and Witherspoon Street and is principally occupied by properties of the Palmer Square Corporation. Its concentration of shops, office buildings, and a hotel, as well as extensive parking facilities, makes it one of the most active precincts in the CBD.

- Zone C extends from Witherspoon Street to Vandeventer Avenue and is also very active by virtue of its numerous business and commercial facilities. The easterly portion of the area, however, includes a number of dwellings.

- Zone D includes the area between Washington Road-Vandeventer Avenue and Moore Street. The shops and businesses along Nassau Street link this area to the CBD, with extensive off-street parking facilities located conveniently nearby.

- Zone E, between Moore Street and Chestnut Street-Olden Street, is similar in character to Zone D with Nassau Street serving as the focal point of shopper activity. The parking lot of St. Paul's Church is generally used as a playground for the children attending St. Paul's School and was therefore not included in the parking analysis.

- Zone F includes the area between Chestnut and Murray Place and is also characterized principally by business development extending along Nassau Street.

- Zone G is defined as the area lying east of Murray Place and is comprised almost exclusively of dwellings, except for a small concentration of commercial and business facilities east of Harrison Street. While the parking facilities associated with Zone G were inventoried, they were considered to be unrelated to the CBD and therefore were not included in the parking analysis.

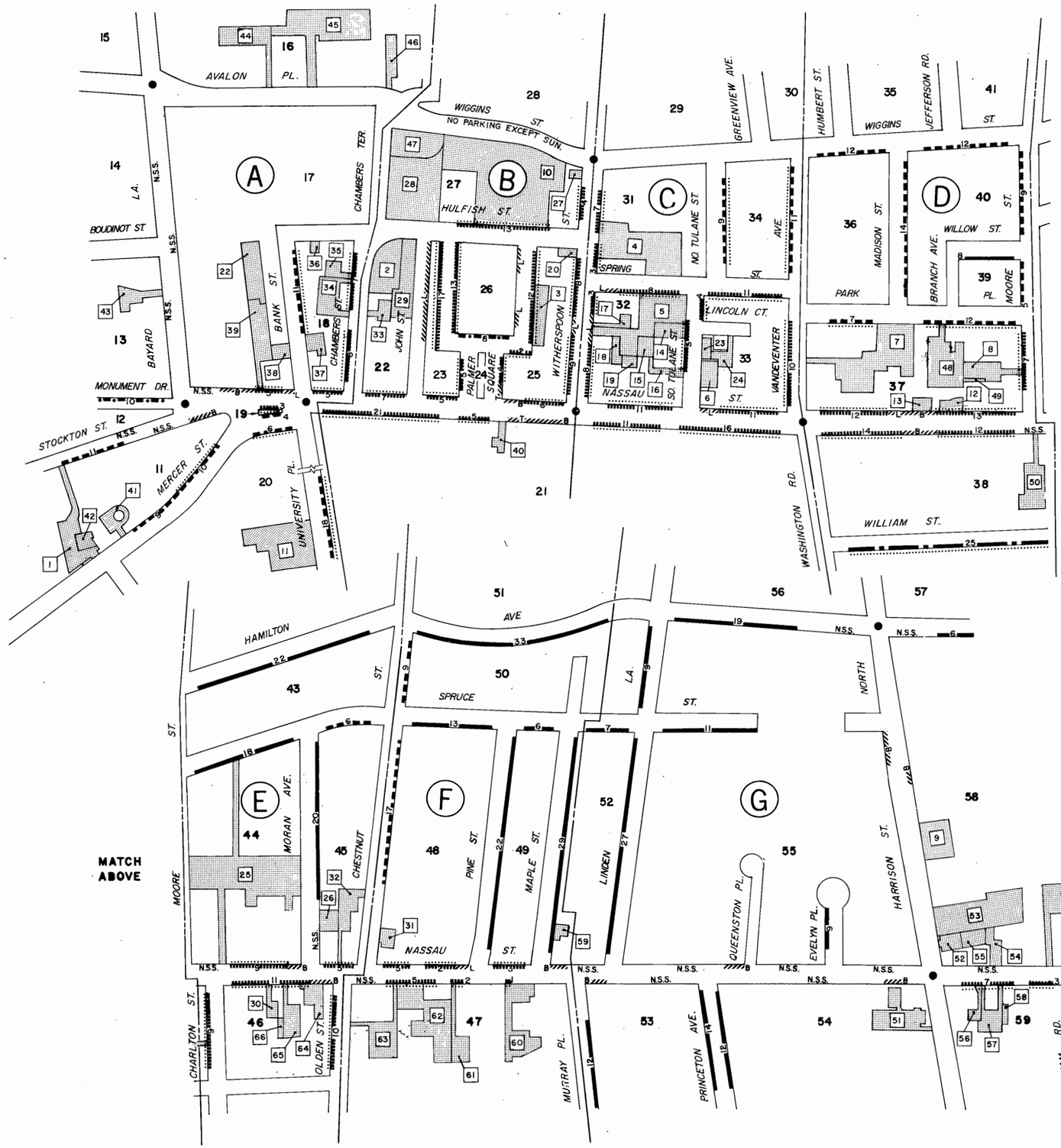
The Parking Inventory

All curbside parking locations were inventoried relative to their time limitations. All curbside meters in Zones A and B are metered at the rate of ten cents per hour. In other zones, the ten cent rate is limited to Nassau Street, Witherspoon Street, and the streets immediately adjacent to them. All other meters are rated at five cents per hour.

Figure B11 shows the number of parking stalls along each block face by various time limit classifications. Where parking stalls are not individually marked, the total number of parking spaces at each location was estimated with allowances made for driveways and other restricted areas. Figure B11 also shows locations of bus stops, loading zones, and taxi stands where so indicated by signs or other markings.

All off-street parking facilities in the CBD were inventoried and are shown in Figure B11 by Facility Number. Data collection included type of facility, approximate land area, number of stalls, and rates, and is summarized for each facility in the Technical Memoranda, which is bound separately.

Figure B11



0 200 400 800

SCALE IN FEET

Notes

1. NO STOPPING OR STANDING PERMITTED ALONG CURBS DESIGNATED N.S.S.
2. NO PARKING PERMITTED ALONG CURBS WITH NO DESIGNATION.
3. NO PARKING ALONG SOUTH SIDE OF NASSAU STREET 8-9 AM AND 4-6 PM BETWEEN CHARLTON STREET AND MURRAY PLACE.

Legend

- UNRESTRICTED
- 10 HOUR LIMIT
- 2 HOUR LIMIT
- 1 HOUR LIMIT
- 30 MINUTE LIMIT
- BUS STOP
- LOADING ZONE
- TAXI STAND
- METERED
- 8 — NUMBER OF STALLS
- 23 — BLOCK NUMBER
- 36 — FACILITY NUMBER
- OFF-STREET PARKING AREAS
- SURVEY AREA LIMIT
- (A) — SURVEY ZONE
- EXISTING TRAFFIC SIGNAL

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area 1 · Princeton Borough

PARKING INVENTORY

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

The following table summarizes the findings of the Parking Inventory in Zones A through F. Off-street parking spaces comprise more than 70% of the total of 2585 spaces. Zone B accommodates more than one-third of the off-street facilities and approximately 30% of the total CBD parking capacity.

Parking Inventory Summary

Zone	Number of Stalls		
	Curb	Off-Street	Total
A	107	356*	463
B	139	660	799
C	128	308	436
D	162	245	407
E	110	79**	189
F	147	144	291
Total	793	1792	2585

*Exclusive of Facilities 44, 45 and 46.

**Exclusive of Facility 25.

With respect to the off-street parking facilities, it is noted that the Borough of Princeton operates eight lots in the CBD. These are all metered and accommodate 471 stalls, or approximately one-fourth of the total off-street facilities. The rates at these facilities range from five cents per hour at the more remotely located lots to five cents per 30 minutes at those more favorably located. Several of the facilities provide for long term parking at the rate of 60 cents for 10 hours.

The Palmer Square Corporation operates two lots which are available to the public at variable rates that include a discount for customers with validated tickets. The remaining off-street parking facilities are reserved or are operated to serve visitors and customers of specific establishments.

Parking Usage

A usage survey was made in order to obtain an indication of the extent that the curb and off-street parking facilities are utilized. All curb parking locations and a representative group of off-street parking areas were observed periodically throughout the day between the hours of 10:00 A.M. and 6:00 P.M. One technician was assigned to each of the six survey areas (Zones A through F) and was required to complete an inventory of his assigned facilities as he made a circuit.

One aspect of the survey suggests that the parking facilities were possibly not utilized to a normal degree on the day of the survey, February 4, 1972. The day was extremely cold, thereby perhaps discouraging some would-be shoppers or CBD oriented drivers. The fact that the survey was conducted on a Friday, however, mitigates this condition to some extent since Friday is typically a busier shopping day than normal. Accordingly, the results of the survey are considered valid insofar as they are indicative of the relative usage of the parking facilities in one zone as compared to another. On the other hand, because of the weather and possibly the time of the year, parking usage perhaps was not as great as might normally be expected.

Charts A through F summarize the findings of the survey with the letter designations of the charts indicating the previously described zones shown in Figure B11. Zones A, B and C show relatively high parking usage with peak occupancy occurring during the midday period. Peak curbside parking occupancy was noted at 85% to 90% capacity and peak off-street parking occupancy at 80% to 90% in Zones B and C.

Beyond Vandeventer the survey indicated that parking usage in Zones D, E and F is not as great as the three other zones. This results from the fact that Zones D, E and F have a smaller proportion of commercial and business development in relation to their parking capacity. In other words, there is a sufficient supply of parking spaces in proximity to the generators located along Nassau Street to accommodate parkers. As might be expected, the survey indicates that the parking facilities farthest from Nassau Street are least used.

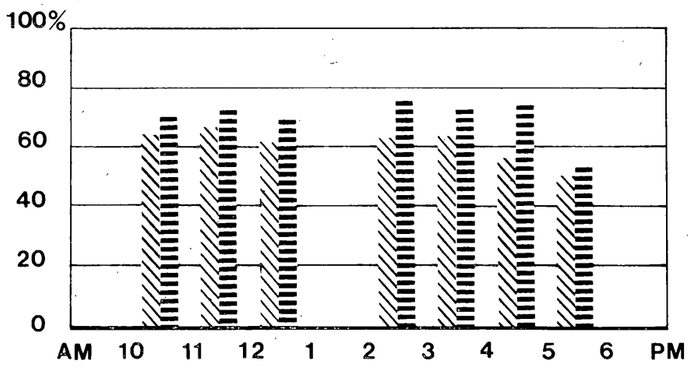
Parking Turnover

On the day of the parking usage survey, an independent survey of parking turnover was conducted on Nassau Street from University Place to Washington Road-Vandeventer Avenue. The survey involved periodically recording the license plate number of each parked vehicle, whether legally or illegally parked. The results of the 10:00 A.M. to 6:00 P.M. survey are as follows:

Parked less than 30 minutes	26%
Parked 30 to 45 minutes	54%
Parked 45 to 60 minutes	14%
Parked more than 60 minutes	6%

Thus, all but six percent of the parkers observed the one-hour metered time limit. It was observed, however, that a few vehicles were parked for several hours, including some that were parked all day.

A



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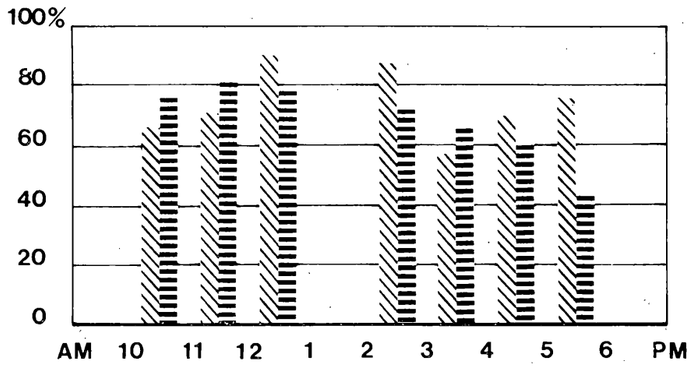

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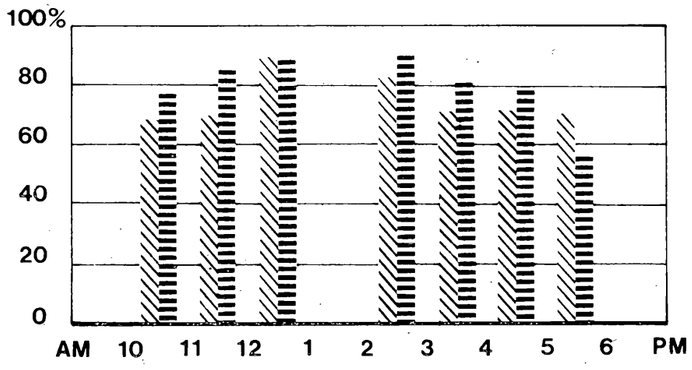
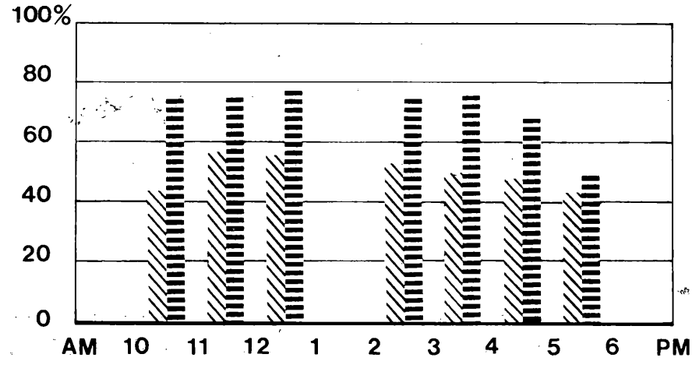
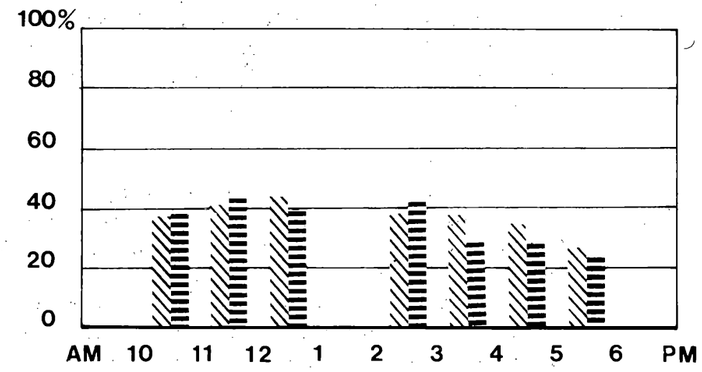


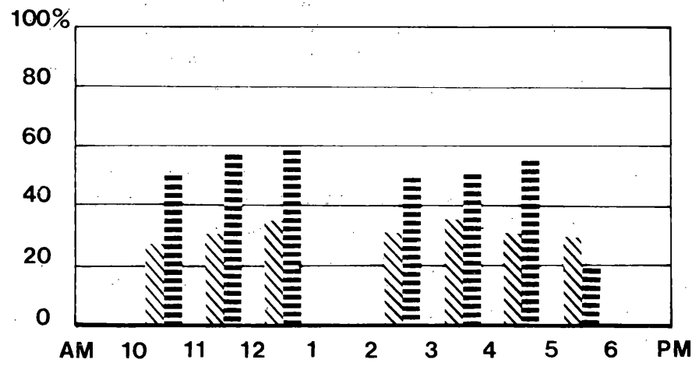
D



E



F



CURBSIDE PARKING OCCUPANCY

OFF-STREET PARKING OCCUPANCY

CURBSIDE PARKING OCCUPANCY

OFF-STREET PARKING OCCUPANCY

Parking Violations

During the course of the usage survey, the technicians made note of any violations at curbside parking stalls. A total of 150 violations were counted and primarily involved cars parked overtime at metered locations, but also included a number of double parked vehicles and those parked in no parking zones. It was noted that many of the overtime parkers had been issued summonses. It was further noted that some of the vehicles observed to be "in violation" were counted more than once. This resulted from the fact that all violations were noted during each circuit of the survey party with no attempt to distinguish a given violation from one observed earlier.

The greatest number of violations was noted on Nassau Street west of Washington Road-Vandeventer Avenue. These primarily involved overtime parkers, but also included a number of double parked cars and trucks. A higher than average number of violations were also recorded on University Place, Chambers Street, and Witherspoon Street, including both overtime parkers and double parked vehicles.

Proposed On-Street Parking Revisions

Whereas the chief purpose of streets is to accommodate moving traffic and provide access to adjoining properties, by necessity they usually must also be used for the parking of motor vehicles. When parked vehicles become an impediment to traffic operations and access, then modification to on-street parking practices becomes imperative.

Safety is also a consideration relative to curbside parking. During a parking operation, the standing or slowly maneuvering vehicle becomes both an impediment and a hazard to traffic flow, as does the vehicle pulling away from a curb. The opening of car doors on the street side of parked vehicles is another practice that persistently plagues operators of motor vehicles. Undoubtedly the greatest effect of parked vehicles on traffic and safety, however, occurs at intersections. Vehicles parked in proximity to intersections not only restrict the maneuvering area of vehicles, but they also impair the visibility afforded to drivers attempting to view cross traffic and crossing pedestrians. All told, curb parking may directly or indirectly be responsible for one of every five accidents in urban areas.*

As indicated in Figure B12, the principal removal of parking spaces is proposed at intersections. The recommendation to remove any particular parking space was made only after the completion of a review of traffic operations at each location and the requirements of Title 39 of the Revised Statutes.**

*Box, Paul C. The Curb Parking Effect, Traffic Digest and Review, Traffic Institute at Northwestern University, Feb., 1970, pp. 6-10.

**Chapter 4, Article 16 of Title 39 requires that parking be prohibited within 25 feet of the nearest crosswalk or sideline of a street.

Parking along the south side of Nassau Street between Charlton Street and Murray Place is presently prohibited between the hours of 8:00 and 9:00 A.M. and 4:00 and 6:00 P.M. The regulation provides a wider cartway width along this relatively narrow section of Nassau Street during peak travel periods. West of Charlton Street, Nassau Street is approximately 39 feet wide and parking is permitted on both sides throughout the day. East of Murray Place, Nassau Street is approximately 34 feet wide and parking is prohibited at all times. It is therefore proposed to have the section of Nassau Street between Charlton Street and Murray Place serve as a transition between the westerly section of Nassau Street (parking on both sides) and the easterly section of Nassau (no parking on either side). This is to be accomplished by prohibiting the stopping and standing of motor vehicles along the south side of Nassau Street at all times between Charlton and Murray.

The proposed removal of parking at several locations shown on Figure B12 relates to the application of traffic engineering principles to bus stop size and location. The New Jersey Department of Transportation has developed standards for the length of bus stops depending upon their location with respect to intersections. These standards have been applied in developing the proposed bus stops and are discussed in greater detail in the PUBLIC TRANSIT section of the report.

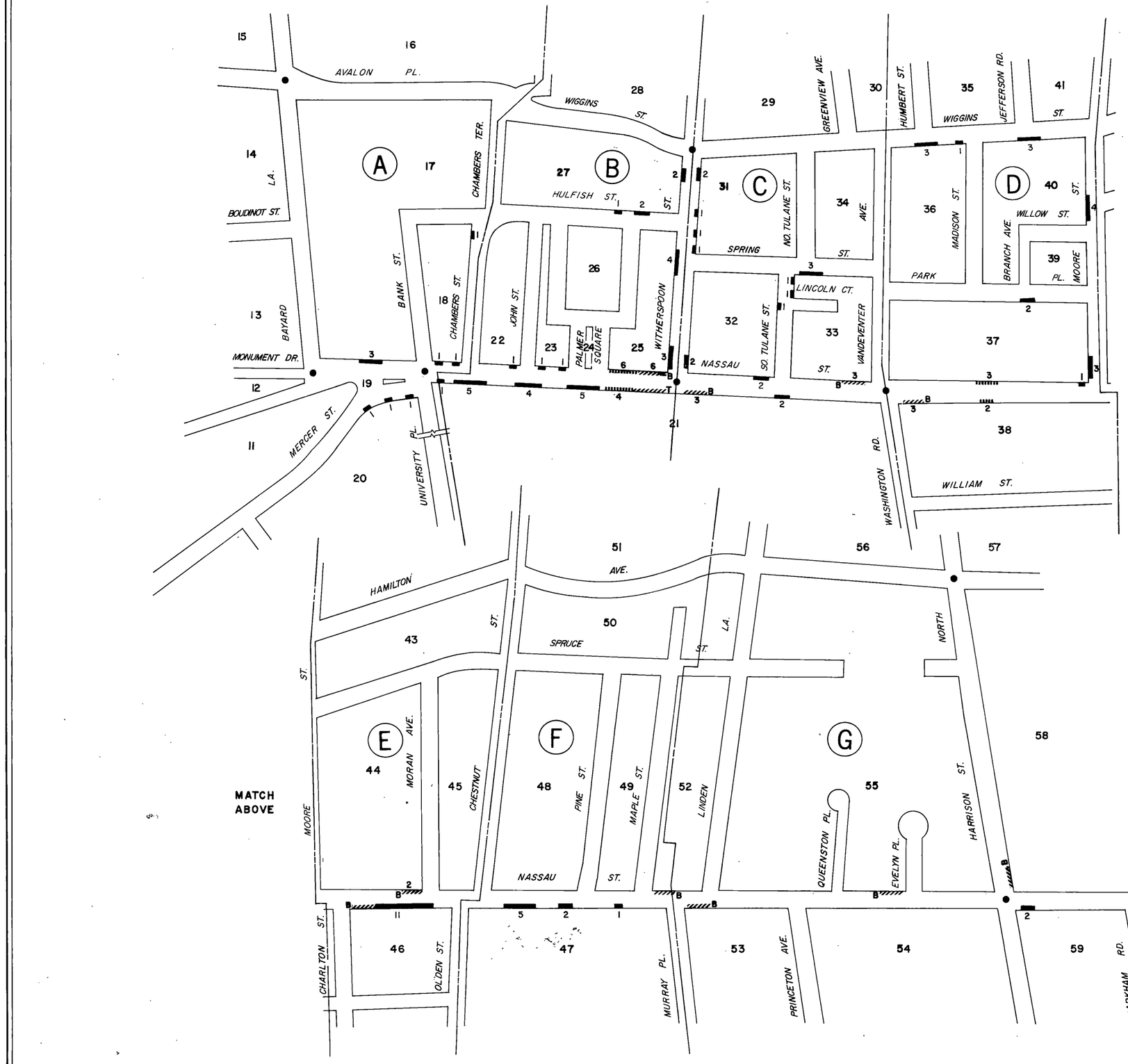
With respect to Loading Zones, no specific recommendations are made herein. As described previously, double parking (especially by trucks) was noted on Nassau Street, Witherspoon Street, Chambers Street, and University Place. Such practices obviously have an adverse effect on both traffic operations and safety. The only mitigating factor observed relative to double parking was that it chiefly occurs during the off-peak travel periods. Nevertheless, it is recommended that steps be taken to reduce the practice of double parking. Whereas more on-street loading zones could be provided, this means of relieving double parking is not necessarily recommended since the use of loading zones is sometimes abused by those truck operators who believe they are privileged in using the facility for all-day parking. It appears then that the best manner in dealing with double parking is through the provision of readily accessible off-street delivery areas behind the shops and business establishments. Many of these places presently do have such areas. Therefore, stricter enforcement of the double parking violation may be required to assure that a truck operator is not avoiding the use of an off-street delivery area when such facilities are available. The development of off-street loading areas should also be encouraged where such facilities are nonexistent.

Figure B12 indicates the location of the proposed revisions to existing on-street parking and includes 111 parking spaces to be removed and 15 parking spaces to be added as follows:

Proposed On-Street Parking Revisions

Zone	Spaces To Be Removed	Spaces To Be Added	Net Spaces To Be Removed
A	9	-	9
B	36	10	26
C	23	-	23
D	20	5	15
E	13	-	13
F	8	-	8
G	2	-	2
Total	111	15	96

Figure B12



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SCALE IN FEET

Summary

ZONE	PARKING SPACES TO BE REMOVED	PARKING SPACES TO BE ADDED	NET
A	9	–	9
B	36	10	26
C	23	–	23
D	20	5	15
E	13	–	13
F	8	–	8
G	2	–	2
TOTAL	111	15	96

Legend

- 4 / 3 — PARKING SPACES TO BE REMOVED / PARKING SPACES TO BE ADDED
- T — PROPOSED TAXI STAND
- B 3 — PROPOSED OR EXTENDED BUS STOP SHOWING PARKING SPACES TO BE REMOVED
- (A) — SURVEY ZONE
- ● — EXISTING TRAFFIC SIGNAL

AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area I · Princeton Borough

PROPOSED

ON-STREET PARKING REVISIONS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

Parking Replacement

The parking usage survey indicated occupancies in the range of 80% to 90% in the most active zones. It is noted that usage of parking facilities to this extent is indicative of a probable short supply of parking at certain times. Parking lots that are unattended* can rarely exceed 90% to 95% occupancy, and do so only under the pressure of great demand. Curbside stalls are more likely to achieve a high occupancy under peak demand conditions, but are often bypassed by drivers because of time limit restrictions. It is further noted that consideration of the weather conditions during the usage survey, and the time of year, suggests that the occupancy rates described previously are not the maximum levels experienced.

*Only Facility 27 is attendant operated.

Accordingly, the relatively high parking usage in Zones A, B and C makes replacement necessary for each parking stall that is removed from service. Overall parking supply in Zone D is not quite as critical as in Zones A, B and C. Nevertheless, parking demand in the Park Place-Nassau Street area is high. Accordingly, the loss of parking spaces south of Willow Street should be replaced. Parking supply in relation to demand is not critical in Zones E, F and G, and replacement is not considered necessary for spaces that are proposed for removal.

In summary, it is recommended that on-street parking be revised in accordance with Figure B12 and that the implementation of this proposal be undertaken only if 62 supplementary off-street spaces are provided as follows:

Parking Space Replacement

Zone	Number of Spaces
A	9
B	26
C	23
D	4
E	0
F	0
G	0
Total	62

Proposed Expansion of Off-Street Parking Facilities

The Borough of Princeton has been considering possible expansion of their metered parking lots in the vicinity of Spring Street between Witherspoon Street and Tulane Street. This location is well within the high parking demand area. Accordingly, it is recommended that a new parking lot be constructed, or an existing municipal lot be expanded, to accommodate 62 cars in the vicinity of Spring Street. It is not intended, however, to exclude from consideration the expansion of parking facilities in other high demand locations.

As an alternate to the above, consideration might be given to investing the funds required for the proposed parking lot expansion into a parking structure. A report completed by others in 1966 indicates that office building construction in the Princeton CBD is a continuing phenomenon that has a twofold effect on parking supply. The trend of new development is to utilize lots that are presently designated for parking, thereby reducing parking supply. At the same time, a greater demand for parking is created by virtue of the new office space provided. Thus, if the municipality determines that a parking structure (possibly located on one of the Spring Street lots) is feasible, consideration should be given to utilizing the replacement parking funds to finance a portion of the structure costs.

Benefit

The benefits of implementing the proposed on-street parking revisions are twofold. The restrictions at intersections and along the narrow portions of Nassau Street that presently exist because of parked vehicles will be relieved. The resulting increase in intersection capacity will expedite the flow of traffic. In terms of safety, the removal of parking at intersections will improve the sight distances of drivers attempting to view both cross traffic and crossing pedestrians. The relocation and extension of bus stops will permit the easy maneuvering of buses, thereby minimizing their conflict with other traffic, and the location of bus stops at signalized intersections where possible will encourage bus patrons to cross under the control of traffic signals.

Cost Estimate

Based on the experience of the Borough of Princeton, the cost of providing off-street parking facilities in the CBD ranges between $3,200.00 and $4,000.00 per stall, averaging approximately $3,500.00. These costs are inclusive of property acquisition and the construction of improvements. Thus, it is estimated that the replacement of 62 curbside parking spaces with a like number of off-street spaces will cost $217,000.00.

The New Jersey Department of Transportation maintains noninterconnected coordination of the five signal installations on Nassau Street. The signals operate on a 90-second background cycle which provides balanced progression capability that functions 24 hours a day. The principal limitation of the system is its dependence upon signal coordination through synchronous motors.

In selecting the type of interconnected operation that has been recommended, traffic volume data was reviewed and operation specified on the basis of demonstrated traffic needs. This has resulted in low cost, programmed type master control provided by a time clock and simple coordinating units. Thus, maintenance will be simplified and maintenance costs will be reduced.

The use of leased telephone lines has been recommended. A modest monthly charge is involved, but this method of interconnection is preferred to the use of interconnect cable. Initial installation costs are avoided with leased lines, and maintenance service is provided by the utility company.

Traffic volume data along Nassau Street indicate an essentially balanced distribution of flows throughout the day. Characteristically, volumes are heavier during hours that the businesses operate than at other times. Accordingly, two background cycles, both programmed for balanced flows, are recommended: a 90-second cycle between the hours of 7:00 A.M. and 7:00 P.M. and a 70-second cycle for the remainder of the 24-hour period.

As shown in Figure B13, several signals in proximity to Nassau Street are proposed for inclusion in the signal system. 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 in the system are as follows:

U.S. Route 206/Avalon Place-Hodge Road
Witherspoon Street/Wiggins Street
Harrison Street North/Hamilton Avenue

Benefit

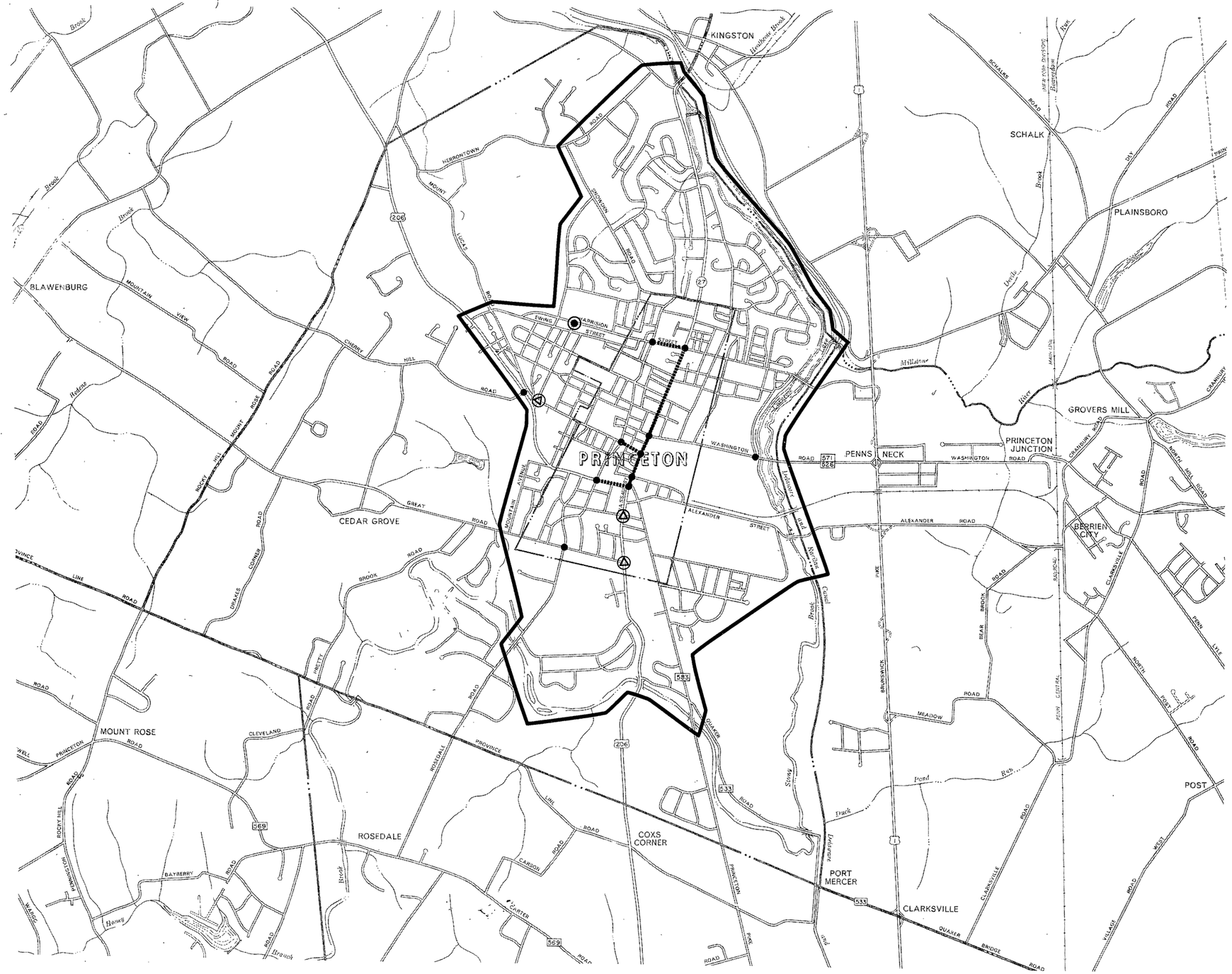
The progressive movement of traffic that the proposed system will offer to Nassau Street motorists will depend on the proportion of "green time" or "through band width" that can be programmed. It will also relate to the ability of motorists to maintain a relatively constant speed which, because of the prevalence of parking maneuvers and other interferences, will not always be readily achieved. Nevertheless, the activities that adversely affect the quality of traffic flow fluctuate and, at times, do not seriously impede traffic. Thus, it is anticipated that, as the result of the operations afforded by the proposed system, reductions in travel delays will be achieved for many motorists using Nassau Street.

Cost Estimate

The following estimate includes cost for equipment, engineering, and annual charges for a pair of leased telephone lines:

Initial Cost (Equipment)	$7,000.00
Engineering	1,000.00
Total	$8,000.00
Annual Cost (Leased Lines)	$ 60.00

Figure B 13



AREAWIDE TOPICS STUDY

Mercer County, N.J.

Report Area 1

TRAFFIC SIGNALS AND SIGNAL SYSTEMS

NEW JERSEY DEPARTMENT OF TRANSPORTATION

September 1972 Travers Associates Consultants

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. In other instances, substantial relief will only be realized when major roadway improvements, beyond the scope of the TOPICS program, are undertaken.

Whereas a summary of critical elements of the study network is presented herein, this section of the report also capsulizes pertinent proposals made by others. Several improvements, generally of a minor nature, are discussed since they are considered appropriate in the context of the TOPICS study.

Operational Evaluation

U.S. Route 206

U.S. Route 206 is designated as Lincoln Highway at the westerly section of the study area, becoming Stockton Street and Bayard Lane respectively within the corporate limits of Princeton Borough. This section of the highway is approximately 30 feet wide and curbed. Beyond Bayard Lane, the roadway pavement narrows to approximately 25 feet in width and is flanked by narrow paved shoulders. Speed limits vary from a maximum of 45 mph along the more rural locations to a minimum of 30 mph along the urbanized section of the highway in Princeton Borough. Traffic volumes along the more heavily traveled portions of the highway range from 13,000 to 15,000 vehicles a day, exceeding the roadway's capacity.

Just beyond the westerly limits of the study area, Route 206 assumes a curved alignment and descends toward Stony Brook on a grade of 8% to 10%. Several accidents have occurred within this section of the highway, primarily fixed object type, but field inspections indicate that no clear problem is evident.

The accident history at the two intersections of the highway with Elm Road and Library Place was significant. Accordingly, flashing traffic signal control has been recommended at both locations and is discussed elsewhere in the report.

Route 206 at Nassau Street is signalized and turns abruptly into Bayard Lane, requiring all Route 206 northbound traffic to turn left. A number of various type accidents have occurred at intersections with same direction type the most common. No TOPICS type improvements are seen as relieving this intersection which presently accommodates volumes that exceed its capacity. The use of a 12-inch diameter arrow signal lens is recommended, however, as a replacement for the existing eight-inch lens.

The signalized intersection of the highway at Hodge Road-Avalon Place has a high accident incidence including 11 same direction type, five right angle type, and five involving left turns. Accordingly, increasing the three-second amber to the highway to four seconds, and including a one-second, all-red interval after each phase, will possibly provide relief. The three-lane south leg is somewhat restrictive, especially for left turning vehicles from Avalon Place. Thus, relocating the stop line for the middle lane farther south from the intersection could be helpful in easing turning movements.

Near the northerly terminus of Bayard Lane, Route 206 turns approximately 45 degrees to the north forming a "Y" type intersection with Bayard Lane. While the accident history of the intersection has been low, long range planning considerations should include channelizing this intersection.

Resurfacing the highway to the north, in the vicinity of Valley Road, has been recommended elsewhere in the report. Proposed channelization on the Valley Road approach at Route 206, in conjunction with a left turn prohibition from the highway, has also been proposed. And at Cherry Hill Road, the Department's recent installation of traffic signal control will reduce the potential for right angle type accidents at that location.

At the Ewing Street intersection, a high number of same direction type accidents is attributed to the heavy southbound left turn volume from Route 206. The narrow highway pavement requires through traffic to stop when a preceding vehicle is attempting to turn left. The Department has programmed an improvement for the intersection in the form of a jughandle type turning roadway with the provision that Princeton Township acquire the necessary property. The municipality, however, has been unsuccessful in negotiating for the required property. An alternate solution, which possibly may not require additional right-of-way, would be to widen the highway to provide three operating lanes, one of which would be designated for left turns.

Studies by others indicate traffic increases on Route 206 in the future despite relief from the proposed construction of Interstate Route 95. The freeway will divert some through traffic from the highway, but anticipated development in the area will result in a net increase in traffic volumes on Route 206. Only the construction of an outer loop road system* would result in substantial relief of the highway.

N. J. Route 27

N. J. Route 27 (Nassau Street-Lincoln Highway) commences at Bayard Lane and extends in an easterly direction through the central business district of Princeton Borough. In the CBD, the highway exceeds a curb-to-curb width of 50 feet, narrowing to approximately 40 feet beyond Washington Road and to 30 feet at Harrison Street. East of Snowden Lane, Route 27 is approximately 24 feet in width with shoulders flanking the traveled way.

Thus, Route 27 takes on dramatic physical and operational variations within the limits of the study area. In the CBD, the highway is an urban street with metered parking and low travel speeds. Toward the easterly limit of the study area, roadside development thins out, parking is prohibited, and a speed limit of 45 mph is in effect. Traffic volumes range from a maximum of approximately 15,000 vehicles a day in the CBD to approximately half that amount east of Snowden Lane. The higher volumes are at the capacity level of the highway.

*Greater Princeton Traffic Study, Tippetts-Abbett-McCarthy-Stratton, February, 1971.

The principal restrictions to traffic relate to curbside parking and the restraints imposed by the major intersections. Recommendations relative to both of these items are discussed elsewhere in the report.

Pavement markings are utilized to a great degree on the highway within the CBD where median lanes provide refuge areas for left turning vehicles. Although the Department of Transportation periodically repaints the markings, it has been noted on occasion that they appear to be quite worn. More frequent painting is recommended, or the possibility of using plastic markings should be considered.

Princeton University

Much of the land on either side of Washington Road between Lake Carnegie and Nassau Street is devoted to the facilities of Princeton University. Enrollment totals more than 5000 students, and employment includes approximately 2900 people both on the main campus and on the James Forrestal Campus located just east of Route 1. While many associated with the school reside on campus, the University constitutes the largest single traffic generator in the study area. Access to the main campus is well dispersed and is accommodated principally by three north-south roadways, Alexander Street, Washington Road, and Harrison Street.

Given the opportunity to enhance traffic operations, the University might well conclude that the relief of Washington Road would be of primary consideration. With the main campus bisected by that roadway, conflicts between motor vehicles and pedestrians are ever present, especially in the area near Nassau Street. The construction of a pedestrian grade separation, proposed by others, does not appear feasible in view of the necessity to serve several widely dispersed crossing points, and because pedestrians do not voluntarily use facilities that extend above or below grade when conditions of moderate traffic volumes on a narrow width of roadway are involved. This conflict then appears to be one that can only be resolved as a long range planning matter that requires the development of alternate circulation patterns of vehicular traffic that would minimize conflicts with pedestrians.

The concentrated surges of traffic associated with football games and other sporting events are also an operational matter of major importance. The congestion that results on such occasions is atypical and, as a practical matter, cannot be relieved to any great degree through modest roadway improvements such as those provided by the TOPICS program. Again, relief must be found through comprehensive area-wide planning.

Harrison Street-Harrison Street North

Harrison Street extends in a northerly direction from Route 1, intersecting Route 27 at a signalized intersection where its designation becomes Harrison Street North. The roadway terminates at Ewing Street as a "Y" type intersection just north of Terhune Road. Volumes vary from approximately 7000 vehicles a day south of Route 27 to twice that volume at the Princeton Shopping Center. The curbed roadway width is approximately 30 feet along its southerly alignment widening to 36 feet at Hamilton Avenue, thence becoming a four-lane divided facility along the frontage of the Princeton Shopping Center. The posted speed limit is 25 mph throughout.

The principal constraint to traffic operations on Harrison Street is the bridge over Lake Carnegie which has a cartway width of 18 feet. The County of Mercer, however, has plans to either widen the bridge or replace it with another structure.

Other deficiencies on the roadway are located at the two signalized intersections with Route 27 and Hamilton Avenue and at the unsignalized intersection at Valley Road and the northerly driveway of the Princeton Shopping Center. Proposed improvements, including signalization of the latter, are discussed elsewhere in the report.

Princeton Shopping Center

The Princeton Shopping Center is located on the east side of Harrison Street North between Clearview Avenue and Terhune Road. The site occupies approximately 35 acres and is served by two drives on Harrison Street North. Parking facilities accommodate approximately 1500 cars. As described previously, it is proposed to signalize the intersection of Harrison Street North at Valley Road and the northerly drive of the center. The proposed improvement includes modification of the median on Harrison to accommodate left turning vehicles and reconstruction of the drive.

Princeton Hospital

The principal facilities of Princeton Hospital occupy a site located on the northeast corner of Witherspoon Street and Franklin Avenue. Most of the 424 beds associated with the hospital are located at this site; the others are approximately equally shared by two satellite facilities. Access to the main unit is via Franklin Avenue, Witherspoon Street, and Henry Street. The possibility of providing bus service to the hospital is discussed in the PUBLIC TRANSIT section of the report.

Realistic Speed Limits

Speed limits are posted to guide drivers along a certain route. 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 Report Area I were selected for survey and analysis: Moore Street-Jefferson Road and Avalon Place-Wiggins Street-Hamilton Avenue. A speed limit of 25 mph is presently posted on both roadways, 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 could travel relatively unrestricted, spot speed checks were observed from a vehicle parked inconspicuously. 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 radar 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 Moore Street-Jefferson Road and Avalon Place-Wiggins Street-Hamilton Avenue. It is also proposed to erect appropriate speed limit and warning signs along the study roadways in accordance with the following schedules. Advisory speed limits 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 also proposed.

It is also noted that the New Jersey Department of Transportation has completed a speed survey of Harrison Street-Harrison Street North-Ewing Street between Route 1 and Route 206. Their findings indicate that a speed limit of 30 mph is applicable between Patton Avenue and Spruce Circle in Princeton Borough and that 35 mph is applicable on the sections beyond these limits. Accordingly, it is recommended that these speed limits be adopted and the proper signs installed.

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

MOORE STREET-JEFFERSON ROAD

Study Section Characteristics

Limits: Mount Lucas Road to Nassau Street

Length: 1.2 miles

Assumed Direction: North-South

Roadway Geometrics and Controls:

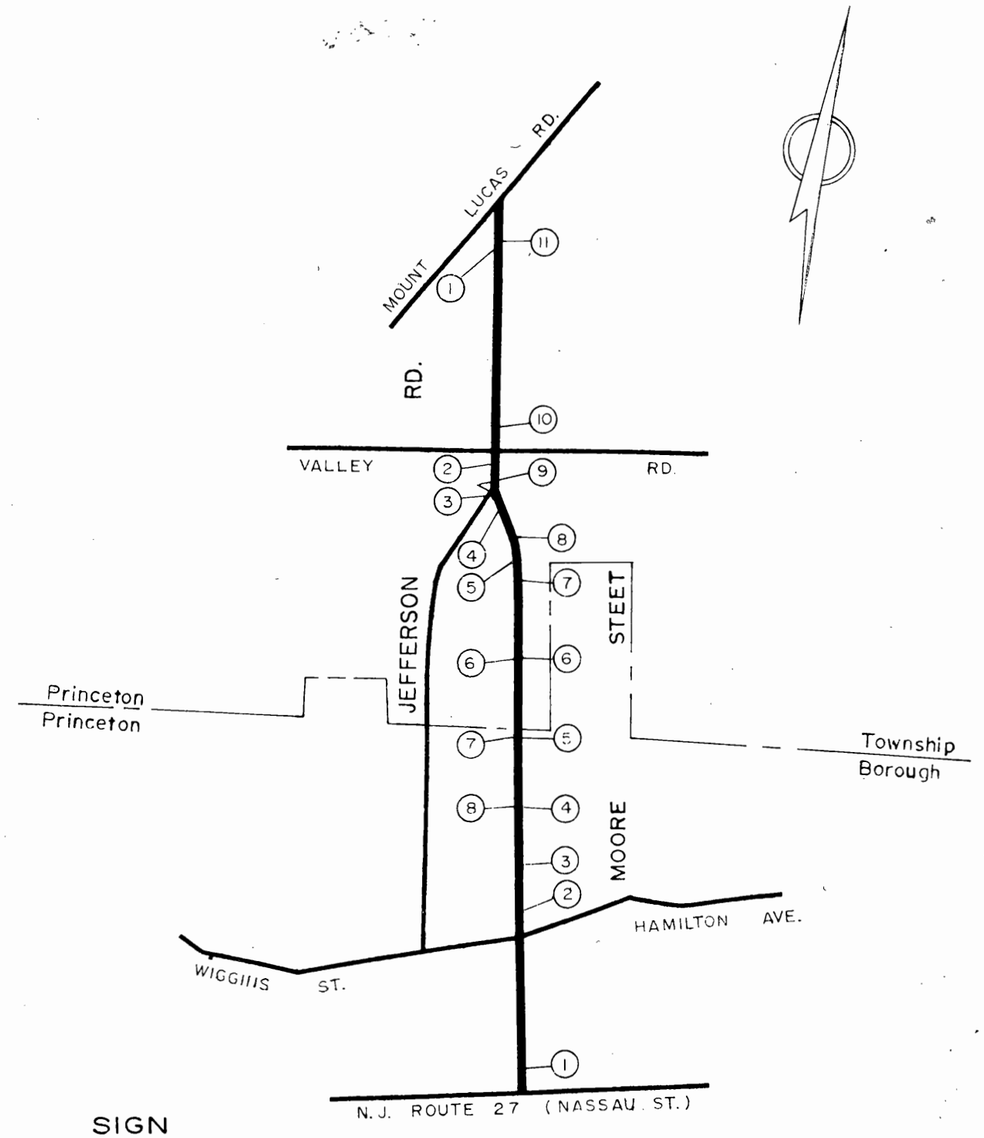
Width	26 to 30 feet
Alignment	Two straight sections connected by a reverse curve.
Controls	Moore Street is STOP sign controlled at Nassau Street, Hamilton Avenue and Valley Road. Other streets are STOP sign controlled at Moore Street and Jefferson Road.
Speed Limit	Statutory 25 mph throughout

Land Use: Residential

School: Princeton High School located on the east side between Houghton Road and Franklin Avenue. Statutory school zone speed in existence.

Recommended Speed Limit

Nassau Street to Valley Road: 30 mph
Valley Road to Mount Lucas Road: 35 mph
School: 25 mph when children are present



SIGN LOCATIONS

MOORE STREET-JEFFERSON ROAD

Sign Schedule: Northbound Direction

Sign	Type	Location
1) SPEED LIMIT 30	R2-1	170' north of Nassau Street (20' south of Pole 60011PE)
2) SPEED LIMIT 30	R2-1	124' north of Hamilton Avenue (55' north of Pole 60123PB on opposite side)
3) School Advance	S1-1	Opposite southwest corner of Moore Street/Hawthorne Avenue (25' south of Pole S on opposite side)
4) SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT (Assembly)	S4-3 R2-1 S4-2	20' south of Houghton Road (opposite southeast corner P.C.)
5) School Crossing	S2-1	Southeast corner of the driveway opposite Franklin Avenue (56' south of Pole PS1478PB)
6) SPEED LIMIT 30	R2-1	25' north of Pole E60654PT on opposite side
7) a) Left Reverse Turn	W1-3	290' south of Guyot Avenue (22' south of Pole 60972PT)
b) 20 mph Advisory Speed plate	W13-1	Mounted beneath sign 7.a.
8) Left Arrow	W1-6	40' north of Guyot Avenue
9) Right Arrow	W1-6	Opposite Pole 61086PT
10) SPEED LIMIT 35	R2-1	200' north of Valley Road (20' south of Pole 61426PT)
11) SPEED LIMIT 35	R2-1	186' south of Mount Lucas Road (in place of existing 25 mph sign)

Sign Schedule: Southbound Direction

Sign	Type	Location
1) SPEED LIMIT 35	R2-1	186' south of Mount Lucas Road (in place of existing 25 mph sign)
2) a) Left Reverse Turn	W1-3	100' south of Valley Road (20' north of Pole 61088PT on opposite side)
b) 25 mph Advisory Speed plate	W13-1	Mounted beneath sign 2.a.
3) Double Arrow	W12-1	At intersection of Moore Street and Jefferson Road (in place of existing delineator)
4) SPEED LIMIT 30	R2-1	28' south of Guyot Avenue (30' north of Pole 61116PT)
5) School Advance	S1-1	30' north of Pole E60656PT
6) SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT (Assembly)	S4-3 R2-1 S4-2	30' north of Pole E60653PT
7) School Crossing	S2-1	15' north of Pole 6934PB, mounted in place of existing SPEED CHECKED BY RADAR sign
8) SPEED LIMIT 30	R2-1	25' north of Pole R60129PB

AVALON PLACE-WIGGINS STREET-HAMILTON AVENUE

Study Section Characteristics

Limits: Bayard Lane to Snowden Lane

Length: 1.4 miles

Assumed Direction: West-East

Roadway Geometrics and Controls:

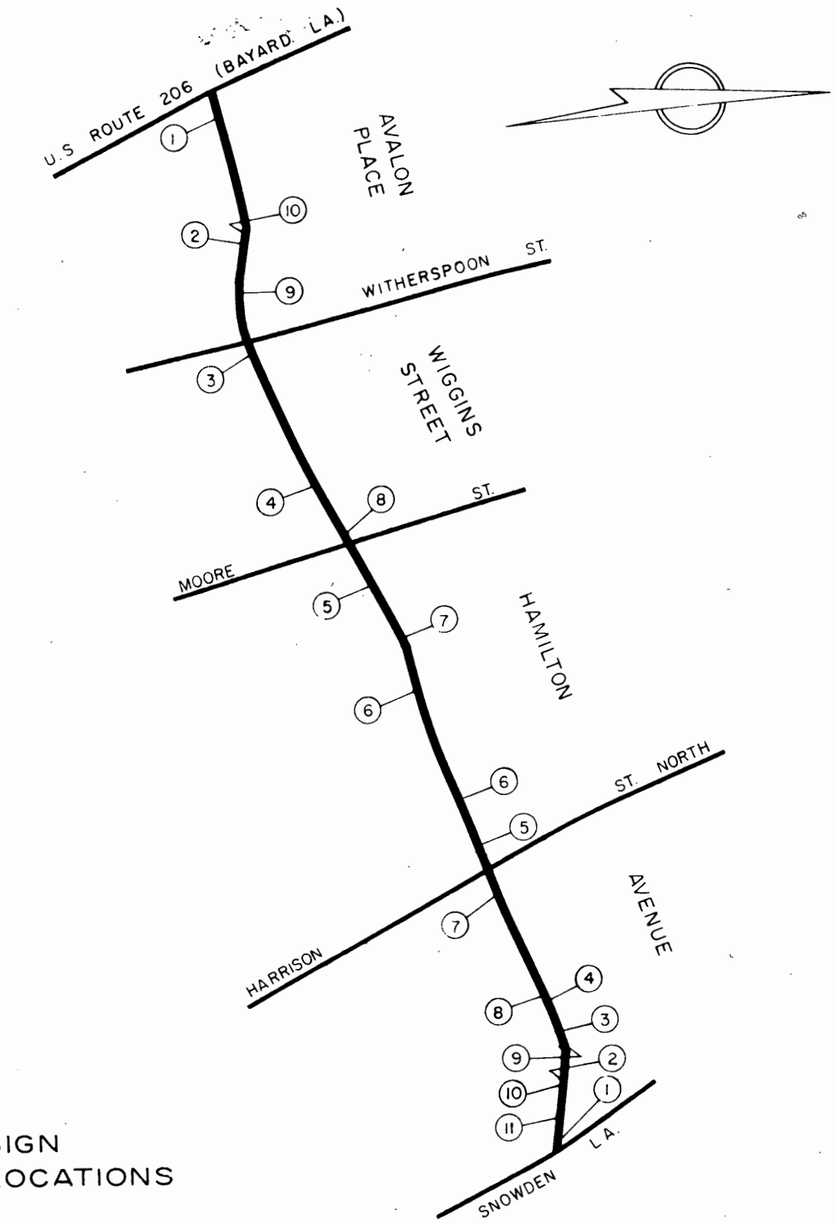
Width	30 feet
Alignment	Several curves
Controls	Traffic signals at Harrison Street, Witherspoon Street and Bayard Lane. Other intersecting streets are STOP sign controlled.
Speed Limit	Statutory 25 mph throughout

Land Use: Residential

School: None

Recommended Speed Limit

Bayard Lane to Snowden Lane: 30 mph



SIGN LOCATIONS

AVALON PLACE-WIGGINS STREET-HAMILTON AVENUE

Sign Schedule: Eastbound Direction

Sign	Type	Location
1) SPEED LIMIT 30	R2-1	203' east of Bayard Lane (36' west of Pole 60865PB)
2) Left Arrow	W1-6	On south side, 20' west of hydrant 124
3) SPEED LIMIT 30	R2-1	94' east of Witherspoon Street (in place of existing 25 mph sign)
4) Left Curve	W1-2	300' west of Moore Street (45' west of Pole 60228PB)
5) a) Right Reverse Curve	W1-4	340' west of Chestnut Street (30' west of Pole 60449PB)
b) 25 mph Advisory Speed plate	W13-1	Mounted beneath sign 5.a.
6) Right Arrow	W1-6	Corner opposite Hamilton Avenue (16' west of Pole A60968PB)

Sign Schedule: Eastbound Direction (continued)

Sign	Type	Location
7) SPEED LIMIT 30	R2-1	150' east of Harrison Street (opposite Pole 60795PB)
8) a) Right Reverse Turn	W1-3	25' east of Pole 60540PB on opposite side
b) 20 mph Advisory Speed plate	W13-1	Mounted beneath sign 8.a.
9) Right Arrow	W1-6	On north side, 30' west of Pole 60651PB
10) Left Arrow	W1-6	On south side, 75' east of Pole 60939PB
11) STOP AHEAD	W3-1	280' west of Snowden Lane (50' west of Pole 60939PB)

AVALON PLACE-WIGGINS STREET-HAMILTON AVENUE

Sign Schedule: Westbound Direction

Sign	Type	Location
1) a) Right Reverse Curve	W1-4	70' west of Snowden Lane (30' east of Pole 60652PT on opposite side)
b) 25 mph Advisory Speed plate	W13-1	Mounted beneath sign 1.a.
2) Right Arrow	W1-6	On south side, 35' west of Pole 60938PB
3) Left Arrow	W1-6	On north side, 25' east of Pole 60651PB
4) SPEED LIMIT 30	R2-1	40' east of Pole 60538PB
5) SPEED LIMIT 30	R2-1	220' west of Harrison Street (62' west of Pole 60501PB on opposite side)

Sign Schedule: Westbound Direction (continued)

Sign	Type	Location
6) a) Left Reverse Turn	W1-3	350' east of Linden Lane (opposite Pole E60499PB)
b) 15 mph Advisory Speed plate	W13-1	Mounted beneath sign 6.a.
7) Left Arrow	W1-6	74' east of Pole 51556PB
8) SPEED LIMIT 30	R2-1	120' west of Moore Street (in place of existing 25 mph sign)
9) a) Right Reverse Turn	W1-3	300' west of Witherspoon Street (36' east of Pole PS1527PB)
b) 20 mph Advisory Speed plate	W13-1	Mounted beneath sign 9.a.
10) Right Arrow	W1-6	Southwest corner of Chambers Street and Wiggins Street (15' east of Pole PS1523PB)

Existing Conditions

Mercer Metro, the principal bus operator in Mercer County, assigns one route in the Princeton Borough-Princeton Township area. Route P extends from the City of Trenton, through Lawrence Township along Route 206, to Princeton following Nassau Street and Harrison Street North, and terminating at the Princeton Shopping Center. Thus, the central business district of Princeton is served, as is the largest generator in the area, Princeton University, located south of Nassau Street.

In most instances, the existing bus stops are not well identified by signs or other markings except along Nassau Street. Furthermore, many bus stops are too short and are generally not located to the best advantage relative to overall traffic operating considerations.

Princeton Hospital operates two units in Princeton Borough: the main building located at Witherspoon Street and Franklin Avenue and the branch located at Bayard Lane and Avalon Place. It is estimated that of the 700 persons employed at the two locations many (possibly half) reside in Trenton, many of whom rely on public transportation in commuting to work.

Proposed Improvements

The following improvements are recommended relative to bus operation in Report Area I:

- Mercer Metro make a determination of the feasibility of rerouting their Route P to provide bus service to Princeton Hospital.
- Establish all proposed bus stops (as listed in Table C of the Appendix) 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 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 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	$800.00
Engineering	100.00
Total	$900.00

All existing traffic and parking ordinances on the study roadways in Princeton Borough and Princeton Township 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.

Speed Limits (Princeton Township)

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

- Herrontown Road: 35 mph, either direction, from the center of Snowden Lane to 700 feet east of the easterly leg of Herrontown Circle.
- Snowden Lane: 35 mph, either direction, entire length.
- Terhune Road-Van Dyke Road: 35 mph, either direction, between Mount Lucas Road and Snowden Lane.
- Valley Road: 35 mph, both directions, entire length, except that the speed limit in the Valley Road School Zone shall be 25 mph during recess or while children are going to or leaving school during opening or closing hours.
- Cherry Hill Road: 35 mph, both directions, from a point 480 feet north of the center of Crestview Drive to Rocky Hill-Mount Rose Road (signed Cherry Valley Road).
- Cherry Hill Road: 40 mph, both directions, from Mount Lucas Road to a point 480 feet north of the center of Crestview Drive.
- Herrontown Road: 40 mph, either side, from 700 feet east of the easterly leg of Herrontown Circle to River Road.
- Princeton Pike-Mercer Street (County Road 583): 50 mph, either direction, from the southerly township line to the center of Stony Brook Bridge.

Parking (Princeton Township)

It is recommended that the following No Parking At Any Time ordinance be submitted to the New Jersey Department of Transportation for approval:

- Alexander Street: west side, between the municipal boundary line of the Township and a point 365 feet south of such boundary line, as measured along Alexander Street.

- Mercer Road-Princeton Pike: both sides, from a line 50 feet northeast to a line 1200 feet southwest of the center line of Quaker Road.

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

- No person shall park any vehicle on Walnut Lane, east side, between Guyot Avenue and the boundary line between the Borough of Princeton and the Township on school days between the hours of 8:00 A.M. and 4:00 P.M.

APPENDIX

Table	Description	No. Pages
A	Accident History at Intersections 1968-1970	1
B	Traffic Signal and Flashing Signal Locations	1
C	Proposed Bus Stops	1

TABLE A

ACCIDENT HISTORY AT INTERSECTIONS 1968-1970

Intersection	Number of Accidents PD	PI	F	Total
N. J. Rte. 27/Witherspoon St.	46	13		59
N. J. Rte. 27/Washington Rd. -Vandeventer Ave.	20	11		31
Witherspoon St. /Wiggins St.	16	13		29
Harrison St. N. /Valley Rd. -Shopping Center	18	10		28
U.S. Rte. 206/Avalon Pl. -Hodge Rd.	18	9		27
U.S. Rte. 206/Ewing St.	13	12		25
Witherspoon St. /Valley Rd.	17	6		23
Elm Rd. /Rosedale Rd. -Cleveland La.	8	14		22
U.S. Rte. 206/Elm Rd.	17	4		21
U.S. Rte. 206/N. J. Rte. 27	17	4		21
U.S. Rte. 206/Cherry Hill Rd.	12	9		21
U.S. Rte. 206/Library Pl.	15	5		20
N. J. Rte. 27/Harrison St.	15	4		19
N. J. Rte. 27/Moore St.	15	3		18
N. J. Rte. 27/Chestnut St. -Olden St.	16	2		18
N. J. Rte. 27/S. Tulane St.	13	4		17
N. J. Rte. 27/Chambers St.	11	5		16
Washington Rd. /Faculty Rd.	10	6		16
N. J. Rte. 27/Mercer St.	12	3		15
N. J. Rte. 27/Pine St.	10	5		15
N. J. Rte. 27/Palmer Square E.	12	2		14
Harrison St. N. /Hamilton Ave.	10	4		14

Intersection	Number of Accidents PD	PI	F	Total
Alexander St. /Faculty Rd.	12	1		13
Harrison St. /Hartley Ave.	9	4		13
Wiggins St. /Vandeventer Ave.	10	3		13
Harrison St. /Prospect Ave.	3	9		12
Harrison St. N. /Franklin Ave.	4	8		12
Jefferson Rd. /Valley Rd.	5	7		12
U.S. Rte. 206/Cleveland La.	7	4		11
Witherspoon St. /Spring St.	6	5		11
U.S. Rte. 206/Valley Rd.	4	5	1	10
N. J. Rte. 27/University Pl.	9	1		10
N. J. Rte. 27/Palmer Square W.	8	2		10
Chestnut St. /Spruce St.	5	4		9
Hamilton Ave. -Wiggins St. -Moore St.	4	5		9
Witherspoon St. /Hulfish St.	6	3		9
U.S. Rte. 206/Bayard La.	3	4		7
Harrison St. N. /Entrance to Shopping Center	5	2		7
Mercer St. /Alexander St.	4	3		7
Witherspoon St. /Leigh Ave.	7			7
U.S. Rte. 206/Jefferson Rd.	4	2		6
N.J. Rte. 27/John St.	3	3		6
Alexander St. /West Dr.	1	5		6
Witherspoon St. /Maclean St.	4	2		6

PD: Property Damage PI: Personal Injury F: Fatal

TABLE B

TRAFFIC SIGNAL AND FLASHING SIGNAL LOCATIONS

INTERSECTION	STATUS	IMPROVEMENT	DESIGN DRAWING
Existing Signals			
U.S. Route 206/N.J. Route 27	Approved	Proposed	
U.S. Route 206/Avalon Place-Hodge Road	Approved	Proposed	
U.S. Route 206/Cherry Hill Road	Approved	None	
N.J. Route 27/University Place	Approved	Proposed	B2
N.J. Route 27/Witherspoon Street	Approved	Proposed	B3
N.J. Route 27/Washington Road-Vandeventer Avenue	Approved	Proposed	B4
N.J. Route 27/Harrison Street	Approved	Proposed	B5
Elm Road/Rosedale Road-Cleveland Lane	Authorized/Unapproved	None	
Harrison Street North/Hamilton Avenue	Approved	Proposed	B6
Washington Road/Faculty Road	Unauthorized	Proposed	
Witherspoon Street/Wiggins Street	Approved	Proposed	B7
Proposed Signals			
Harrison Street North/Valley Road	Authorized	Proposed	B8
Proposed Flashing Signals			
U.S. Route 206/Elm Road		Proposed	
U.S. Route 206/Library Place		Proposed	
Witherspoon Street-Mount Lucas Road/Valley Road		Proposed	B9

TABLE C

PROPOSED BUS STOPS*

	Bus Stop Type
U.S. Route 206 (Lincoln Highway-Stockton Street), South Side	
Quaker Road	Far Side
Edgerstone Road	Far Side
Lovers Lane	Far Side
Elm Road	Far Side
Hibben Road	Far Side
Library Place	Far Side
U.S. Route 206 (Lincoln Highway-Stockton Street), North Side	
Library Place	Far Side
Cambelton Road	Far Side
Elm Road	Far Side
Lovers Lane	Far Side
Edgerstone Road	Far Side
Quaker Road	Near Side
N.J. Route 27 (Nassau Street), South Side	
Bayard Lane	Far Side
Witherspoon Street	Far Side
Washington Road	Far Side (95' long)
Charlton Street	Far Side
Murray Place	Far Side
N.J. Route 27 (Nassau Street), North Side	
Evelyn Place	Far Side
Maple Street	Near Side
Moran Avenue	Far Side
Vandeventer Avenue	Far Side
Witherspoon Street	Far Side
Mercer Street	Far Side
Harrison Street North, East Side	
Nassau Street	Far Side
Hamilton Avenue	Mid-Block (530' south)
Franklin Avenue	Far Side
Clearview Avenue	Near Side
Harrison Street North, West Side	
Valley Road	Far Side
Clearview Avenue	Far Side
Franklin Avenue	Far Side
Ewing Street	Far Side
Spruce Circle	Far Side

*All bus stops listed in Table C are located along Route P of the Mercer Metro Bus Line.

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