Totowa-West Paterson Sewerage Authority Passaic County, New Jersey

Step One Document

Pandullo Quirk
Associates

Science
Engineering
Design

Gateway "80" Office Park
Wayne, New Jersey 07470

January 1977

TABLE OF CONTENTS

RECEIVED
JAN 11 11 21 AM '77
DEPT. ENVIR PROTECT.
DIV OF WATER RESOURCES

	REPORT PARTS, CHAPTERS, SUBCHAPTERS	PAGE NO.
	Cover	i
	Table of Contents	ii
	Abbreviations	vi
1.0	SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	1
	1.1 Findings	1
	1.2 Conclusions	3
	1.3 Recommendations	3
2.0	EVENTS LEADING TO THE PUBLICATION OF THIS DOCUMENT	5
3.0	INTRODUCTION	8
4.0	DOCUMENTS OF RECORD	10
	4.1 Reports	10
	4.2 Letters	10
5.0	STEP ONE RETHINKING AND REDEFINITION	12
	5.1 Background	12
	5.2 Task Force Input Towards Rethinking and Redefining the Problem	13
6.0	INFILTRATION/INFLOW ANALYSIS	15
7.0	ALTERNATIVES	17
	7.1 Land Optimization	17
	7.2 Regional Configurations	20

TABLE OF CONTENTS - Continued

REPORT PARTS, CHAPTERS, SUBCHAPTERS	PAGE NO.
8.0 ENVIRONMENTAL FINDINGS	22
8.1 Procedures	22
8.2 Results	23
9.0 IMPLEMENTATION FINDINGS	28
10.0 ENGINEERING COST FINDINGS	30
11.0 INSTITUTIONAL INPUT	33

TABLES

Table Number	Description	Page Number
7-1	Wastewater Treatment Plant Land Requirements Land Optimization	19
7-2	Summary of Alternatives	21
8-1	Environmental Matrix	25
8-2	Environmental Matrix Comments	26
10-1	Present Worth Analysis for Alternates	31
11-1	Alternate 3A Costs	35
11-2	Alternate 3C Costs	36

EXHIBITS

Exhibit Number	Description
1	Direction and Implementation Schematic
2	Resolution of Implementation Restraints Schedule
3	Flow Chart of Contents of EIS
4	Land Optimization Process Units Layout
5	Implementation Overlay
6	WTP Construction Cost Overlay
7	Pumping Station Construction Cost Overlay
8	Transmission Facility Cost Overlay

--	APPENDIX - Summary of 23 alternative plans with 23 plan plates - bound at rear of this document

ABBREVIATIONS

For convenient reference by the reader, Abbreviations used with this report are as follows:

EAS	- Environmental Assessment Statement
EIS	- Environmental Impact Statement
FP	- Facilities Plan
I/I	- Infiltration/Inflow
MG	- Million Gallons
MGD	- Million Gallons per Day
NJDEP	- New Jersey Department of Environmental Protection
O&M	- Operation and Maintenance
PQA	- Pandullo Quirk Associates
PVSC	- Passaic Valley Sewerage Commission
SSES	- Sewer System Evaluation Survey
USEPA	- United States Environmental Protection Agency
WTP	- Wastewater Treatment Plant
201	- Facilities Planning

1.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

1.1 Findings

A total of 23 alternative system configurations were evaluated; of these, 11 existed prior to September, 1972, with 12 being added during the fall of 1976. It should be noted that the new alternatives represent only those which possessed some reasonable expectation of success.

An implementation evaluation was prepared with the result that only 8 of the 23 alternatives possessed no significant restraints. Factors such as objections of an adjacent community, the need for an Environmental Impact Statement, and institutional delays were used to rule out alternatives.

A complete Environmental determination was prepared by Lawler, Matusky and Skelly in late 1974. As a result, only 2 of the 23 alternatives were found to show definite advantages over the others. All alternatives were compared to the alternative that had been recommended in 1975 (one treatment plant on "Riverview Island"), which is now known to be unacceptable. Favorable consideration was granted only to those alternatives which possess superior environmental qualities when compared to the "Riverview Island" alternative.

Lastly, engineering factors and present-worth costs were evaluated with the result that 9 of the 23 alternatives were found to be equivalent and the least costly. The level of significance of the present worth cost analysis applied to

each project cost factor was established to be ten percent. Therefore, all alternatives are considered equivalent if they possess total present worth costs of capital and operation and maintenance within ten percent of the least costly alternative.

An Implementable and Environmentally Acceptable Alternative possessing reasonable monetary costs has been developed that will provide the facilities necessary to meet local water quality objectives. The Authority voted unanimously in favor of the alternative thereby making it fully cost effective.

The alternative selected (referred to herein as 3A) provides for abandonment of the West End plant in Totowa and the upgrading and expansion of wastewater treatment facilities at the existing Riverview site in Totowa and the existing West Paterson site.

A summary of monetary costs associated with selected alternate 3A are presented below:

ALTERNATE 3A MONETARY COSTS

Cost Item	Totowa (1000 $)	West Paterson (1000 $)	Total (1000 $)
Transmission Facilities	887	0	887
Treatment Facilities	3,325	3,785	7,110
Sewer System Evaluation Survey and Rehabilitation	429	274	703
Subtotal	4,641	4,059	8,700
Project Costs	2,797	2,461	5,258
Present Worth of O&M	3,115	2,765	5,880
TOTALS	10,553	9,285	19,838

The sewer systems in West Paterson and Totowa are subject to possibly excessive extraneous flow in the form of Infiltration/Inflow. A separately bound accompanying document entitled "I/I Analysis for Totowa-West Paterson" contains the details supporting the above claims.

1.2 Conclusions

It is concluded that data, analyses and studies contained within the "Facilities Plan" prepared by Pandullo Quirk Associates, Gar Chew Lai, and Robert P. Schilling, dated April 1975 and the "Environmental Assessment Statement" prepared by Lawler, Matusky, and Skelly in late 1974 provided a sufficient and complete base upon which to prepare this document.

Furthermore, the additional analyses presented herein stem directly from foregoing described reports and when all presentations are taken as a whole, provides a substantially complete Step One submittal.

1.3 Recommendations

It is recommended that the Authority take action on near term goals as follows: make final arrangements to proceed into Step II design.

The most significant of these are final institutional arrangements in the form of service agreements, establishment of a project financing system, and renegotiation of professional services contracts.

The Sewer System Evaluation Survey recommended in the I/I Analysis report should be initiated as soon as possible to proceed in parallel with the above described Authority goals.

As a final recommendation, the Authority should, in addition to all of the above, prepare grant applications to receive United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection Agency (NJDEP) financial assistance to the fullest extent.

2.0 EVENTS LEADING TO THE PUBLICATION OF THIS DOCUMENT

State and Federal regulatory agencies have been developing an increasing awareness of deficiencies related to effluent discharges from the three wastewater treatment plants in Totowa and West Paterson since about 1967-1968. The most recent and significant action taken by the communities of Totowa and West Paterson as well as USEPA and NJDEP has occurred during the period from 1972 to date.

On January 18, 1972 the firm of Pandullo Quirk Associates, Gar Chew Lai and Robert P. Schilling entered into a triventure agreement with the Totowa-West Paterson Sewerage Authority to prepare studies, reports, designs and all else necessary to construct facilities capable of meeting water quality goals of surface waters in the Authority area. At about the same time the firm of Lawler, Matusky and Skelly entered into an agreement to provide necessary environmental assessment reports to complement work of the above described triventure consultants.

Reports and studies were completed leading to the publication of an "Environmental Assessment Statement (EAS)" and a "Facilities Plan (FP)" in early 1975. The latter document was issued in April, 1975.

During the next year numerous communiques crossed between the Authority and USEPA/NJDEP to clarify contents of the reports. Then on June 14, 1976 a letter was issued by the USEPA declaring their position on how the two reports

could be upgraded to satisfy the requirements of Public Law (PL) 92-500 and thereby conclude the Step I phase report requirements. Equally important, USEPA declared that the two "best" alternatives presented within the EAS and FP were not implementable and that redefinition of system configuration alternatives was necessary.

On September 16, 1976, the triventure engineers were directed by the Authority to develop engineering and environmental data together with written documentation for all reasonable alternatives upon which the Authority could quickly make a decision and provide direction to the project.

During the next three months carefully planned work procedures were followed to successfully establish and identify a cost effective alternative which was implementable, environmentally acceptable, equivalent to the least cost alternative and could be sponsored by the Authority. In order to accomplish the necessary work, an itemized plan of study was prepared along with itemized budgets of time, manpower and dollars. Input and approvals were obtained by meetings and communiques with the following parties: Authority members, USEPA, NJDEP, and Lawler, Matusky and Skelly. The results of the above described work effort were concluded to the Authority's satisfaction on December 2, 1976 and a formal presentation was made to representatives of USEPA on December 17, 1976.

In conclusion, this documentation is submitted to complete USEPA and NJDEP Step One report submission requirements.

Other documents submitted under Step One are as follows: The "I/I Analysis for Totowa West Paterson" which accompanies this document, the "EAS" and the "FP".

3.0 INTRODUCTION

On September 16, 1976 the Totowa-West Paterson Sewerage Authority directed the triventure engineering team of Pandullo Quirk Associates, Gar Chew Lai and Robert P. Schilling to prepare viable wastewater treatment system alternatives and concluding Step I report documentation with the goal of proceeding toward design and construction as soon as possible. In response to this challenge a task force was formed on September 21, 1976 comprised of senior staff members of Pandullo Quirk Associates. Task force liaison was maintained with Gar Chew Lai and Robert P. Schilling.

The task force acted to redefine and rethink alternatives, make decisions and present solutions. Primary emphasis was placed on the following concepts:

(a) to find implementable solutions within the confines of existing reports

(b) to obtain Federal and State grants as quickly as possible at the possible risk of missing the absolutely best solution. The thought being that implementating the apparent best solution immediately is preferred over implementing a possibly slightly better solution in 1990 or later.

(c) to retain the transition aspect of the project thereby avoiding a formal USEPA Facilities Planning (201) approach.

In quick order a ten-week program was formulated that detailed a procedure to conclude Step I documentation and revise the I/I analysis. The program was approved by the Authority on October 7, 1976.

The program was begun and successfully completed by December 17, 1976. During the work execution phase, key meetings were held with Authority members on November 4, and December 2 and with representatives of the USEPA and NJDEP on November 5. These meetings provided input and direction to the program contributing substantially to the quality of the overall product.

4.0 DOCUMENTS OF RECORD

Discussion contained herein presents final Step I arguments through evaluation of alternatives and, most importantly, by tying back to and drawing upon existing reports and declarative communiqués. The bulk of these documents of record are too voluminous to be attached hereto as appendices. They are, however, on file with the Authority and the reviewing agencies. Pandullo Quirk Associates (PQA) retains a complete set of the documents, copies of which may be obtained upon authorized request.

4.1 Reports

(a) "Wastewater Management Study Facilities Plan for Totowa-West Paterson Sewerage Study Group" prepared by PQA, Gar Chew Lai, and Robert P. Schilling in triventure, dated April, 1975.

(b) "Environmental Assessment Statement Totowa-West Paterson Wastewater Management Study" for Totowa-West Paterson Sewerage Authority by Lawler, Matusky and Skelly Engineers, late 1974.

(c) "Infiltration/Inflow Analysis Report Totowa-West Paterson Sewerage Authority by PQA dated December 1976.

4.2 Letters

(a) Ernest Chrisbacher, P.E. of PQA "Totowa-West Paterson Wastewater Management Study" dated May 8, 1974.

(b) Paul Schorr of NJDEP, "to Ernest Chrisbacher" dated April 23, 1974.

(c) Vincent Pagano, Jr. of NJDEP "Totowa-West Paterson and Peckman River Wastewater Management Studies" dated February 11, 1974.

(d) Ernest Chrisbacher, P.E. of PQA "Totowa-West Paterson Wastewater Management Study" dated January 28, 1974.

(e) S.A. Lubetkin, of PVSC "Totowa-West Paterson Sewerage Authority" dated August 16, 1974.

(f) John H. O'Dowd, P.E. of NJDEP "Stream Encroachment Application No. 5952" dated August 7, 1974.

(g) Anthony T. Buzzoni of Wayne, N.J., "Totowa-West Paterson Studies" dated January 10, 1975.

(h) Lee T. Purcell, Jr., representing Wayne, N.J., "Totowa-West Paterson Studies - Our Job #2212.091 Costing of Alternatives for Wayne Township" dated December 17, 1974.

(i) Ernest Chrisbacher, P.E. of PQA "Totowa-West Paterson Sewerage Authority" dated January 21, 1975.

(j) Ernest Chrisbacher of PQA "Totowa-West Paterson Sewerage Authority" July 14, 1975.

(k) Mark H. Savedoff, P.E., of USEPA "Project Number C-34-460 Totowa-West Paterson Sewerage Authority" dated June 14, 1976.

(l) Merrill Montgomery, Township Clerk of the Township of Little Falls, N.J. "to Mr. Ernest Chrisbacher" dated November 4, 1976.

5.0 STEP ONE RETHINKING AND REDEFINITION

5.1 Background

As mentioned previously herein, a Task Force composed from staff of the triventure engineers was convened on September 21, 1976 to rethink and redefine the past, present and future of the Authority project.

A concentrated effort was put forth by the task force that included input received from Authority members, USEPA and NJDEP. Five major task force meetings were convened as well as numerous committee-level conferences.

A culminating meeting was convened on October 7, 1976 by the Authority at which the triventure engineer presented a course of action designed to tie all existing reports and communiques together and conclude the Step I work effort. A ten week work program and budget was approved by the Authority.

A chart entitled "Direction and Implementation Schematic" traces the history of the project from December 1973 through September 1976. Potential Project direction as set forth by the Task Force is also shown followed by task force expectations of the resolution of implementation restraints.

A second chart entitled "Resolution of Implementation Restraints Schedule" focuses on the ten-week work program between October 7, 1976 and December 16, 1976. The chart depicts two separate products being worked on simultaneously

TOTOWA - WEST PATERSON

DIRECTION AND IMPLEMENTATION SCHEMATIC

RESOLUTION OF IMPLEMENTATION RESTRAINTS SCHEDULE

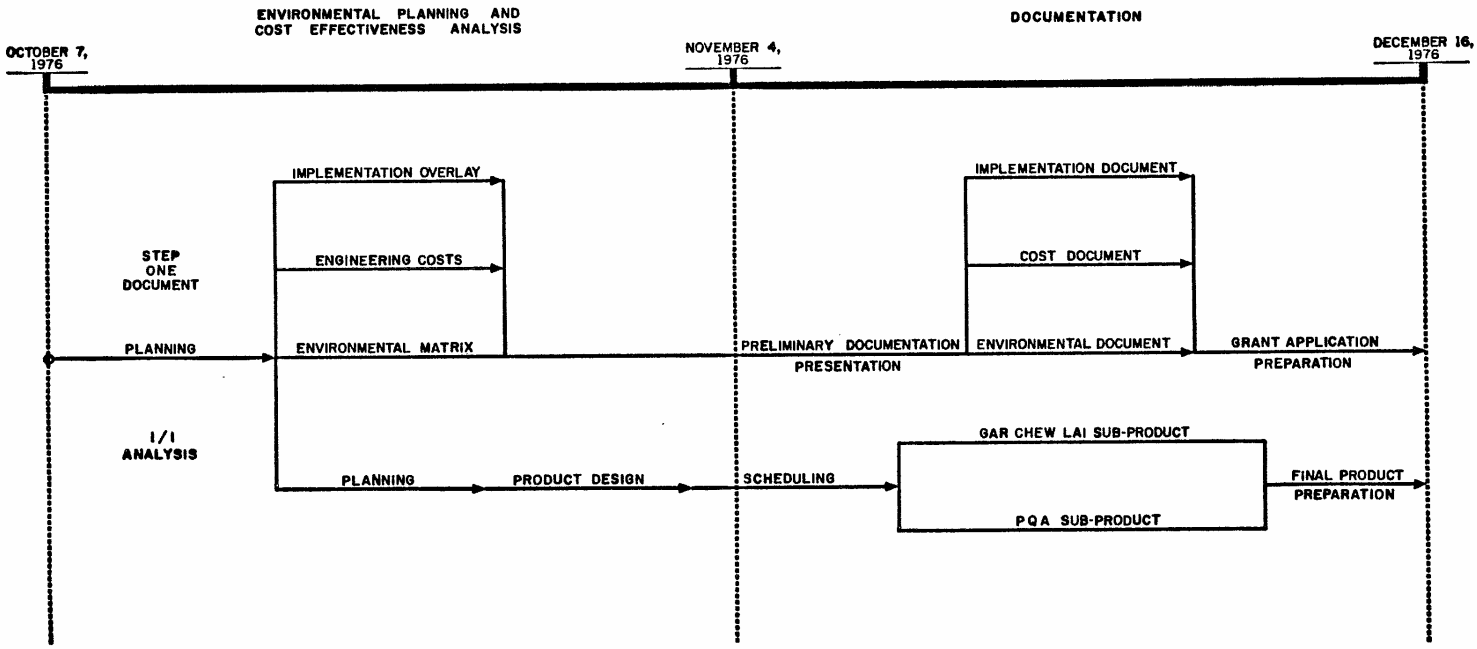


EXHIBIT 2

as follows: a Step One document and an I/I Analysis. The Step One document is divided into implementation, engineering, and environmental subproducts.

The chart also has a time break on November 4, 1976 separating analysis from documentation of the two products. During the week of November 4, coordination and input was received from authority members as well as representatives of USEPA and NJDEP.

5.2 Task Force Input Towards Rethinking and Redefining the Problem

During the period between September 21, 1976 and October 7, 1976 the task force evaluated numerous implementation, engineering and environmental factors that were dismissed due to unfavorable success potential. Therefore, these factors were not developed in detail during the preparation of the Step I document. It is worth mentioning the factors, however brief, to demonstrate the thoroughness of the task force methods.

Conversion of the West End Wastewater Treatment Plant (WTP) was considered. Domestic flows would be redirected to the Riverview WTP. Industrial flows would require little or no pretreatment at the source; all industrial users would share in the operation and maintenance of the WTP in proportion to the strength and quantity of their wastes. Effluent discharge and land use considerations were not favorable to this concept. Several expansion concepts for the Riverview

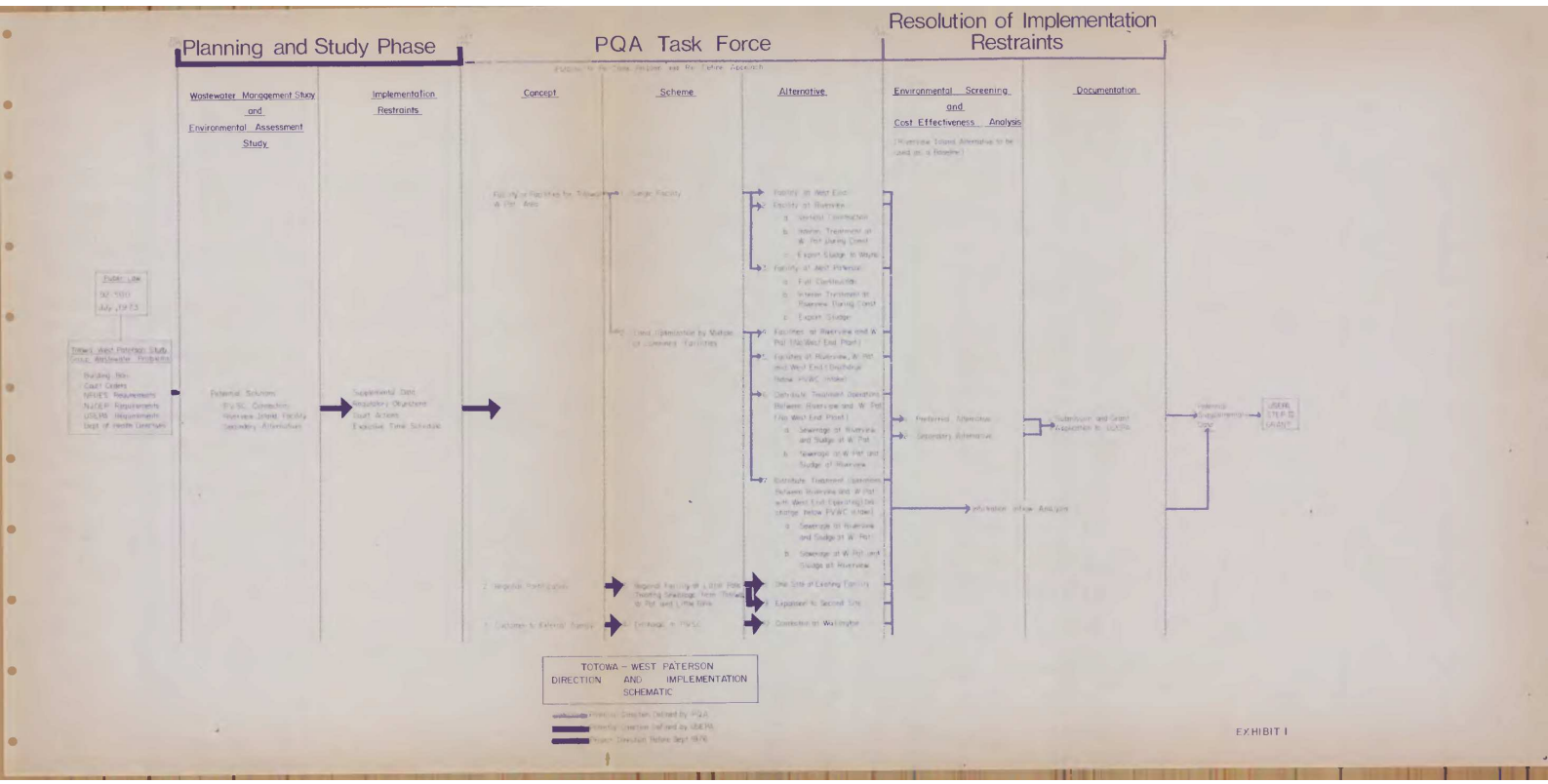

Planning and Study Phase
PQA Task Force
Resolution of Implementation Restraints
Wastewater Management Study and Environmental Assessment Study
Implementation Restraints
Concept
Scheme
Alternative
Environmental Screening and Cost Effectiveness Analysis
Documentation
TOTOWA – WEST PATERSON DIRECTION AND IMPLEMENTATION SCHEMATIC

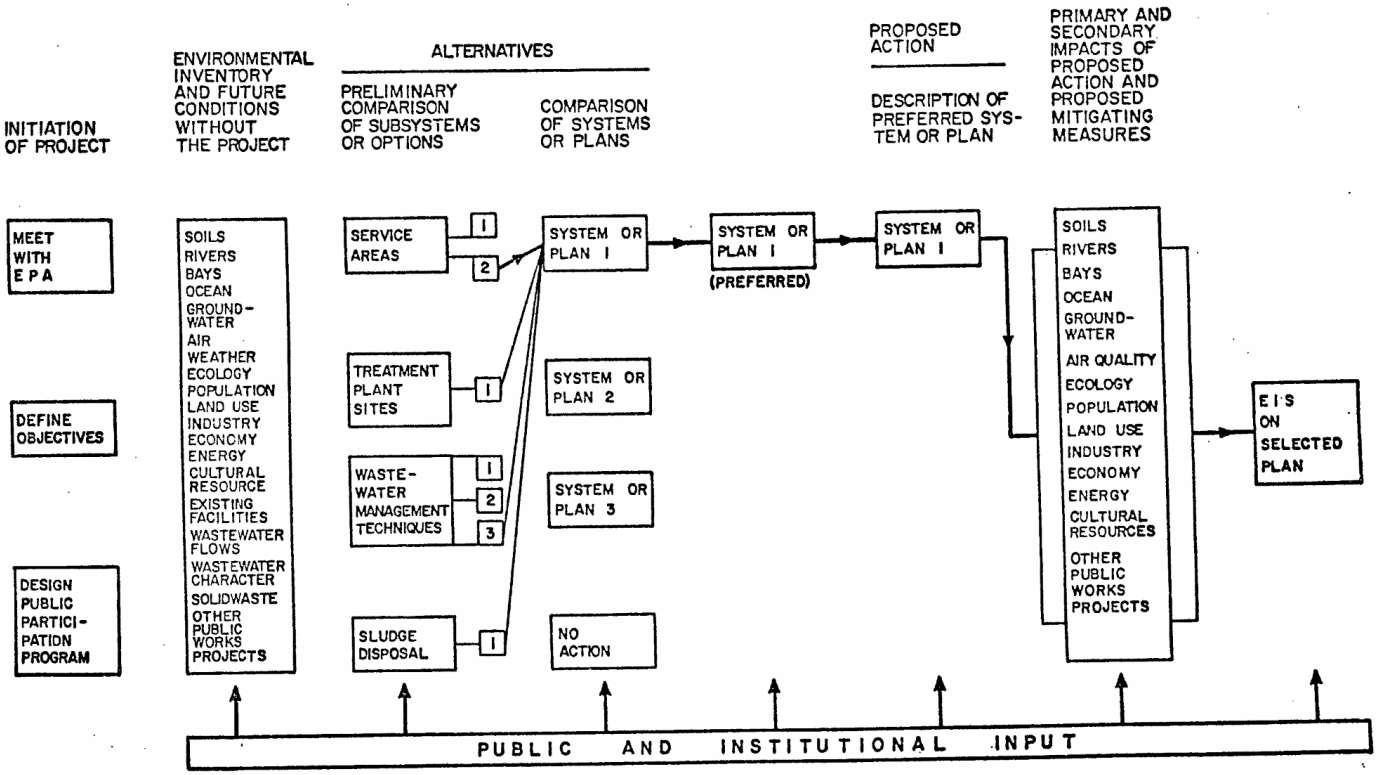
EXHIBIT I

WTP were considered: expansion to island, to land south of Route 80, to the west under River Road, vertically and through land optimization. Vertical construction and land optimization were marked for more detailed consideration.

Consideration was given to pursuing the original River Island Alternative (FP alternate 2A previously rejected by USEPA). Questions raised by the EAS would have to be studied, NJDEP rejection of a stream encroachment permit would require recycling and new information, the position of USEPA would have to be countered, and Army Corps of Engineers and New Jersey Water Policy and Supply Council requirements would each require attention. Lastly, the task force was unanimously of the opinion an Environmental Impact Statement (EIS) would be required.

A chart entitled "Flow Chart of Contents of EIS" is contained herein showing the magnitude of this requirement. It was estimated that about $40,000 and two years would be required to produce an EIS. At the end of the two years the Riverview Island alternative could be found unacceptable, furthermore, options open in 1977 might not be open in 1979.

The task force concluded that the Riverview Island alternative should not be pursued but was very useful as a baseline case. Implementation and environmental considerations for potentially successful alternatives were compared to Riverview Island by using the detail data contained within existing reports. Engineering costs for new alternatives were also developed from data used for Riverview Island.



FLOWCHART OF CONTENTS OF EIS

EXHIBIT 3

6.0 INFILTRATION/INFLOW ANALYSIS

Infiltration/Inflow (I/I) documentation in the form of a separate report has been compiled by extracting I/I sections from existing reports and by responding to requests from USEPA to provide additional data. The report was completed in December, 1976.

Infiltration and Inflow quantities were determined to be possibly excessive. Totowa was found to have a maximum infiltration of 2.57 MGD with an annual average of 0.67 MGD. West Paterson was found to have a maximum infiltration of 0.75 MGD with an annual average of 0.40 MGD. Yearly inflow quantities of 26 MG and 25 MG for Totowa and West Paterson, respectively, were observed.

The I/I Analysis recommended that a Sewer System Evaluation Survey (SSES) be undertaken with the goal of eliminating 80% of the infiltration and 100% of the inflow. Estimated project costs are presented in the table below:

ESTIMATED PROJECT COSTS

(S.S.E.S.)

	TOTOWA	WEST PATERSON	TOTAL
STEP I			
Pre-Physical Survey	$ 33,200	$ 24,000	$ 57,000
STEP II			
Physical Survey	70,570	47,880	118,450
Rainfall Simulation	17,350	10,960	28,310
Clean & T.V.	78,650	46,330	124,950
Report	38,000	38,000	76,000
TOTALS: LOWER ESTIMATE	$237,770	$162,140	$404,910
UPPER ESTIMATE	$288,910	$202,930	$491,840

For an indepth development of the I/I quantities, the cost effectiveness analysis of I/I, and the SSES plan of study, the reader is referred to the I/I Analysis report.

7.0 ALTERNATIVES

The system configuration alternatives existing prior to task force documentation included most of the system components required of newly conceived alternatives. Furthermore, the new components of the new alternative systems could be extrapolated from data contained within the existing reports such as the conversion of 8,000 feet of 12 inch force main to 8,000 feet of 16 inch force main or 10,000 feet of 12 inch force main. The conversion procedures will be described herein in Part Ten.

However, one particular aspect of the alternative required new thinking and development. That aspect was the maximizing existing site useage or "Land Optimization."

Therefore, this document part is divided into a discussion of land optimization and regional configurations.

7.1 Land Optimization

Land optimization refers to the attempt to place a maximum amount of treatment process units upon a minimum amount of land or lands. This may be achieved by constructing vertically, reducing site areaways to a safe absolute minimum, creating specialized treatment processing cells for sludge and hydraulic wastes upon non adjacent sites, or by utilizing a site to the fullest extent with the expectation of wastes which cannot be processed due to lack of space.

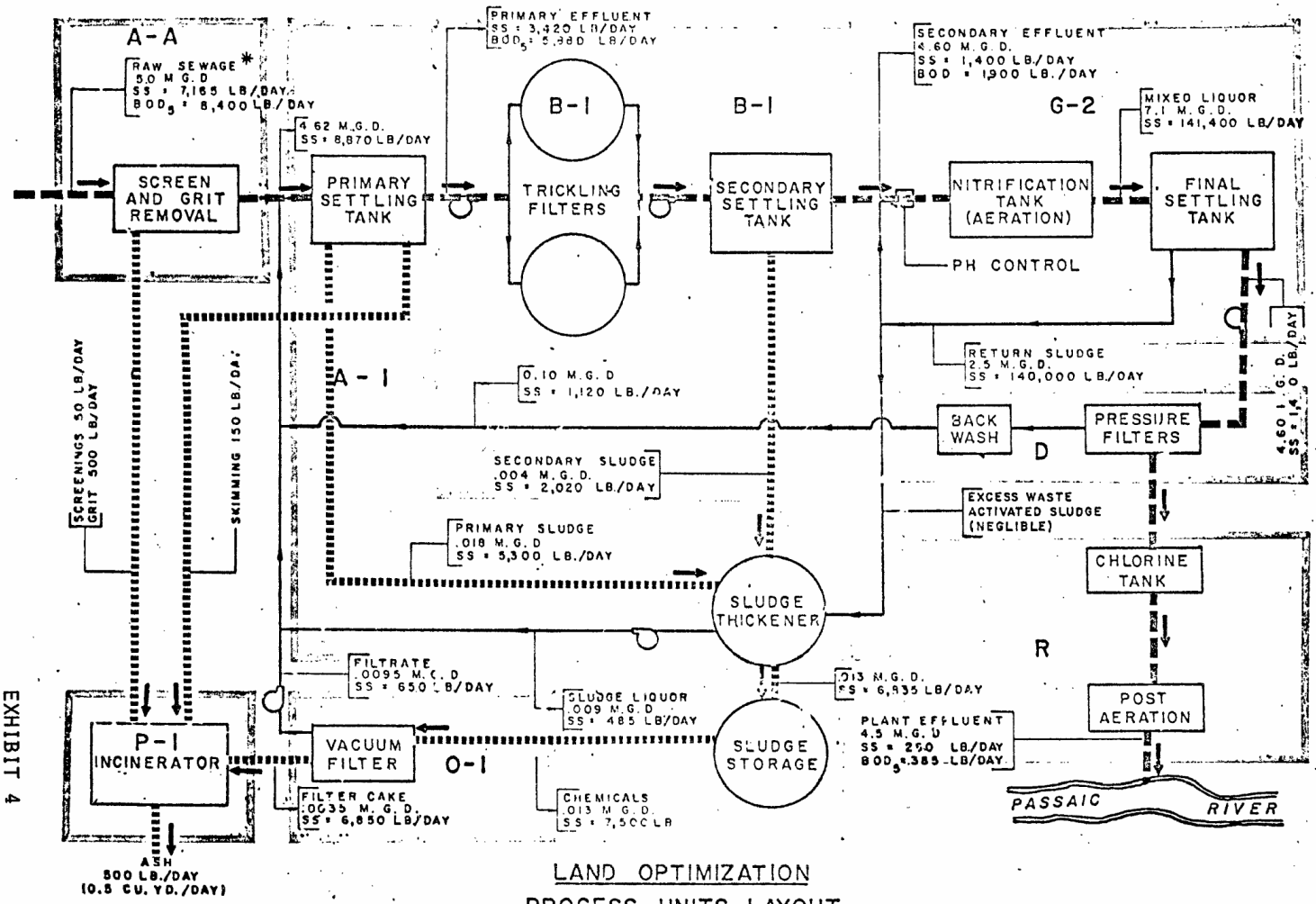
Land optimization has intriguing possibilities: by eliminating grass, shrubs, set backs and open areaways, a

great deal of space is conserved. The resulting site may be considered stark or esthetically unpleasing. However, if a site is available such as Riverview which is bounded on all four sides by the 50± feet high Interstate highway bridge, the Riverview Island wildlife habitat in the Passaic River, and 50± feet below a cemetary, land optimization gains quick acceptability.

The method used to determine land requirements is depicted on Exhibit 4 entitled "Land Optimization Process Unit Layout." Instead of spreading process unit out and about a site, they are consolidated and placed in near proximity to one another. The heavy solid lines on the exhibit represent the boundaries of process units if they were placed close together.

Next an envelope of land requirements was calculated, see Table 7-1 entitled "Wastewater Treatment Plant Land Requirements." Conventional Land Requirements (open spaces, relief, pleasant views) were calculated using recommended formulas contained within USEPA publication "Technical Report a Guide to the Selection of Cost Effective Wastewater Treatment Systems" dated July 1975. A 6.5 MGD WTP as required by Totowa-West Paterson is shown to require 420,633 square feet of space.

A second set of calculations shown as "Land Optimization Goal" were derived by applying NJDEP design criteria plus approximately 50% to allow for access and safety. Here it is found that a 6.5 MGD WTP requires only 104,904



LAND OPTIMIZATION

PROCESS UNITS LAYOUT

*BOD & SS LOADINGS - MAX. ANTICIPATED BETWEEN (1977-1987)

EXHIBIT 4

TABLE 7-1

WASTEWATER TREATMENT PLANT LAND REQUIREMENTS

LAND OPTIMIZATION

TOTOWA-WEST PATERSON STEP ONE DOCUMENT

UNITS	ALPH-NUMERICAL REFERENCE	CONVENTIONAL LAND REQUIREMENTS*		LAND OPTIMIZATION GOAL	
		Land Requirement Formula	Area Required (SQ.FT.)	Design Criteria	Minimum Surface Area (SQ.FT.)
Screening and Grit Removal	AA	0	0	50 ft. x 60 ft.	3,000
Primary Settling and Thickening	A-1	0.23 + .088Q	34,848	800 GPD/SF	16,250
Trickling Filter, Final Settling and Thickening	B-1	$1.20 \times Q^{(.81)}$	238,273	1 GPM/SF 700 GPD/SF	6,018 18,571
Nitrification Tower	G-2	$.50Q^{(.84)}$	104,980	1 GPM/SF	6,018
Pressure Filter	D	0.24 + .028Q	18,295	3.5 GPM/SF	3,439
Disinfection	R	0.21 + .018Q	14,375	30 min. det.	2,006
Vacuum Filter	O-1	-(0.26) + .021Q	4,792	see P-1	see P-1
Incinerator	P-1	-(0.84) + .015Q	436	100 ft. x 100 ft.	10,000
Sludge Storage	---	---	2,634	7 days	2,634
Control Building	---	---	2,000	20 x 100	2,000
	Subtotal		---	---	69,936
				Areaways	34,968
	Total		420,633**		104,904**

*Reference USEPA "Technical Report A Guide to the Selection of Cost Effective Wastewater Treatment Systems" July 1975
**Note Riverview site contains approximately 80,000-85,000 SQ.Ft.

square feet of space.

In conclusion, a land requirement of from 420,000 downward to 105,000 square feet can be used to locate the Totowa-West Paterson WTP. By maximizing land optimization, a 6.5 MGD WTP could be placed upon the existing 85,000 square feet at the Riverview site with only a modest amount of vertical construction. Likewise a 3.5 MGD constructed upon the 100,000 ± square feet West Paterson site is a potentially successful alternative.

7.2 Alternatives

By taking advantage of the land optimization concept, 23 alternatives were developed that had a potential for success.

The alternatives fall within three system configuration concepts as follows: facility or facilities within study area, extra-regional participation, or customer to an external agency. The concepts possess scheme sublevels as follows: a single facility, land optimization by multiple facilities, land optimization by combined facilities, regional participation with treatment in Little Falls, N.J., discharge to P.V.S.C.

A tabulation of the 23 alternatives to be assessed are presented on Table 7-2 entitled "Summary of Alternatives." Alternative alpha-numeric designations are listed depicting scheme and alternative description.

TABLE 7-2

SUMMARY OF ALTERNATIVES

TOTOWA-WEST PATERSON SEWERAGE AUTHORITY

DESIGNATION	CONCEPT	SCHEME	ALTERNATIVE
1	Facility within study area	Single facility for Totowa, West Paterson and Little Falls	Facility at Riverview
1A	Facility within study area	Single facility for Totowa, West Paterson and Little Falls	Facility at Riverview, West End Flow to Wayne
2A	Facility within study area	Single Facility - Island Site	Facility at Riverview
2B	Facility within study area	Single Facility - Island Site	Facility at Riverview, West End Flow to Wayne
3A	Facility within study area	Land Optimization by Multiple Facilities	Facilities at Riverview & West Paterson, West End to Riverview
3B	Facility within study area	Land Optimization by Multiple Facilities	Facilities at Riverview & West Paterson, West End Flow to Wayne
4A	Customer to External Agency	PVSC via Paterson	Paterson connection at Main West End to Riverview pumping Station
4A1	Customer to External Agency	PVSC via Paterson	Paterson Connection at Broadway
4B	Customer to External Agency	PVSC via Paterson	Paterson Connection at Main, West End Flow to Wayne
4B1	Customer to External Agency	PVSC via Paterson	Paterson Connection at Broadway, West End Flow to Wayne
4C	Customer to External Agency	PVSC via Paterson	Paterson Connection at Broadway, Interceptor Sewer on Passaic River West Bank
3C	Facility within study area	Land Optimization by multiple facilities	Facilities at Riverview, West Paterson, West End
5A	Facility within study area	Single Facility Within Region	Facility at West End
5B	Facility within study area	Single Facility Within Region	Vertical Construction at Riverview
5C	Facility within study area	Single Facility Within Region	Facility at West Paterson
6A1	Facility within study area	Land Optimization by Combined Facilities	Wet Units at Riverview, Sludge at West Paterson
6A2	Facility within study area	Land Optimization by Combined Facilities	Wet Units at West Paterson, Sludge at Riverview
6B1	Facility within study area	Land Optimization by Combined Facilities	Wet Units at Riverview, Sludge at West Paterson, West End to Wayne
6B2	Facility within study area	Land Optimization by Combined Facilities	Wet Units at West Paterson, Sludge at Riverview, West End to Wayne
7A	Extra-Regional Participation	Facilities at Little Falls	Expand existing Little Falls Plant On Site
7B	Extra-Regional Participation	Facilities at Little Falls	Expand Little Falls Plant Off Site
8	Customer to External Agency	PVSC via Wallington	Totowa-West Paterson Connection
8A	Customer to External Agency	PVSC via Wallington	Totowa, West Paterson Combined with Little Falls Connection

8.0 ENVIRONMENTAL FINDINGS

Following development of implementable alternatives for the Totowa-West Paterson Project by the Task Force, environmental analysis of the alternatives was required. Analyses were to be consistent with the Task Force Proposal which called for work to be conducted at an absolute minimum expenditure of manpower resources and with full tie back keeping within the framework of the data contained in the existing EAS. The approach taken was the synthesis of an environmental screening matrix which was designed to enable comparison of the environmental effects of the alternatives. This allowed the selection of the least environmentally sensitive alternative(s). The following describes the procedures and results relative to formulation and analysis of the Totowa-West Paterson Environmental Screening Matrix.

8.1 Procedures

An environmental matrix was developed to analyze each of the wastewater treatment alternatives by comparison to the baseline alternative (2A) using "+," "0," and "-" screening values. Positive values indicate beneficial impacts; zero values neutral impacts and negative values detrimental impacts. Seventeen environmental impact receptors were utilized from the Environmental Protection Agency recommendations for preparation of environmental impact statements (Federal Register, April 14, 1975). Environmental data for screening was based on the previously mentioned EAS, prepared by Lawler, Matusky and Skelly Engineers, and supplemented with field

reconnaissance by PQA staff on October 28, 1976 of potential applicable treatment facilities and interceptor routes.

As mentioned, each wastewater treatment system alternate was compared to Alternate 2A, the Riverview Island concept, which proposed the expansion of the Riverview Wastewater Treatment Plant for treatment of combined flows from Totowa and West Paterson. Alternate 2A would require partial filling of the Passaic River to provide the area for plant expansion at the Riverview site. Both the West End and West Paterson sewerage treatment plants would be abandoned and converted to pumping stations diverting sewage flows to the expanded Riverview treatment facility.

In making comparisons of each Alternate with Alternate 2A, each environmental impact receptor was assigned a "+," "0," or "-" value, dependent upon the type of impact. For example, Alternate 5B does not require filling of the Passaic River, but did require an additional river crossing. Therefore, surface water quality and aquatic ecosystem values for filling would be positive, whereas, surface water quality and aquatic ecosystem values for crossing would be negative.

The results of the environmental matrix analysis are presented for each alternate in Table 8-1. Basic documentation supporting the rating values are presented in Table 8-2.

8.2 Results

After each alternate was evaluated, all positive, zero

and negative values were independently summed for comparative purposes. The more favorable alternatives would be those that exhibit a small number of negative values; of those alternatives that remain the most favorable, would be those with a large number of positive values. Accordingly, the more favorable alternatives are shown below, note that 3A and 3C are preferred over the others.

FAVORABLE ALTERNATIVE

	Matrix Summation		
Alternative	+	0	-
1	1	12	4
2A	0	17	0
3A	10	5	2
3C	10	5	2
5C	2	14	1
6A-1, 6A-2	2	11	4
6B-1, 6B-2	2	11	4

TABLE 8-1

ENVIRONMENTAL MATRIX

TOTOWA-WEST PATERSON STEP ONE DOCUMENT

		ENVIRONMENTAL IMPACT RECEPTORS																	Summations		
	Alternatives	Steep Slopes	Unstable Soils	Vegetation	Wildlife Habitats	Surface Water Quality		Aquatic Ecosystems		Ground Water	Wetlands	Floodplains	Air Quality	Noise Levels	Historical & Archeological Sites	Traffic Congestion	Upgrade of Existing Land use	Compatible with Contiguous Land use	+	0	-
						Filling	Crossing	Filling	Crossing												
1	1	0	0	0	0	0	0	0	0	-	0	0	-	-	0	-	+	0	1	12	4
2	1A	+	-	-	-	0	-	0	-	-	-	-	+	+	0	+	+	0	5	4	8
3	*2A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0
4	2B	+	-	-	-	0	-	0	-	-	-	-	+	+	0	+	0	0	4	5	8
5	3A	0	+	+	0	+	+	+	+	+	0	0	+	+	0	+	-	-	10	5	2
6	3B	+	-	-	-	+	+	+	+	-	-	-	+	+	0	+	-	-	8	1	8
7	4A	0	0	0	0	+	0	+	0	-	0	0	-	-	-	-	+	+	4	8	5
8	4A-1	0	0	0	0	+	0	+	0	-	0	0	-	-	-	-	+	+	4	8	5
9	4B	+	-	-	-	+	0	+	0	-	-	-	-	-	-	-	+	+	5	2	10
10	4B-1	+	-	-	-	+	0	+	0	-	-	-	-	-	-	-	+	+	5	2	10
11	4C	-	0	0	0	+	-	+	-	-	0	0	-	-	0	-	+	+	4	6	7
12	3C	0	+	+	0	+	+	+	+	+	0	0	+	+	0	+	-	-	10	5	2
13	5A	-	0	0	0	+	0	+	0	-	0	0	-	-	0	-	+	+	4	8	5
14	5B	-	-	-	-	+	-	+	-	-	-	-	-	-	0	-	0	0	2	3	12
15	5C	0	0	0	0	+	0	+	0	0	0	0	0	0	0	0	0	-	2	11	1
16	6A-1	0	0	0	0	+	-	+	-	0	0	0	0	0	0	0	-	-	2	11	4
17	6A-2	0	0	0	0	+	-	+	-	0	0	0	0	0	0	0	-	-	2	11	4
18	6B-1	0	0	0	0	+	-	+	-	0	0	0	0	0	0	0	-	-	2	11	4
19	6B-2	0	0	0	0	+	-	+	-	0	0	0	0	0	0	0	-	-	2	11	4
20	7A	+	0	0	0	+	-	+	-	-	0	0	-	-	0	-	+	+	5	6	6
21	7B	+	0	-**	-**	+	-	+	-	-	0	0	-	-	0	-	+	+	5	4	8
22	8	-	0	0	0	+	0	+	0	-	0	0	-	-	***0	-	+	+	4	8	5
23	8A	-	0	0	0	+	0	+	0	-	0	0	-	-	***0	-	+	+	4	8	5

*Base for comparisons; all receptors were set at zero,
**Negative impacts if natural areas are removed,
***Assuming that there are no archeological and historical sites along the Wallington route.

TABLE 8-2

ENVIRONMENTAL MATRIX COMMENTS

TOTOWA-WEST PATERSON STEP ONE DOCUMENT

Alternatives		
1.	1	- Negatives -- Additional interceptor linking West Paterson to Little Falls.
		- Positive -- Treatment plant abandonment at West End, West Paterson and Little Falls.
2.	1A	- Negatives -- West End to Mountain View interceptor (e.g. wetlands, floodplains, forest).
		- Positives -- Omission of West End - Riverview interceptor.
3.	2A	Base for comparisons; all receptors were set at zero.
4.	2B	- Positives and Negatives -- Same as 1A.
5.	3A	- Positives -- Omission of Riverview-West Paterson interceptor and river crossing and filling.
6.	3B	- Negatives -- West End Mountain View interceptor route.
		- Positives -- Omission of West End-Riverview interceptor and river crossing and filling.
7.	4A	- Negatives -- Addition of West Paterson - Paterson PVSC interceptor.
		- Positives -- Omission of river filling and abandonment of treatment plants.
8.	4A-1	Same as 4A
9.	4B	- Positives -- Omission of West End-Riverview interceptor, treatment plant abandonment and river filling.
		- Negatives -- West End to Mountain View and West Paterson to Paterson PVSC interceptors.
10.	4B-1	Same as 4B
11.	4C	- Positives -- Omission of river filling and abandonment of plants.
		- Negatives -- Addition of the Riverview to Paterson PVSC interceptor and a river crossing in Paterson.
12.	3C	- Positives -- Omission of Riverview-West Paterson interceptor and river crossing and filling.
13.	5A	- Positives -- Omission of river filling and abandonment of Riverview and West Paterson plants.
		- Negatives -- Addition of West End to Passaic River outfall (impacts would be minimized by construction of interceptor and outfall at the same time).
14.	5B	- Negatives -- Addition of sludge line connecting Riverview with Wayne.
		- Positives -- Omission of river filling.

***Impacts are largely those that would occur during the construction process (interceptors or treatment facilities) with the exceptions of land use characteristics adjacent to facilities.**

TABLE 8-2 (Continued)

Alternatives	
15. 5C	- Positives -- Same as 5B.
16. 6A-1	- Positives -- Lack of river filling.
	- Negatives -- Additional river crossing and West Paterson sludge processing not upgrading land use.
17. 6A-2	- Negatives -- Addition of river crossing and sludge processing at Riverview.
	- Positives -- Same as 6A-1.
18. 6B-1	- Positives -- Same as 6A-1.
	- Negatives -- Addition of river crossing and sludge processing West Paterson.
19. 6B-2	- Positives -- Same as 6A-1.
	- Negatives -- Additional river crossing and sludge processing in Riverview.
20. 7A	- Positives -- Same as 6A-1 and also the omission of Riverview Drive interceptor length adjacent to steep slopes.
	- Negatives -- Additional river crossing and increase of interceptor lengths.
21. 7B	- Positives -- Same as 7A.
	- Negatives -- Additional lengths of interceptors and expansion of Little Falls WTP offsite (** negative impact if natural areas are removed.)
22. 8	- Negatives -- Indicative of additional interceptor lengths to Wallington.
	- Positives -- Lack of river filling and abandonment of all three treatment facilities; ***-- Assuming that there are no archeological and historical sites along the Wallington route.
23. 8A	- Same as 8.

9.0 IMPLEMENTATION FINDINGS

An implementation analysis was performed using two criteria. The first was to establish all known expressed implementation restraints which could delay implementation of an alternative. The second criteria was to adopt task force recommendations of potential aspects of an alternative which are likely to delay implementation.

Restraints found within the first criteria are in the form of letters received from external agencies stating policy as it affects the Totowa-West Paterson Sewerage Authority. For example, a letter received from the Township of Little Falls on November 4, 1976 expressed a strong negative position towards seeking a common solution with Totowa-West Paterson. Therefore, all alternates involving Little Falls have an implementation restraint.

Restraints found within the second criteria were prepared by the task force and are three in number:

(1) Abandon any alternate which structurally modifies the Passaic River.

(2) Abandon any alternate which will require approval of external authorities.

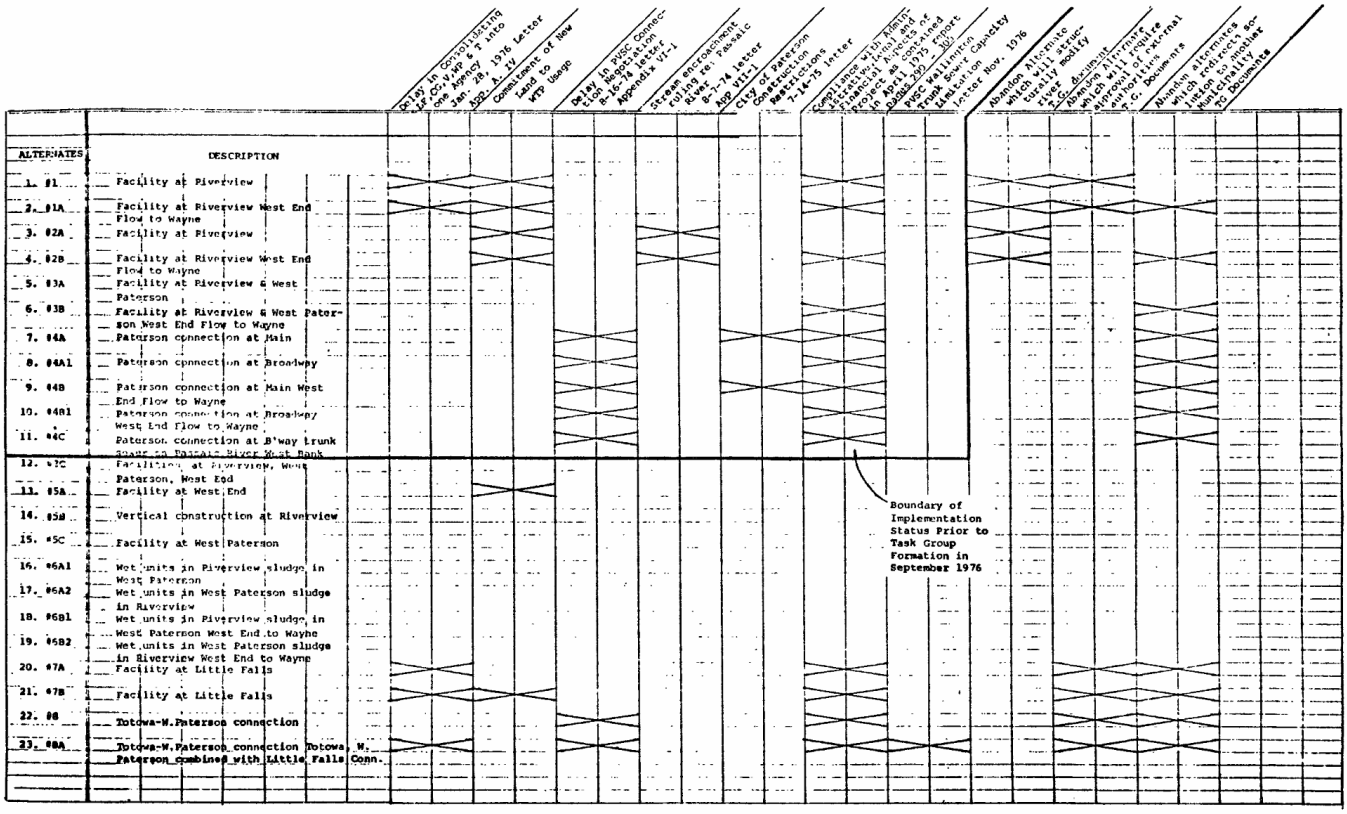
(3) Abandon any alternate which redirects solution to another municipality.

An overlay of the implementation restraints upon the 23 alternates is presented in Exhibit 5 entitled "Implementation Overlay." The exhibit shows that eight of the alternates do

IMPLEMENTATION OVERLAY

FOR TOTOWA - WEST PATERSON STEP I DOCUMENTATION

IMPOSITIONS OF TASK GROUP RESTRICTIONS



ALTERNATES	DESCRIPTION
1. #1	Facility at Riverview
2. #1A	Facility at Riverview West End Flow to Wayne
3. #2A	Facility at Riverview
4. #2B	Facility at Riverview West End Flow to Wayne
5. #3A	Facility at Riverview & West Paterson
6. #3B	Facility at Riverview & West Paterson West End Flow to Wayne
7. #4A	Paterson connection at Main
8. #4A1	Paterson connection at Broadway
9. #4B	Patrson connection at Main West End Flow to Wayne
10. #4B1	Paterson connection at Broadway West End Flow to Wayne
11. #4C	Paterson connection at B'way trunk Sewer to Passaic River West Bank
12. #5C	Facilities at Riverview, West Paterson, West End
13. #5A	Facility at West End
14. #5B	Vertical construction at Riverview
15. #5C	Facility at West Paterson
16. #6A1	Wet units in Riverview sludge in West Paterson
17. #6A2	Wet units in West Paterson sludge in Riverview
18. #6B1	Wet units in Riverview sludge in West Paterson West End to Wayne
19. #6B2	Wet units in West Paterson sludge in Riverview West End to Wayne
20. #7A	Facility at Little Falls
21. #7B	Facility at Little Falls
22. #8	Totowa-W.Paterson connection
23. #8A	Totowa-W.Paterson connection Totowa, W. Paterson combined with Little Falls Conn.

EXHIBIT 5

not have significant implementation restraints and are, therefore, to be preferred over others. The alternates which successfully passed the implementation test are shown below:

ALTERNATES WITH NO SIGNIFICANT IMPLEMENTATION RESTRAINTS
3A
3C
5B
5C
6A-1
6A-2
6B-1
6B-2

10.0 ENGINEERING COST FINDINGS

Engineering costs were developed using the same procedures and references found within the existing FP. Capital costs represent estimated June 1976 dollars. The present worth analyses follow UPSEA cost effectiveness guidelines.

In those cases where new facilities have been introduced as a system component, costs have been extrapolated using standardized procedures. Unit costs have been held consistent with the FP in cases of quantity changes. Unit costs have been changed consistent with the overall FP unit cost structure in cases where quantities have changed. Costs of WTP have been scaled using the USEPA WTP cost experience guide dated February 1976.

Three separate cost overlays have been assembled as follows: Exhibit 6 entitled "WTP Construction Cost Overlay" presents WTP capital and O&M costs for each alternate. Exhibit 7 entitled "Pumping Station Construction Cost Overlay" presents capital and O&M costs for each alternate. Exhibit 8 entitled "Transmission Facility Cost Overlay" presents capital costs for each alternate.

A summary of all capital and O&M costs for all alternates is presented on Table 10-1 entitled "Present Worth Analysis for Alternates." The table also contains associated project costs such as engineering, legal, administration, start up, and interest. A bottom line total present worth of all costs is presented upon which to evaluate costs.

TABLE 10-1

PRESENT WORTH ANALYSIS FOR ALTERNATES*

TOTOWA-WEST PATERSON STEP I DOCUMENTATION

ALTERNATES	1	1A	2A	2B	3A	3B	4A	4A-1	4B	4B-1	4C	5A	5B	5C	3C	6A-1	6A-2	6B-1	6B-2	7A	7B	8	8A
Cost Items																							
Construction Cost Treatment	7,448	9,942	7,500	8,894	8,887	10,056	-0-	-0-	3,000	3,000	-0-	9,375	7,313	7,125	9,647	7,313	7,313	8,500	8,500	14,896	7,480	-0-	-0-
Construction Cost Pump Station	2,075	2,611	2,051	1,957	1,238	1,144	3,551	3,551	2,707	2,707	3,426	2,145	2,051	1,676	894	2,051	1,676	1,707	1,332	2,489	2,489	2,989	2,989
Construction Cost Transmission	1,224	787	1,125	688	750	313	3,375	3,375	2,788	2,788	3,213	2,530	2,438	1,180	-0-	1,488	1,543	736	738	3,081	3,081	7,618	4,320
Construction Cost TOTAL	11,377	13,340	10,676	11,539	10,875	11,513	6,926	6,926	8,495	8,495	6,639	14,050	11,802	9,981	10,541	10,852	10,532	10,945	10,570	20,466	13,050	10,607	7,309
Engineering, Legal, Admin.	1,934	2,268	1,815	1,962	1,849	1,957	1,177	1,177	1,444	1,444	1,129	2,389	2,006	1,697	1,792	1,845	1,790	1,861	1,797	3,479	2,219	1,803	1,243
Start-up costs	100	130	99	120	200	230	30	30	60	60	30	100	130	100	300	150	150	180	180	120	100	30	30
Sub-Total	13,411	15,738	12,590	13,621	12,924	13,700	8,133	8,133	9,999	9,999	7,798	16,539	13,938	11,778	12,633	12,847	12,472	12,986	12,547	24,065	15,369	12,440	8,582
Interest During Construction	1,073	1,259	1,007	1,090	1,034	1,096	651	651	800	800	624	1,323	1,115	942	1,011	1,028	998	1,039	1,004	1,925	1,230	995	687
Annual O&M Treatment	435	435	450	570	534	635	**2,092	**2,092	**2,092	**2,092	**2,092	450	449	450	608	450	450	543	543	522	435	**2,092	**2,092
Annual O&M Pump Stations	81	81	56	56	21	21	126	126	97	97	191	59	56	45	-0-	56	45	35	24	80	80	96	96
Annual O&M Total	516	516	506	626	555	656	2,218	2,218	2,189	2,189	2,283	509	505	495	608	506	495	578	567	602	515	2,188	2,188
Present Worth of O&M	5,467	5,467	5,361	6,632	5,880	5,996	23,497	23,497	23,190	23,190	24,186	5,392	5,350	5,244	6,441	5,361	5,244	6,123	6,007	6,378	5,456	23,180	23,180
Total P.W. of Capital & O&M	19,951	22,464	18,959	21,343	19,838	20,792	32,281	32,281	33,989	33,989	32,608	23,254	20,403	17,964	20,085	19,236	18,714	20,148	19,558	32,368	22,055	36,615	32,449

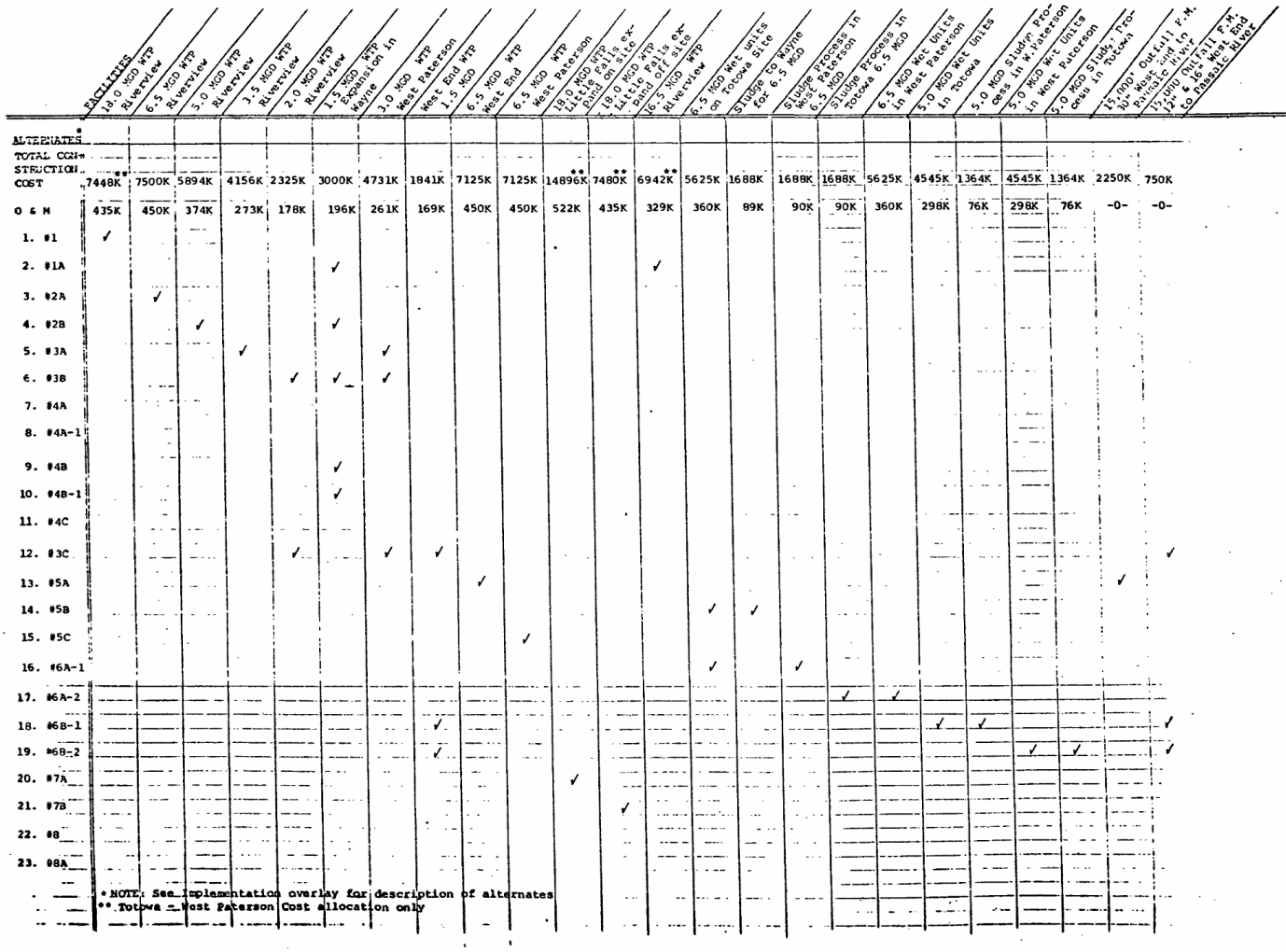
*All costs in thousands of dollars.

**Note: O&M Costs of these alternates include charge from PVSC for connection.

EXHIBIT 6

WTP CONSTRUCTION COST OVERLAY

FOR THE TOTOWA - WEST PATERSON STEP ONE DOCUMENTATION



* NOTE: See Implementation overlay for description of alternates

** Totowa - West Paterson Cost allocation only

CONTRUCTION COST OVERLAY

FOR TOTOWA - WEST PATERSON STEP ONE DOCUMENT

ALTERNATES *	FACILITIES 3.0 MGD P.S. West End to Riverview	6.0 MGD P.S. West Paterson to Riverview	3.0 MGD P.S. West End to View Plant (Wayne)	7.0 MGD P.S. Riverview to West Paterson	13.0 MGD P.S. West Paterson PVSC Trunk Line	4.0 MGD P.S. Riverview to West Paterson	10.0 MGD P.S. West Paterson PVSC Trunk Line	3.0 MGD P.S. West End to Little Falls	4.0 MGD P.S. Riverview to West End	5.0 MGD P.S. West Paterson to Little Falls	3.0 MGD P.S. West End to Little Falls	1.0 MGD P.S. West End to West Paterson	7.0 MGD P.S. Riverview to Little Falls	6.0 MGD P.S. Riverview to Wallington	19 MGD P.S. West Paterson to Wallington	13 MGD P.S. West Paterson	13 MGD P.S. Little Falls	13.0 MGD Riverview P.S. to PVSC	Modification to P.S. & SSES	Modification to P.S. & SSES, Flows to Wayne
CONSTRUCTION COST	250K	813K	250K	938K	1375K	438K	1125K	250K	438K	813K	250K	438K	938K	813K	880K	587K	1375K	988K	894K	
ANNUAL COST	21K	35K	21K	40K	65K	24K	52K	21K	24K	35K	21K	24K	40K	35K	33K	27K	65K	--	--	
1. #1	✓														✓	✓		✓		
2. #1A			✓												✓	✓			✓	
3. #2A	✓	✓																✓		
4. #2B		✓	✓																✓	
5. #3A	✓																	✓		
6. #3B			✓																✓	
7. #4A	✓			✓	✓													✓		
8. #4A-1	✓			✓	✓													✓		
9. #4B			✓			✓	✓												✓	
10. #4B-1			✓			✓	✓												✓	
11. #4C	✓	✓															✓	✓		
12. #3C																			✓	
13. #5A		✓							✓										✓	
14. #5B	✓	✓																✓		
15. #5C						✓					✓							✓		
16. #6A-1	✓	✓																✓		
17 #6A-2						✓					✓							✓		
18. #6B-1		✓																	✓	
19. #6B-2						✓													✓	
20. #7A								✓		✓		✓						✓		
21. #7B								✓		✓		✓						✓		
22. #8	✓												✓	✓				✓		
23 #8A	✓												✓	✓				✓		

*NOTE: See Implementation overlay for description of Alternate

EXHIBIT 7

TRANSMISSION FACILITIES OVERLAY

FOR THE TOTOWA - WEST PATERSON STEP ONE DOCUMENTATION

FACILITIES	15,000' F.M. (12"& 16") West End to Riverview	1000' F.M. 12" W. Paterson to Riverview	6000' F.M. 12" West End to Wayne	1000' F.M. 12" Riverview to West Paterson	12,000' F.M. 30" W. Paterson to PVSC	12,000' F.M. 24" W. Paterson to P.V.S.C.	15,000' F.M. 24" & 12" West Pat. to W. End	1000' F.M. 20" Riverview to W. Paterson	12000' F.M. 30" Little Falls to W. Paterson	1000' F.M. 30" W. Paterson to Riverview	11,000' F.M. 12" West End to McBride & Wanaque	3,000' F.M. 12" Lackawana & McBride to Little Falls	7,000" F.M. 24" West Paterson to Little Falls along McBride	5,000' F.M. 30" West Paterson to McBride & Rt. 4	23,000' F.M. 30" Route 46 to Main Avenue	13,000' F.M. 30" Ave. & Rte 46 to Wallington	23,000' F.M. 36" Rt. 46 to Main Avenue	13,000' F.M. 36" Main Ave. & Rte. 46 to Wallington	12,000' F.M. 30" Riverview to PVSC	Sludge Line Riverview to Wayne 21,000 @ 6"	Sludge line Riverview to W. Paterson 1,000' @ 6"	Riverview to West End Manifold Connection	Rivervier to W. Paterson manifold connection	W. Pat. to Little Falls or Wallington manifold Conn.	Rt. 46 to Wallington manifold connection
Construction Cost	750K	375K	313K	375K	2250K	2100K	2125K	400K	316K	158K	1250K	263K	1163K	750K	3738K	1950K	1557K	822K	2088K	1313K	363K	30K	30K	30K	11K
Alternates																									
1	✓								✓	✓															
1A			✓						✓	✓															
2A	✓	✓																							
2B		✓	✓																						
3A	✓																								
3B			✓																						
4A	✓			✓	✓																				
4A-1	✓			✓	✓																				
4B			✓	✓		✓																			
4B-1			✓	✓		✓																			
4C	✓	✓																	✓						
3C																						✓			
5A		✓					✓													✓					
5B	✓	✓						✓															✓		
5C	✓																				✓				
6A-1	✓	✓																			✓		✓		
6A-2	✓							✓													✓				
6B-1		✓																			✓				
6B-2				✓							✓	✓	✓											✓	
7A				✓							✓	✓	✓											✓	
7B				✓										✓	✓	✓								✓	
8	✓							✓						✓			✓	✓						✓	✓
8A	✓							✓																	

EXHIBIT 8

The level of significance of each present worth cost was judged to be 10%. This means any alternate with a present worth cost within a range 10% higher than the least costly alternate should be judged equivalent within the level of significance of the estimating procedures. By this method nine alternates were judged equivalent such that the selection of any one would be cost effective. The table below lists the nine alternates.

EQUIVALENT ALTERNATES

Alternate Number	Present Worth Dollars
1	19,951,000
2A	18,959,000
3A	19,383,000
3C	20,085,000
5C	17,964,000*
6A-1	19,236,000
6A-2	18,714,000
6B-1	20,148,000
6B-2	19,558,000

*Least costly alternate

11.0 INSTITUTIONAL INPUT

Final Results of implementation, environmental and engineering cost studies were presented to the Authority on December 2, 1976.

A composite of the preferred alternates is presented below. It is found that two alternates (3A and 3C) are preferred under three headings.

COMPOSITE OF PREFERRED ALTERNATIVES

Environmentally Acceptable	Implementable	Engineering Costs Equal
3A*	3A*	1
3C*	3C*	2A
	5B	3A*
	5C	3C*
	6A-1	5C
	6A-2	6A-1
	6B-1	6A-2
	6B-2	6B-1
		6B-2

*Alternates found in all three columns.

The engineering costs on a present worth basis for the two best alternates are shown in tables 11-1 and 11-2 entitled "Alternate 3A Costs" and "Alternate 3C Costs," respectively.

The Authority chose Alternate 3A for the following reasons:

(a) Alternate 3A will allow Totowa to recycle the West End site into industrial acreage.

(b) Two plants are preferable to three from a scheduling of manpower standpoint: vacations, illness, holidays, etc.

(c) Public acceptability of closing a WTP which has in the past caused local residents to complain of odors.

TABLE 11-1

ALTERNATE 3A COSTS

FOR THE TOTOWA-WEST PATERSON STEP ONE DOCUMENTATION

COST ITEMS	CAPACITY (MGD)	COST ($1,000) TOTOWA	W. PATERSON	TOTAL
CONSTRUCTION				
West End Pump Station	3.0	200K	--	200K
West End Force Main		600K	--	600K
Sewer System Evaluation Survey		230K	156K	386K
Rehabilitation		199K	118K	317K
Modifications to Existing Pumping Stations		87K		87K
West Paterson Treatment Plant	3.0	--	3,785K	3,785K
Riverview Dr. Treatment Plant	3.5	3,325K		3,325K
Subtotal (1)		4,641K	4,059K	8,700K
Contingency		1,160K	1,015K	2,175K
Subtotal (2)		5,801K	5,074K	10,875K
Engineering, Legal, Admin. Costs		986K	863K	1,849K
Start-up Costs		100K	100K	200K
(a) Subtotal (3)		6,887K	6,037K	12,924K
(b) Interest During Construction		551K	483K	1,034K
OPERATION & MAINTENANCE				
West End Pump Station		21K	--	21K
Riverview Dr. Treatment Plant		273K	--	273K
West Paterson Treatment Plant		--	261K	261K
Total O&M		294K	261K	555K
(c) Present Worth of O&M		3,115K	2,765K	5,880K
TOTAL (a+b+c)		10,553K	9,285K	19,838K

Totowa W. Paterson

TABLE 11-2

ALTERNATE 3C COSTS

FOR THE TOTOWA-WEST PATERSON STEP ONE DOCUMENTATION

COST ITEMS	CAPACITY (MGD)	COST ($1,000)		
CONSTRUCTION		TOTOWA	W. PATERSON	TOTAL
West End Treatment Plant	1.5	1,473K	--	1,473K
Riverview Dr. Treatment Plant	2.0	1,860K	--	1,860K
West Paterson Treatment Plant	3.0	--	3,785K	3,785K
West End Outfall		600K		600K
Sewer System Evaluation Survey		230K	156K	386K
Rehabilitation		199K	118K	317K
Modifications to Existing Pumping Stations		12K		12K
Subtotal (1)		4,374K	4,059K	8,433K
Contingency		1,093K	1,015K	2,108K
Subtotal (2)		5,467K	5,074K	10,541K
Engineering, Legal, Admin. Costs		929K	863K	1,792K
Start-up Costs		200K	100K	300K
(a) Subtotal (3)		6,596K	6,037K	12,633K
(b) Interest During Construction		528K	483K	1,011K
OPERATION & MAINTENANCE				
West End Treatment Plant		169K	--	169K
Riverview Dr. Treatment Plant		178K	--	178K
West Paterson Treatment Plant		--	261K	261K
Total O&M		347K	261K	608K
(c) Present Worth of O&M		3,676K	2,765K	6,441K
TOTAL (a+b+c)		10,800K	9,285K	20,085K
		Totowa	W. Paterson	

APPENDIX

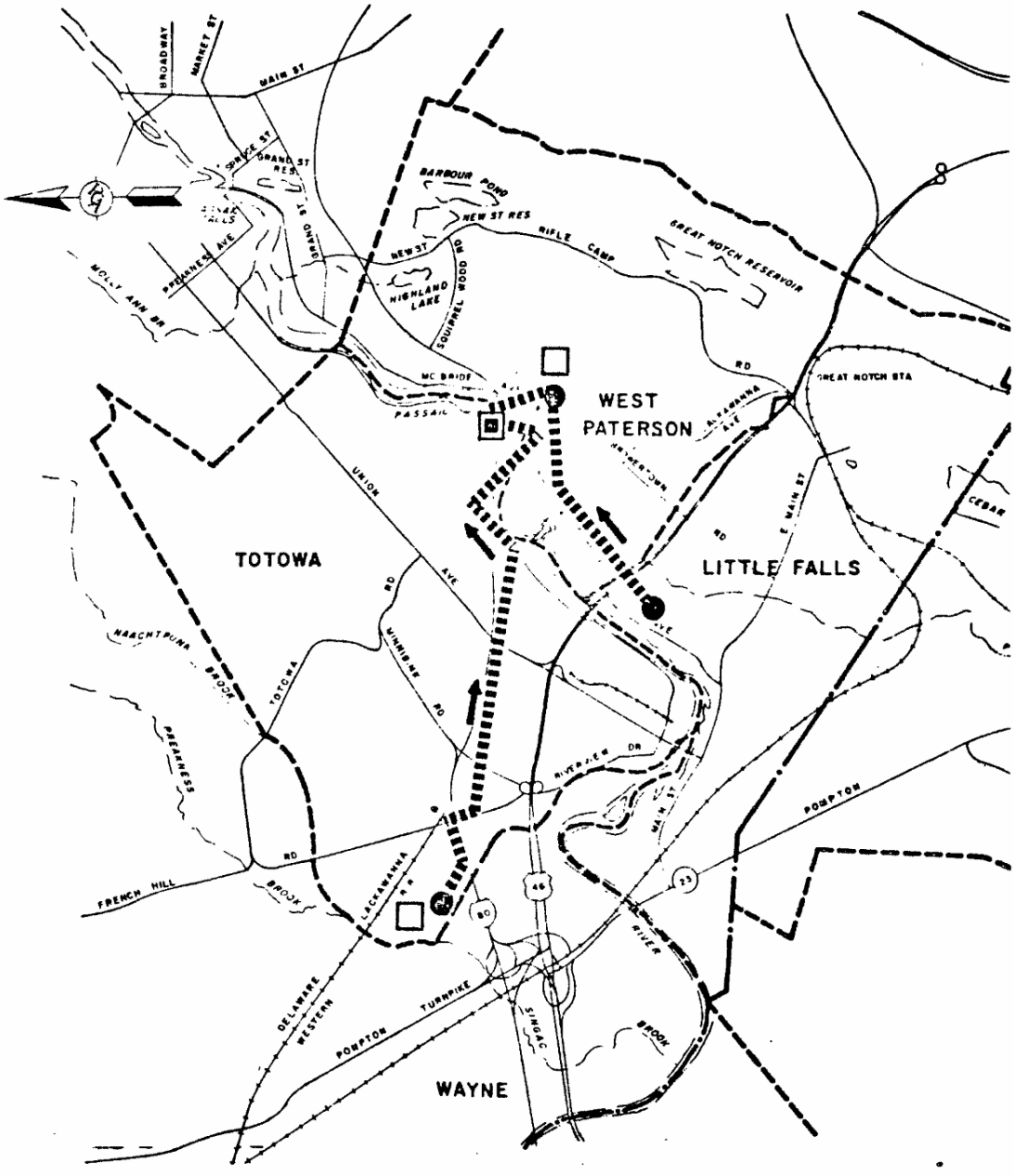
1. Summary of Alternatives Sheet
2. 23 Alternative Plans

December 16, 1976

SUMMARY OF ALTERNATIVES

TOTOWA-WEST PATERSON SEWERAGE AUTHORITY

DESIGNATION	SCHEME	ALTERNATIVE
1	Regional Participation T-WP-LF	Facility at Riverview
1A	" "	Facility at Riverview, West End Flow to Wayne
2A	Single Facility - Island Site	Facility at Riverview
2B	" "	Facility at Riverview, West End Flow to Wayne
3A	Land Optimization by Multiple Facilities	Facilities at Riverview & West Paterson, West End to Riverview
3B	" "	Facilities at Riverview & West Paterson, West End Flow to Wayne
4A	Customer to External Agency via Paterson	Paterson connection at Main West End to Riverview Pumping Station
4A1	" "	Paterson Connection at Broadway
4B	" "	Paterson Connection at Main, West End Flow to Wayne
4B1	" "	Paterson Connection at Broadway, West End Flow to Wayne
4C	" "	Paterson Connection at Broadway, Interceptor Sewer on Passaic River West Bank
3C	Land Optimization by multiple facilities	Facilities at Riverview, West Paterson, West End
5A	Single Facility Within Region	Facility at West End
5B	" "	Vertical Construction at Riverview
5C	" "	Facility at West Paterson
6A1	Land Optimization by Combined Facilities	Wet Units at Riverview, Sludge at West Paterson
6A2	" " "	Wet Units at West Paterson, Sludge at Riverview
6B1	" " "	Wet Units at Riverview, Sludge at West Paterson, West End to Wayne
6B2	" " "	Wet Units at West Paterson, Sludge at Riverview, West End to Wayne
7A	Regional Participation Facilities at Little Falls	Expand existing Little Falls Plant On Site
7B	" " " "	Expand Little Falls Plant Off Site
8	Customer to External Agency via Wallington	Totowa-West Paterson Connection
8A	" " "	Totowa, West Paterson Combined with Little Falls Connection



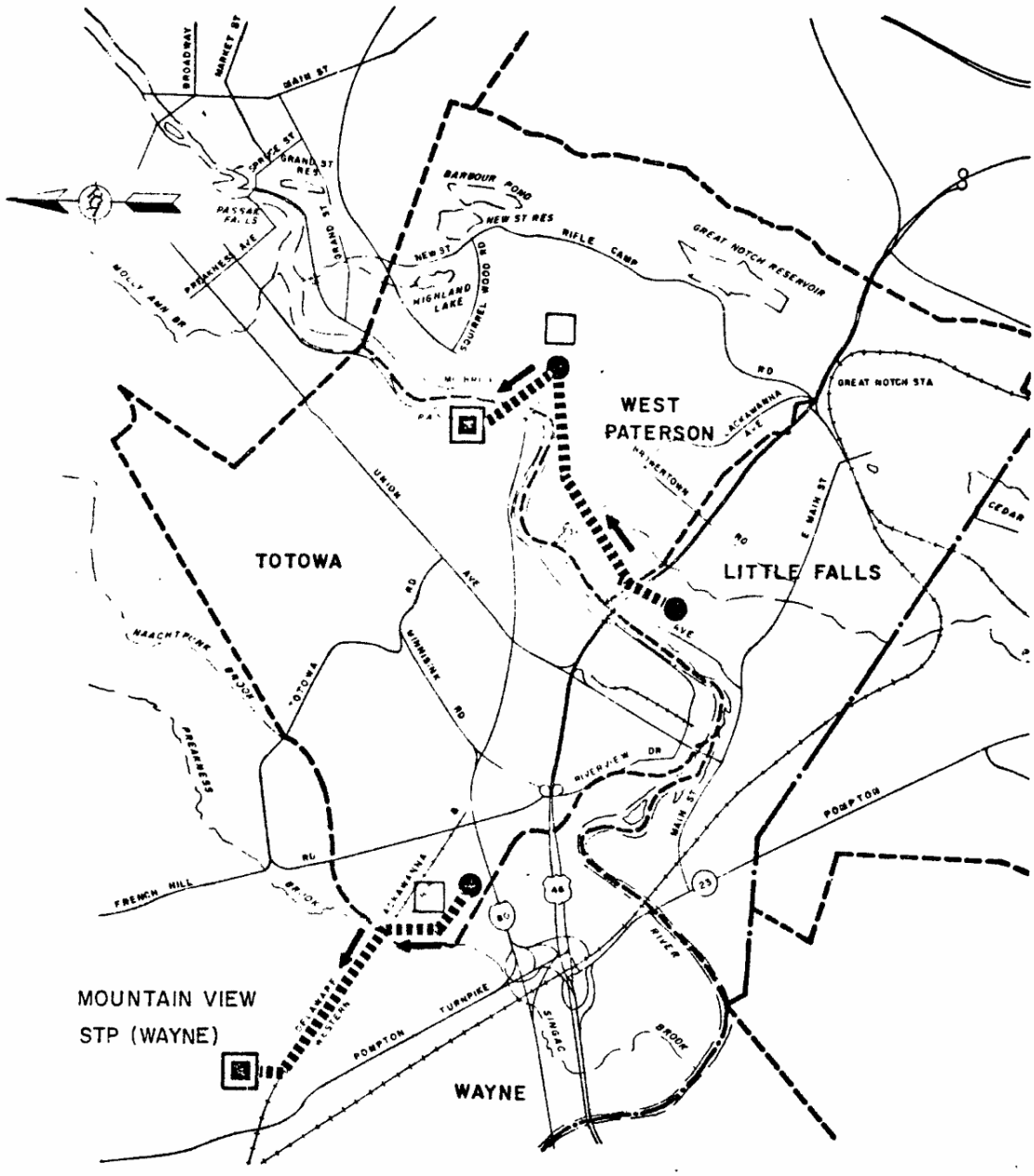
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE I

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



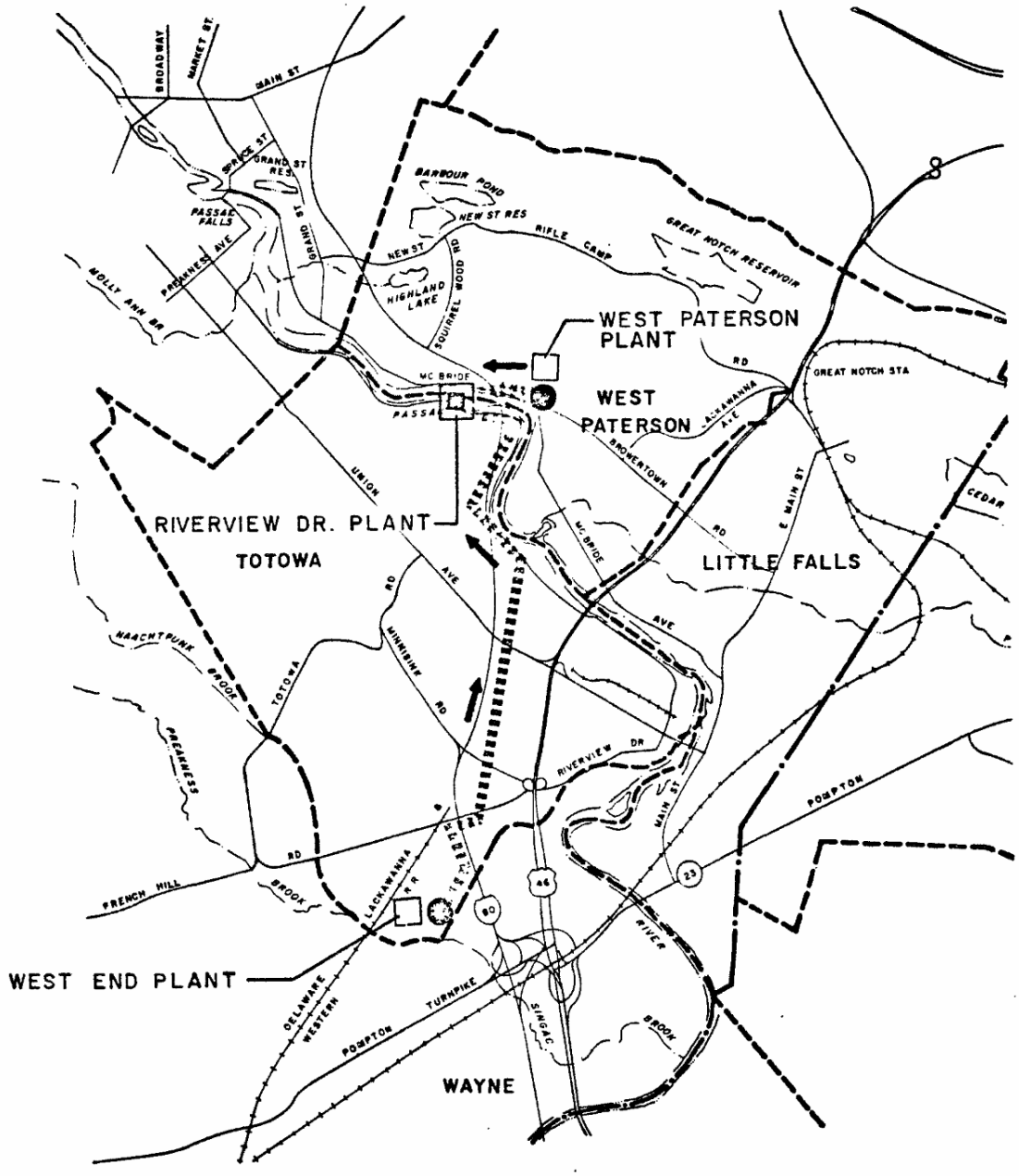
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE IA

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



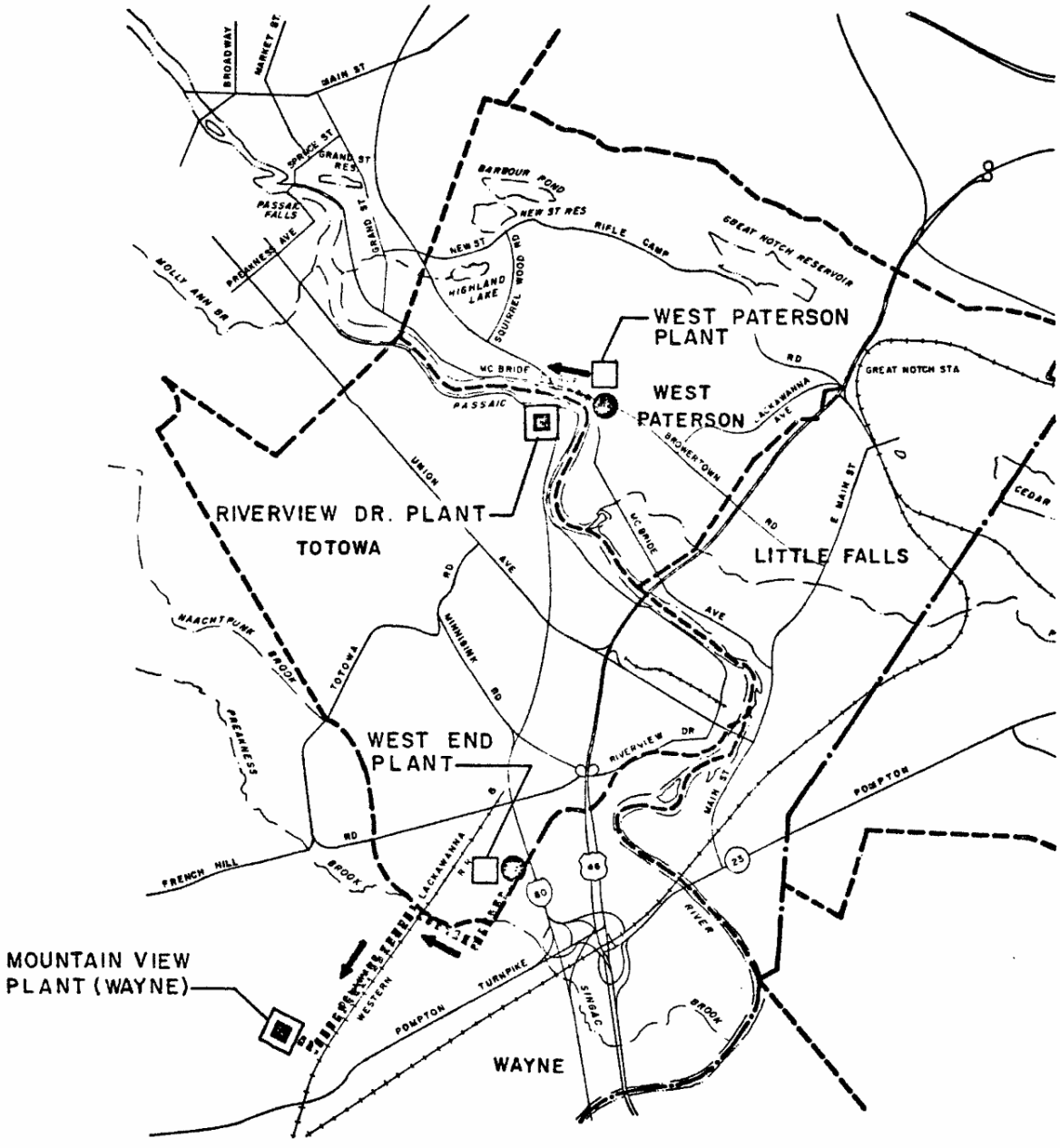
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT- EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 2A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



LEGEND

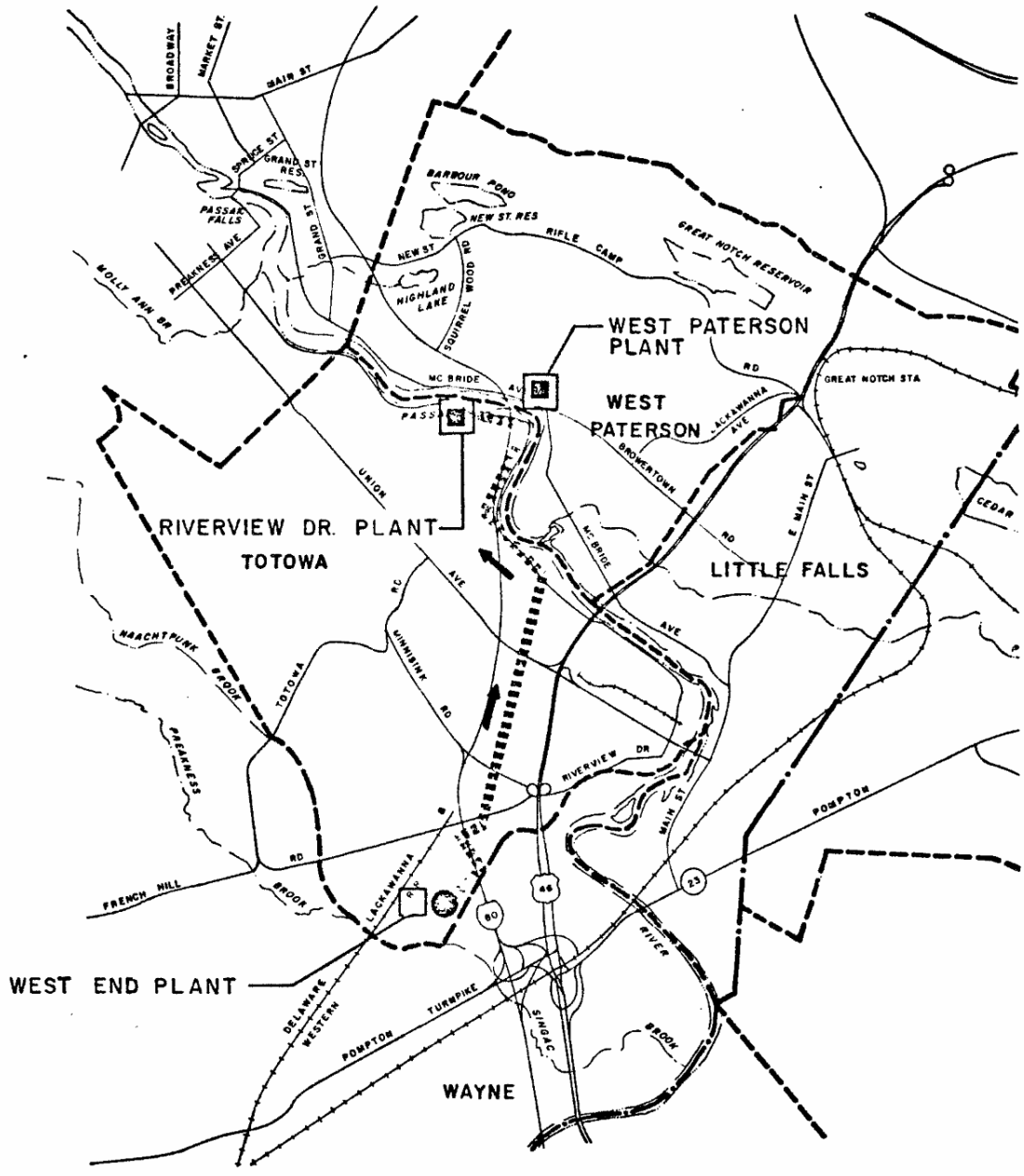
- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 2B

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XVI



LEGEND

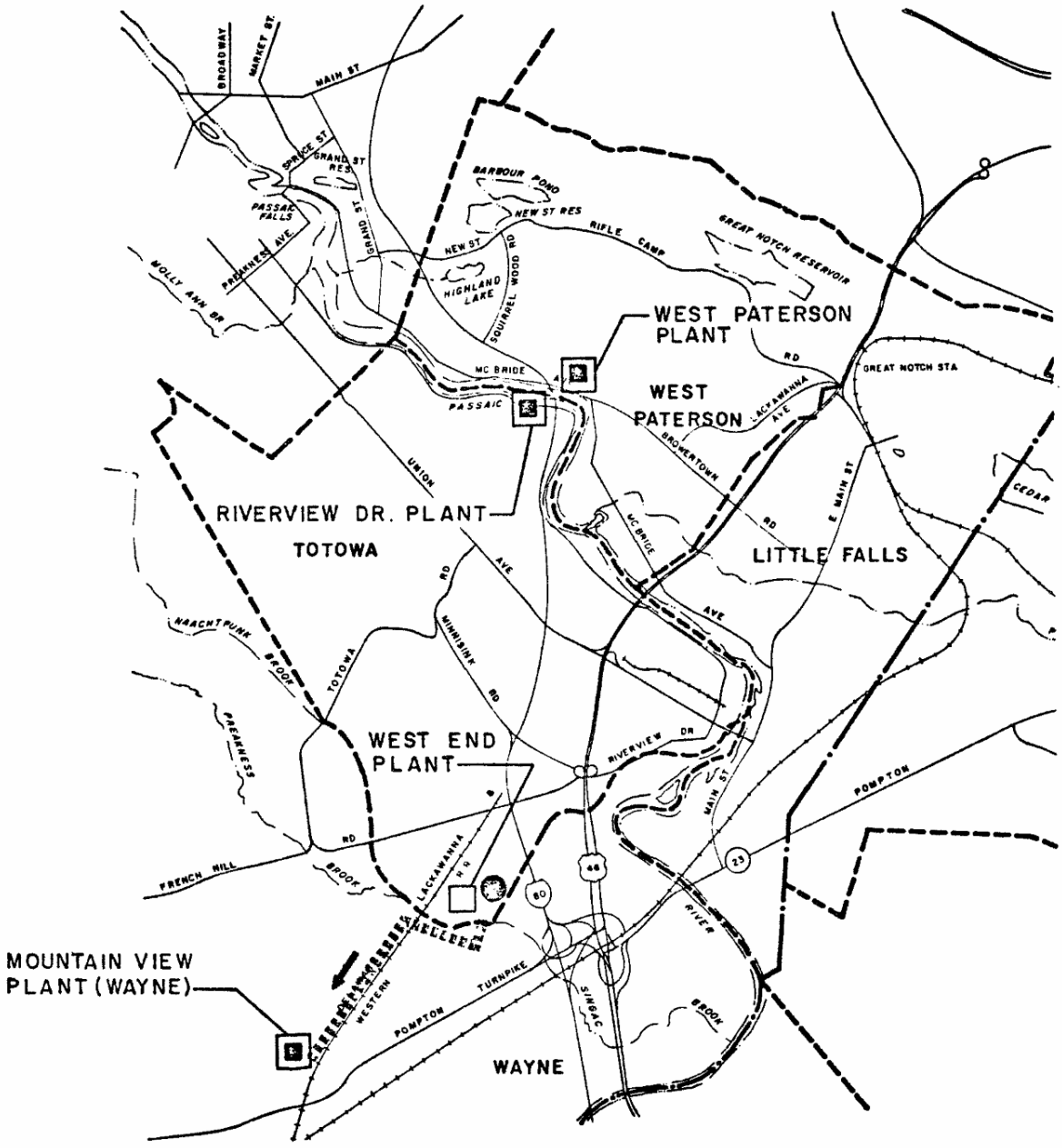
- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 3A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XVII



LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

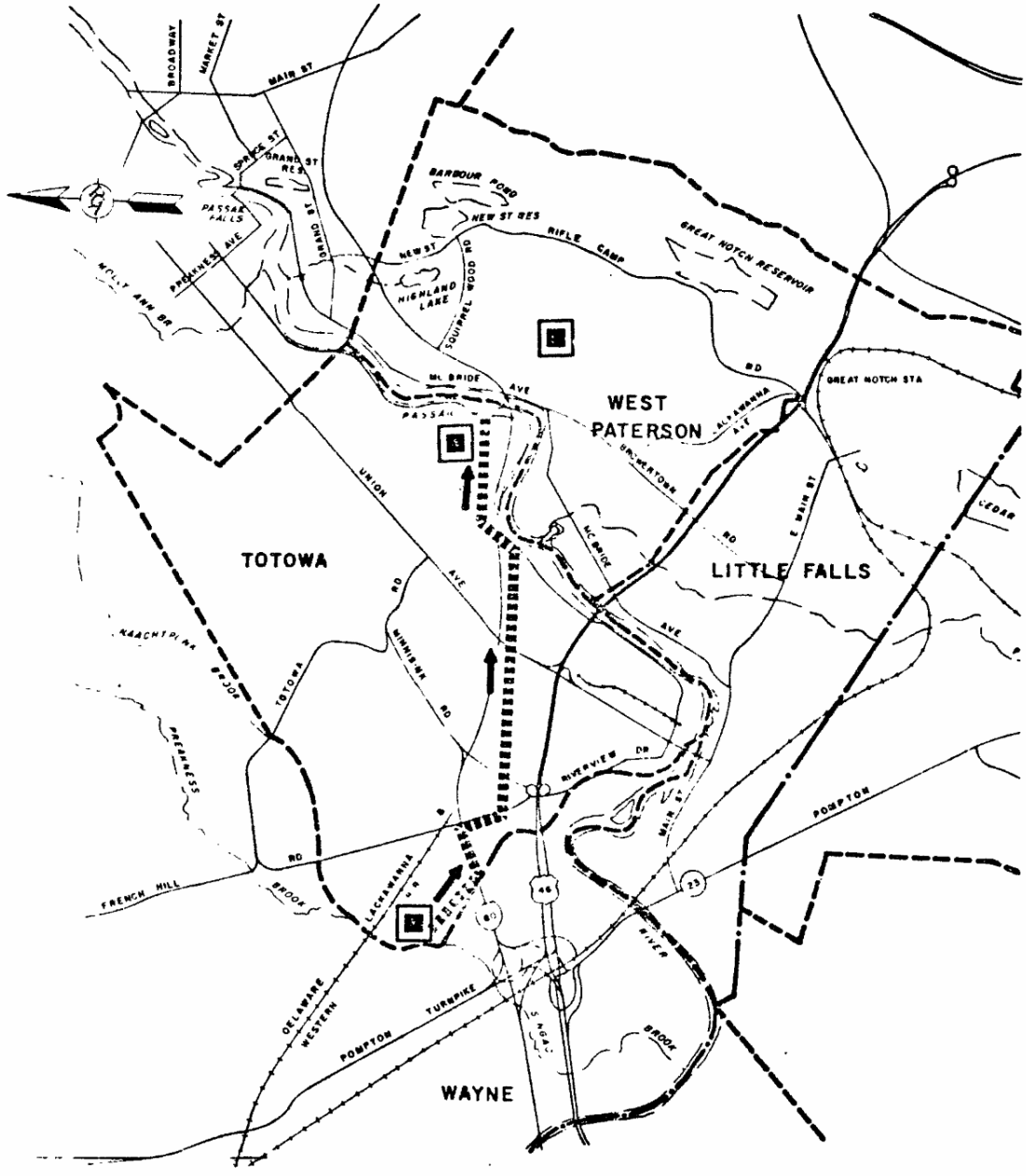
WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 3B

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS

PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XVIII



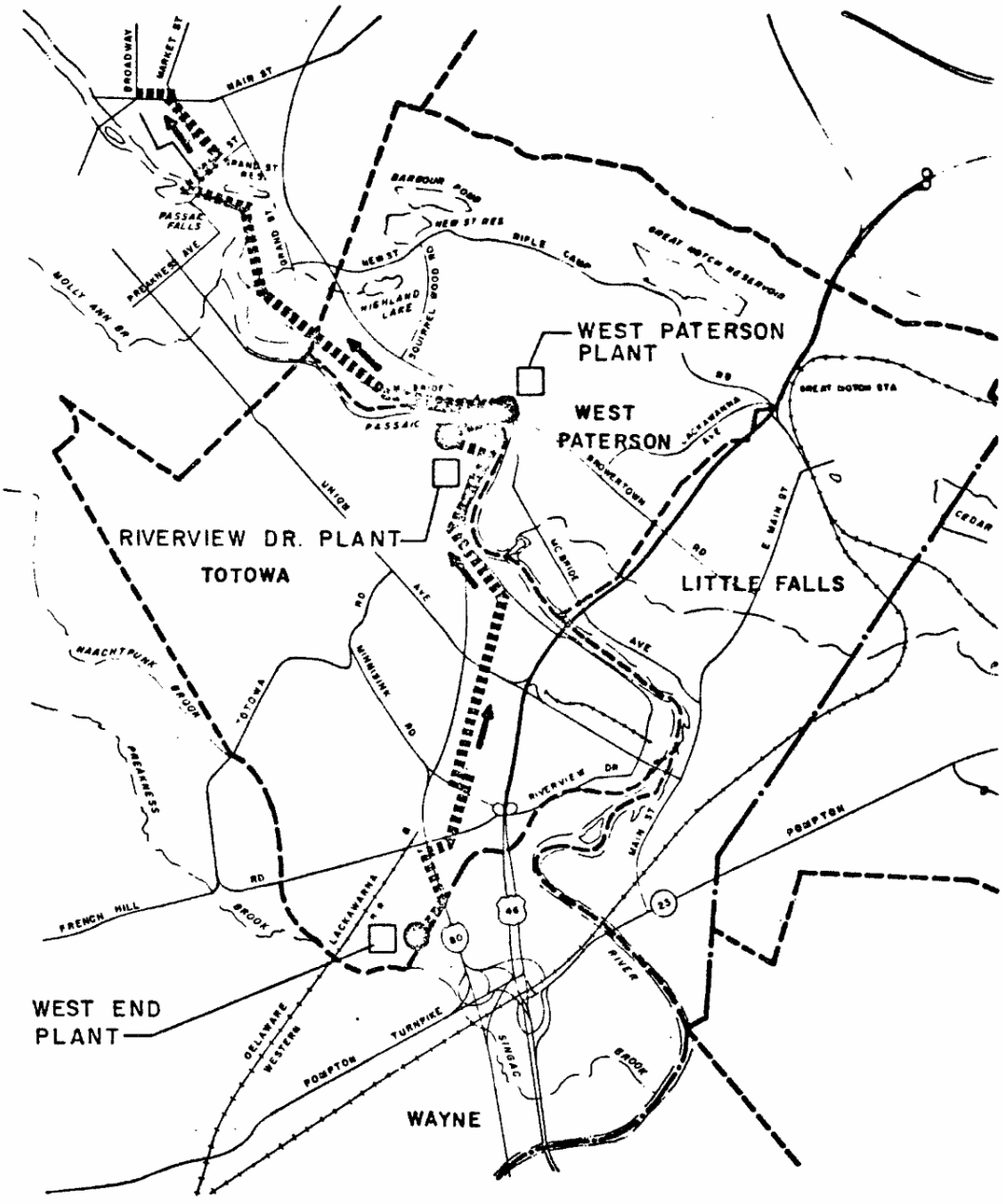
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 3C

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J



LEGEND

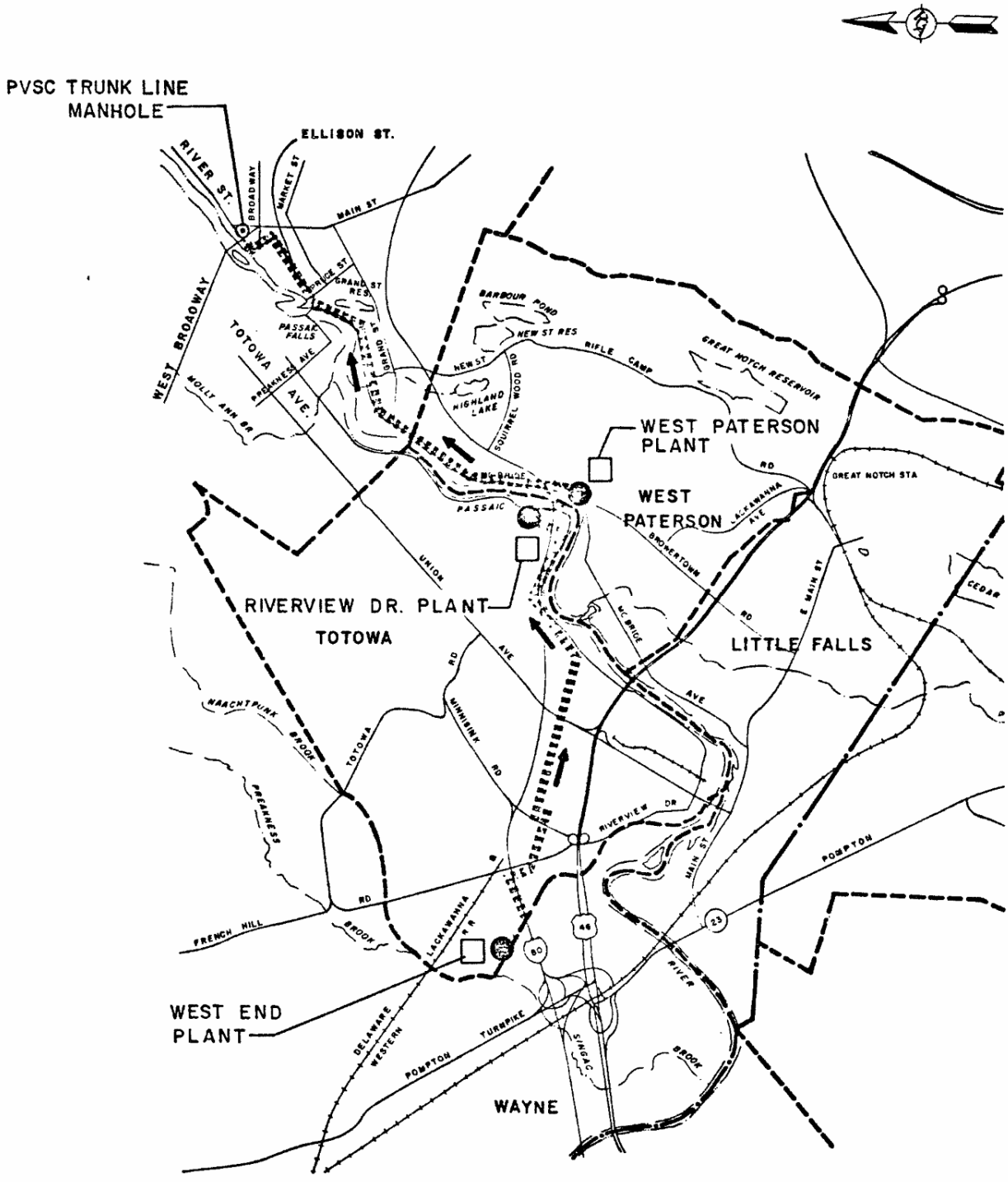
- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 4A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XIX



LEGEND

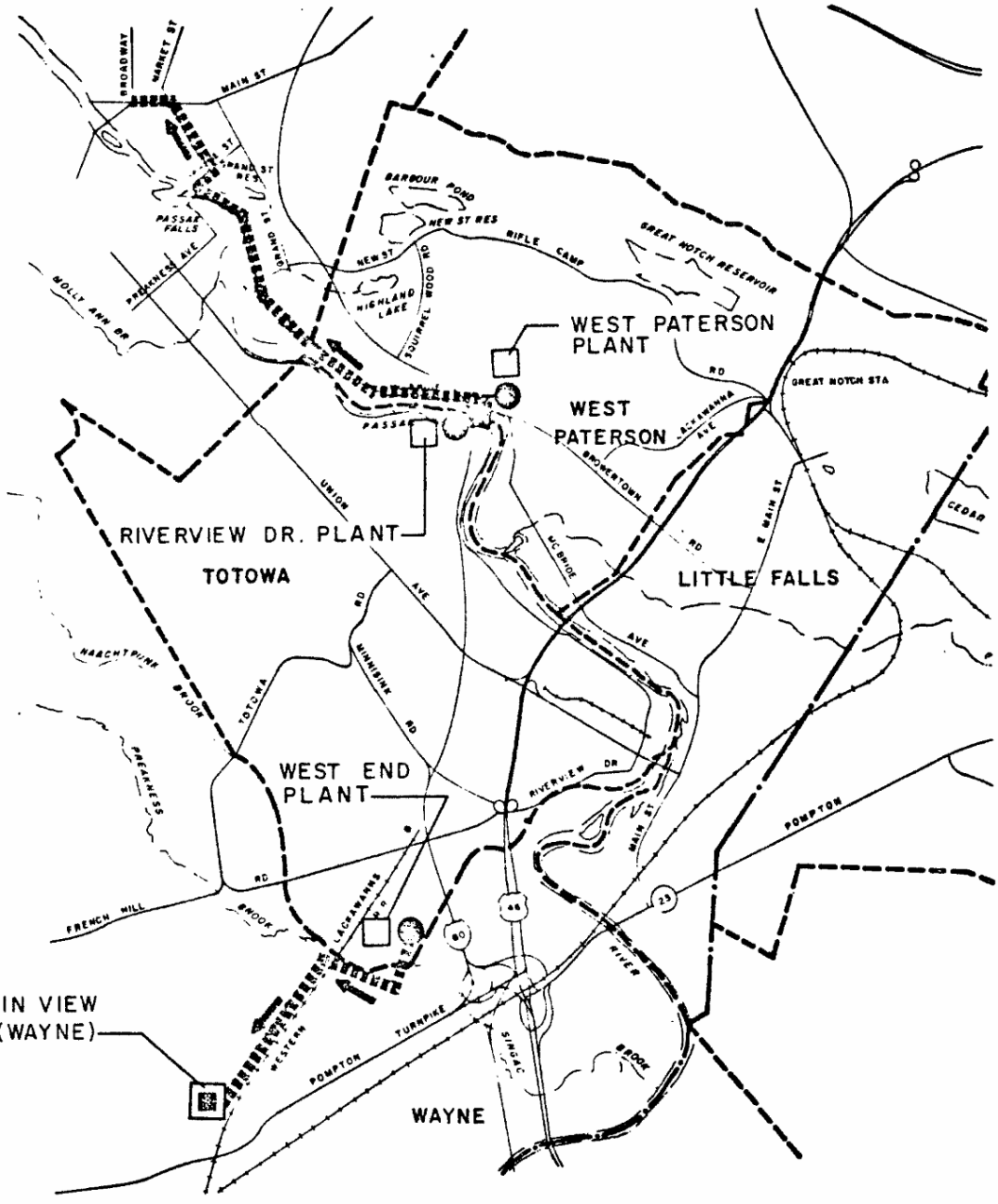
- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 4A-1

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XIV A



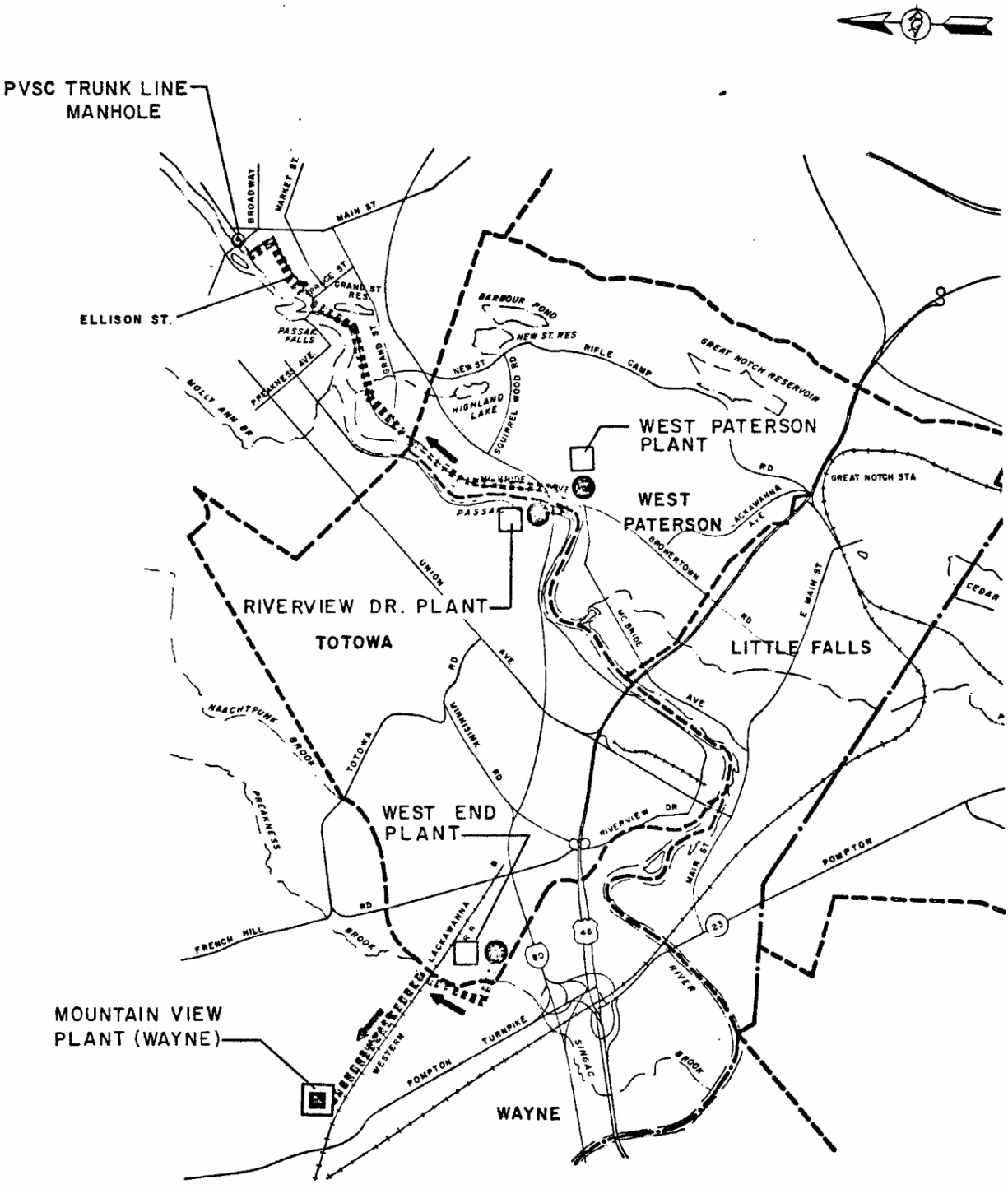
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 4B

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

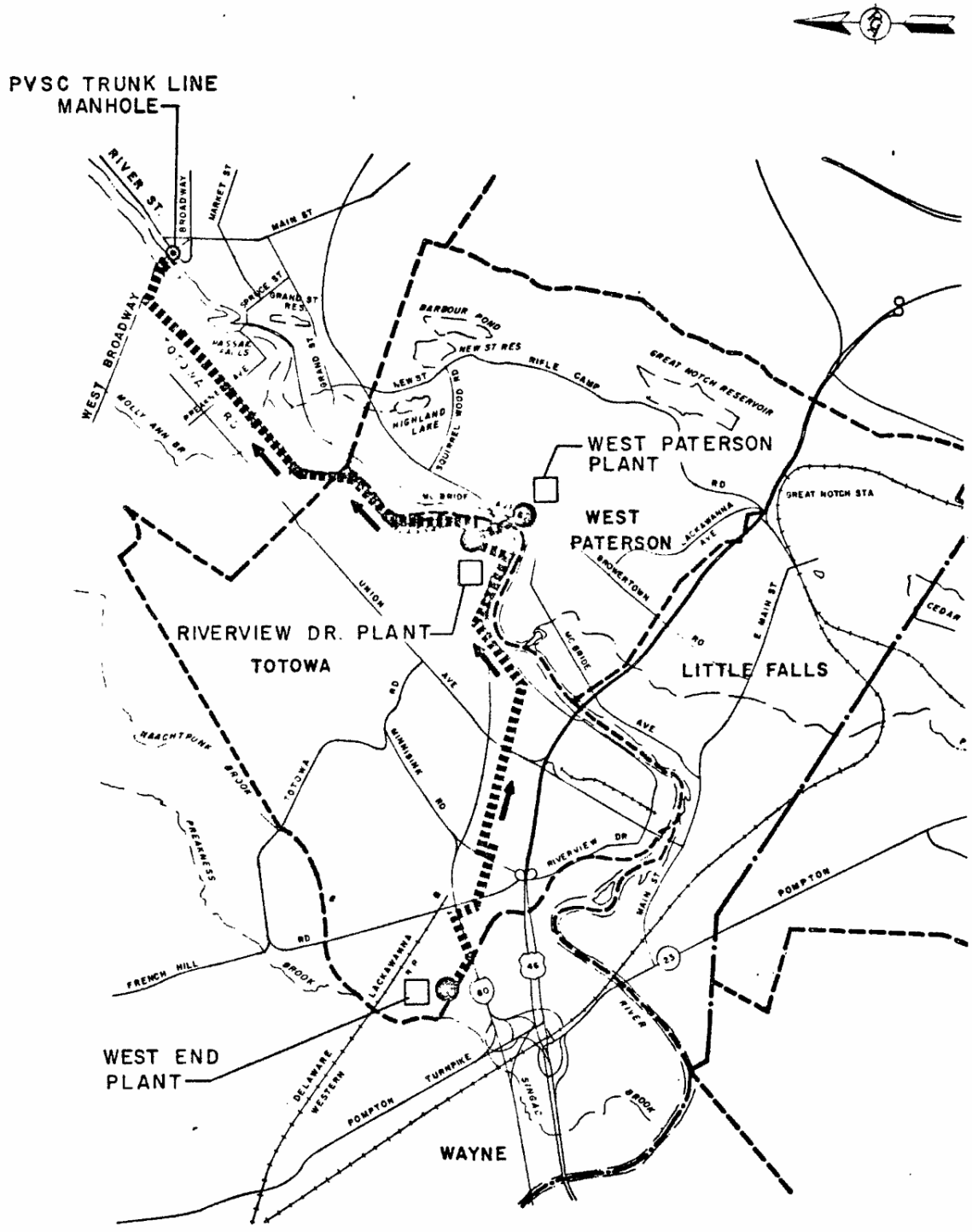
WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 4B-1

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS

PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XX A



LEGEND

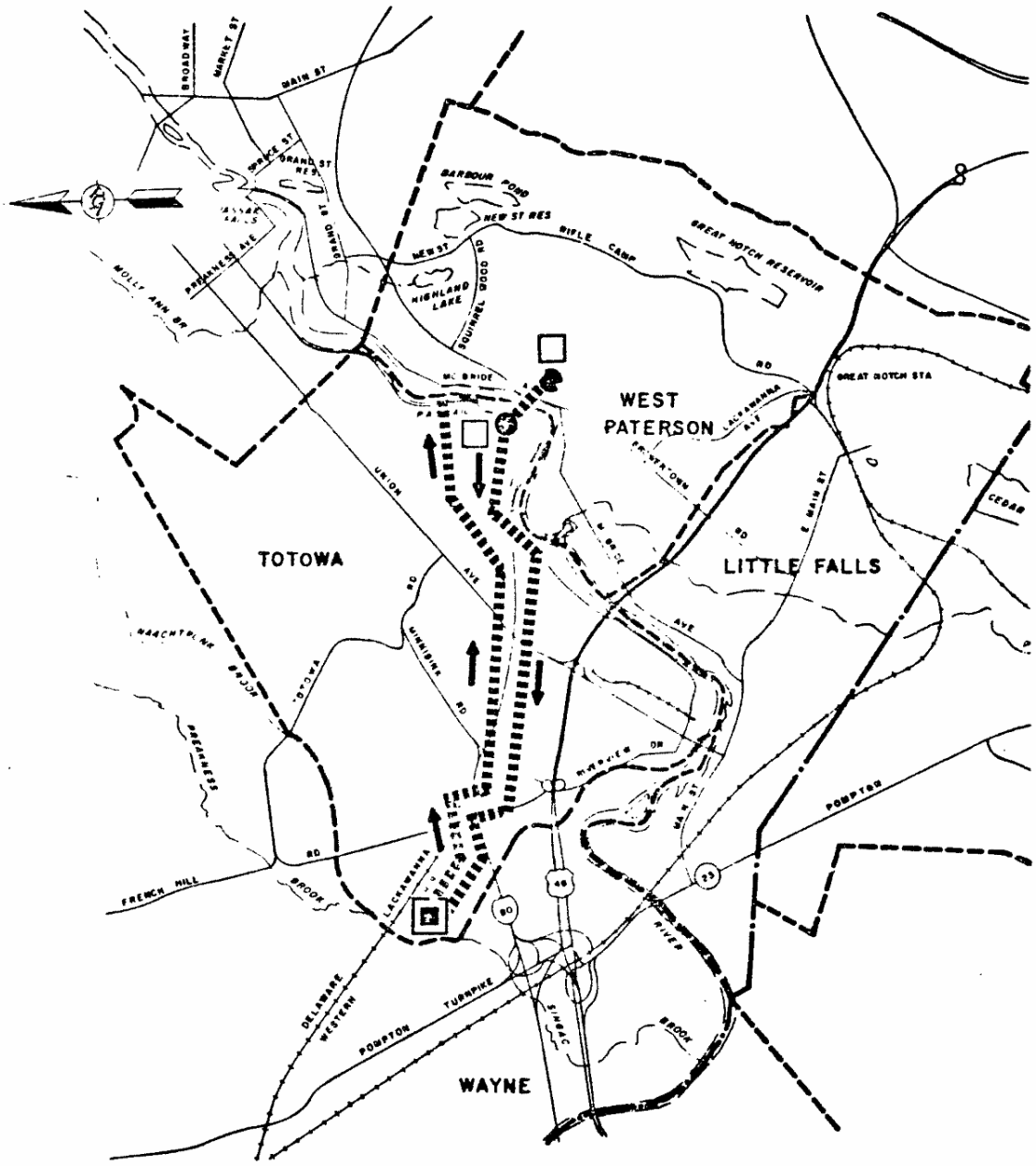
- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 4C

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.

PLATE XX B



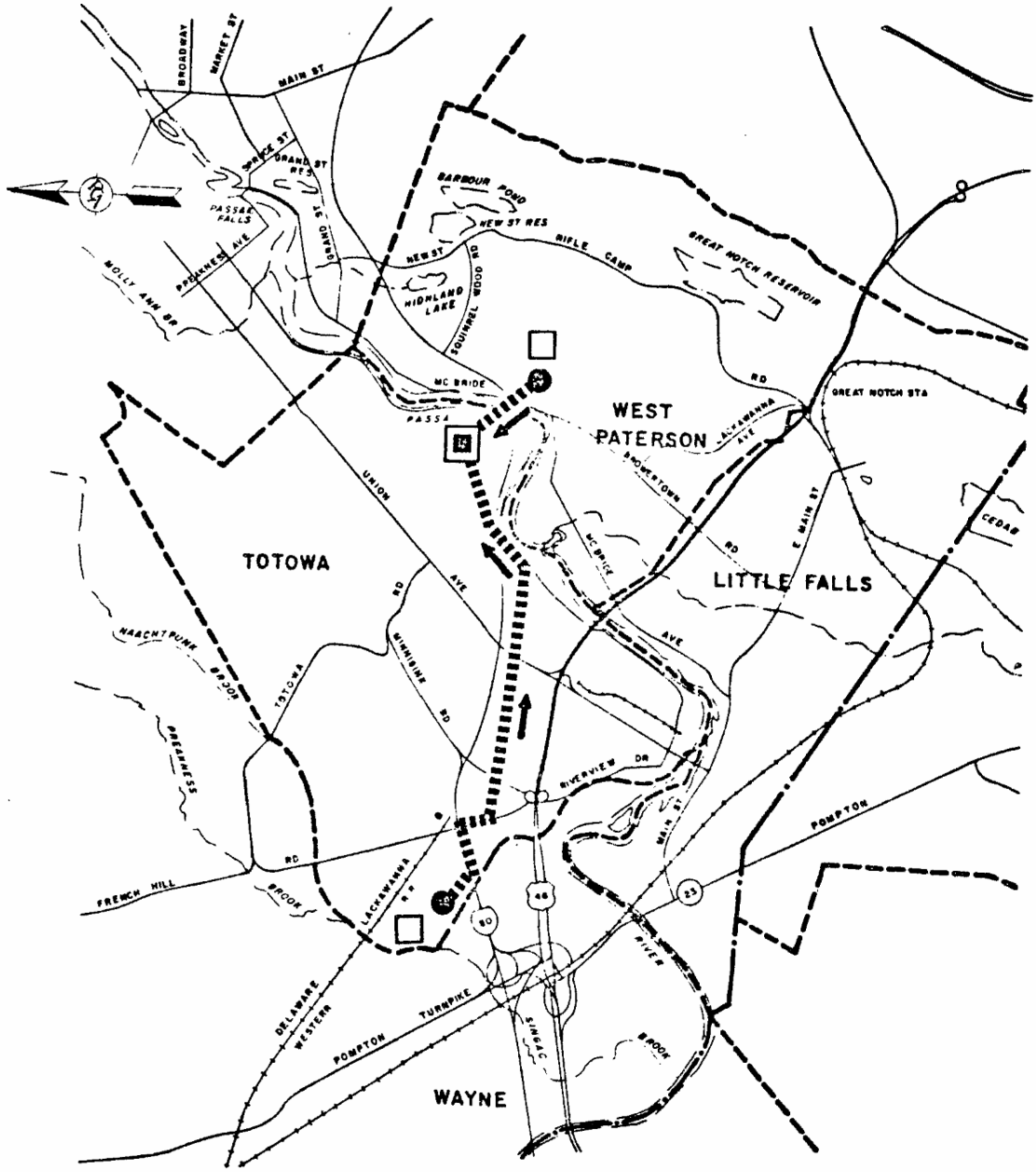
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 5A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



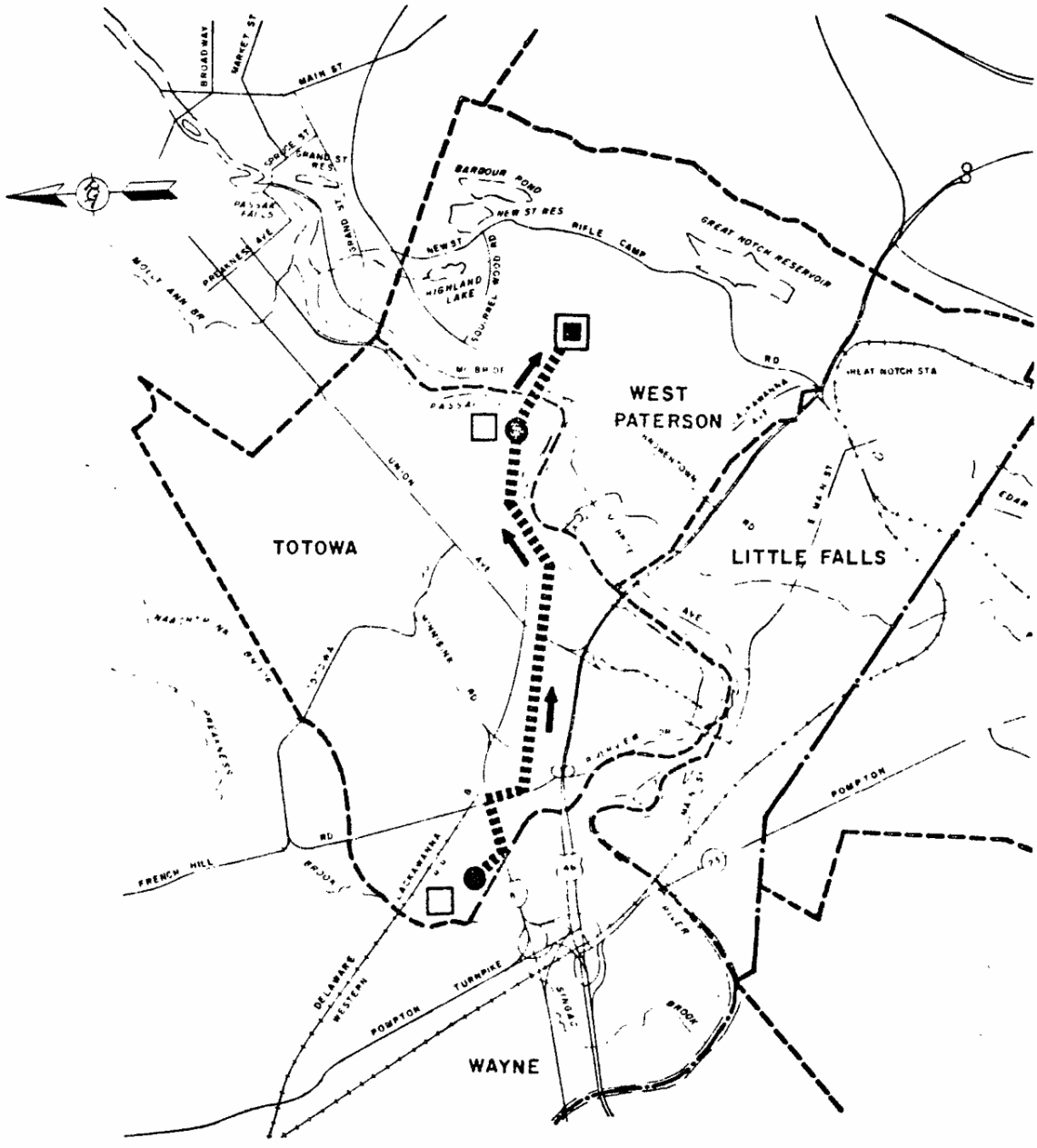
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 5B

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



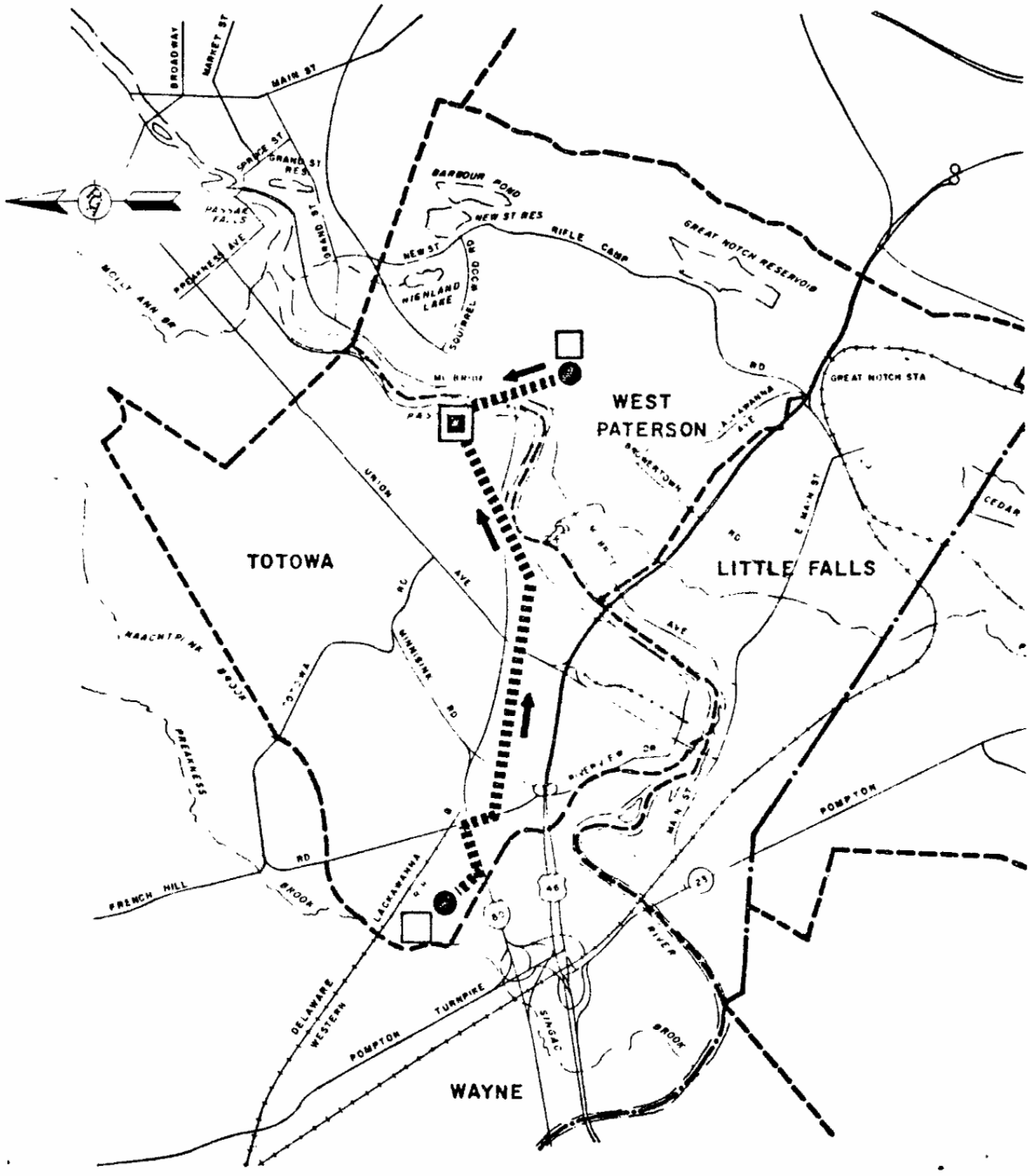
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 5C

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



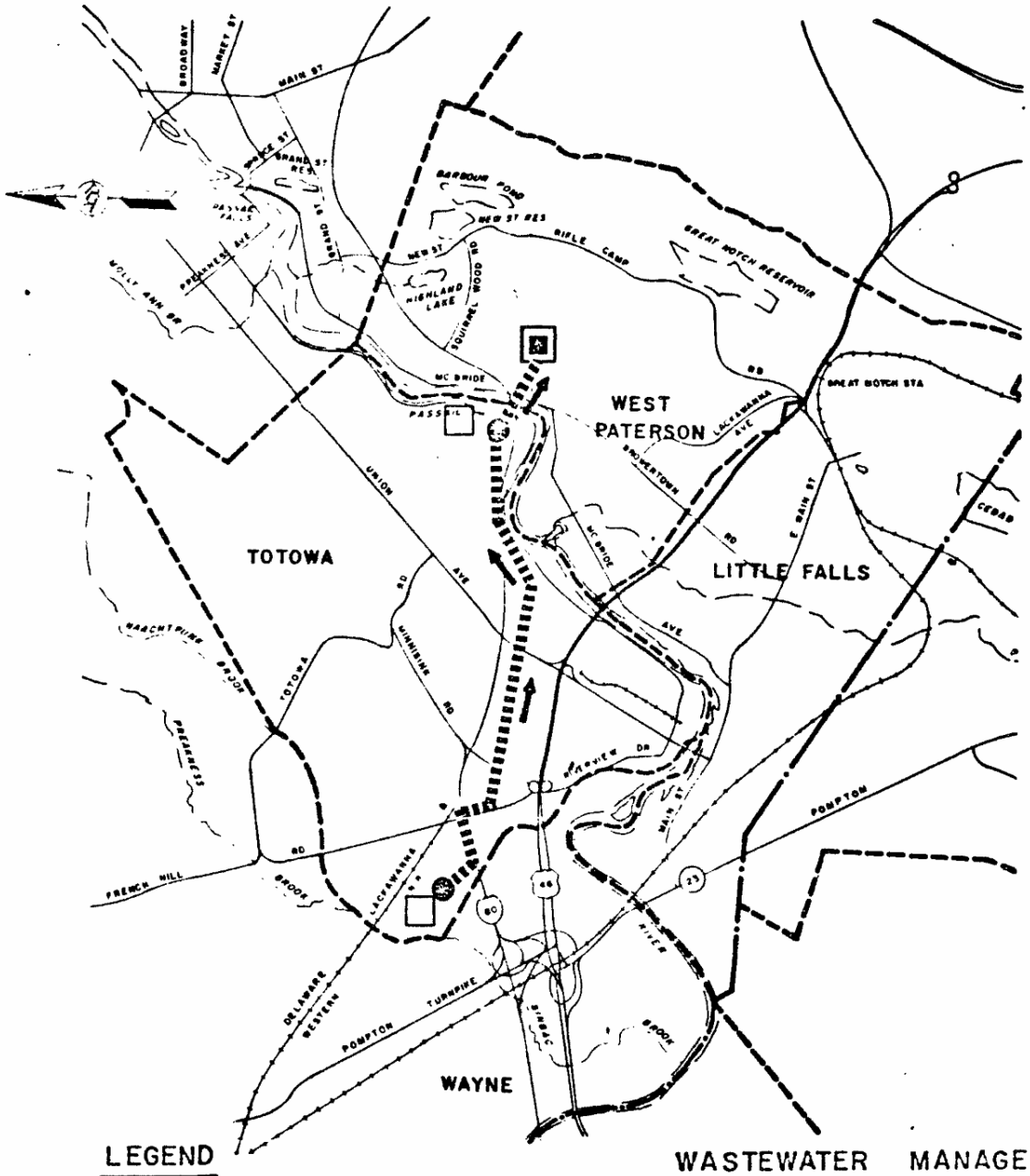
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 6A-1

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNT . N J.



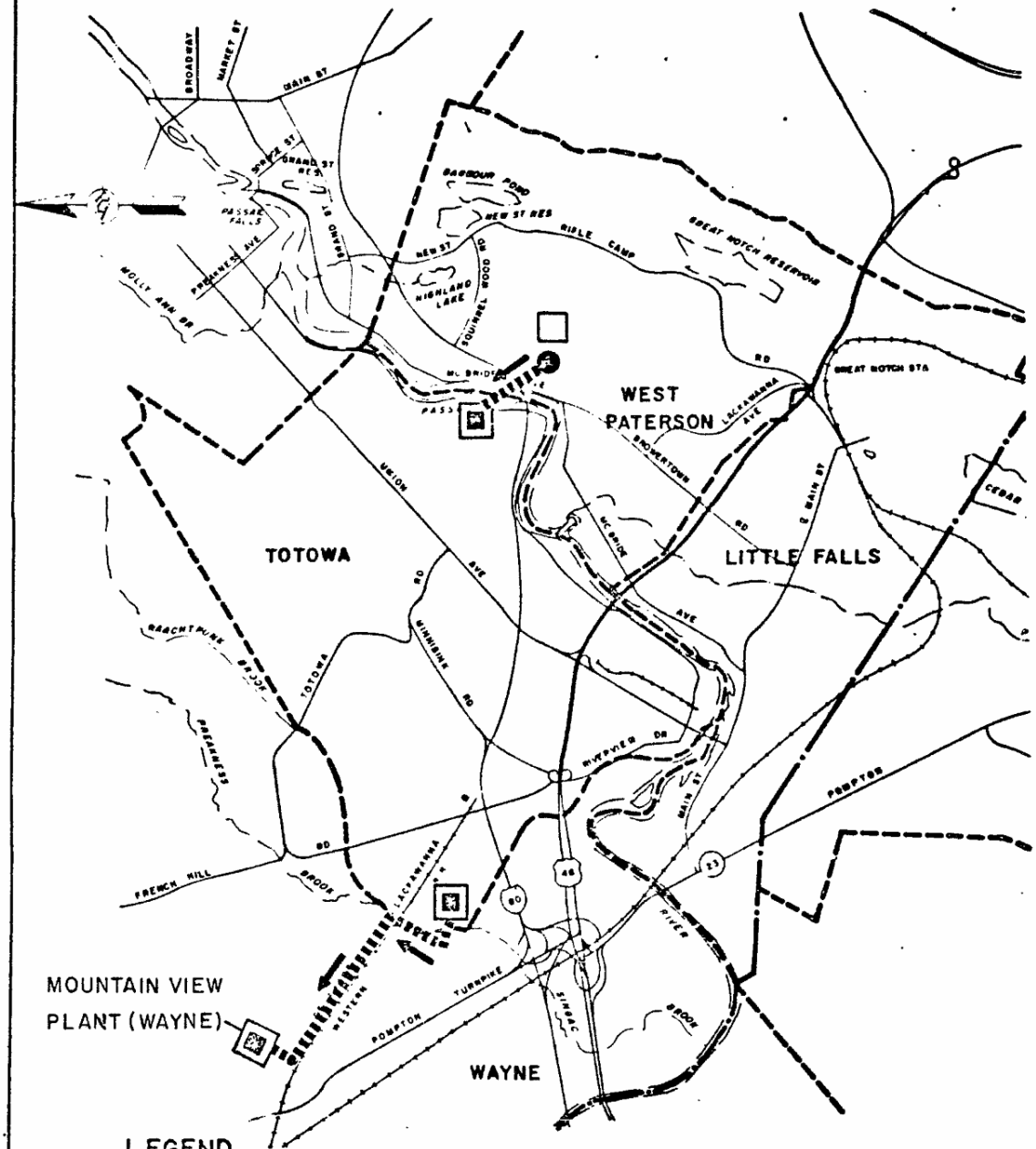
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 6A-2

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J



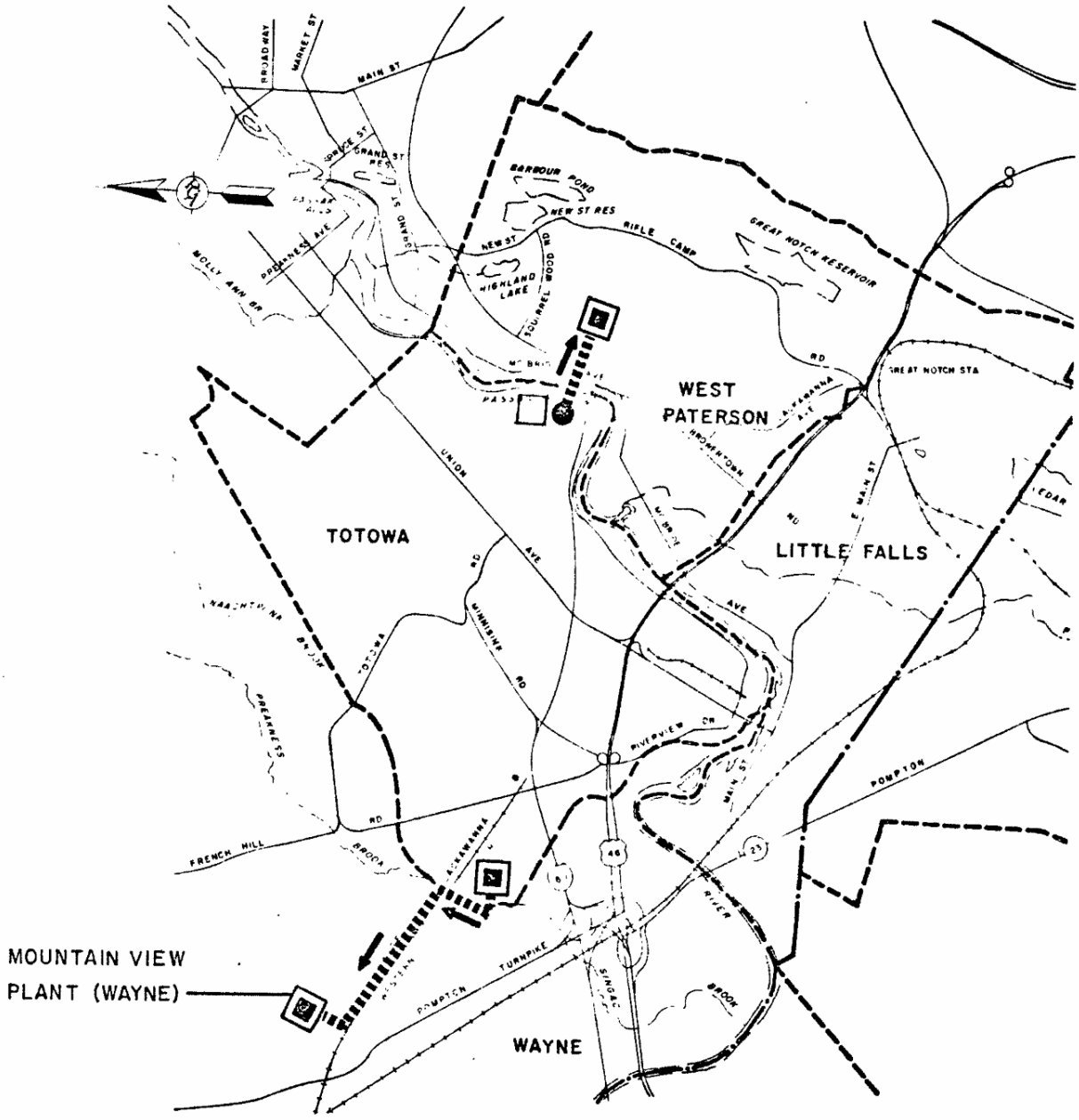
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 6B-1

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



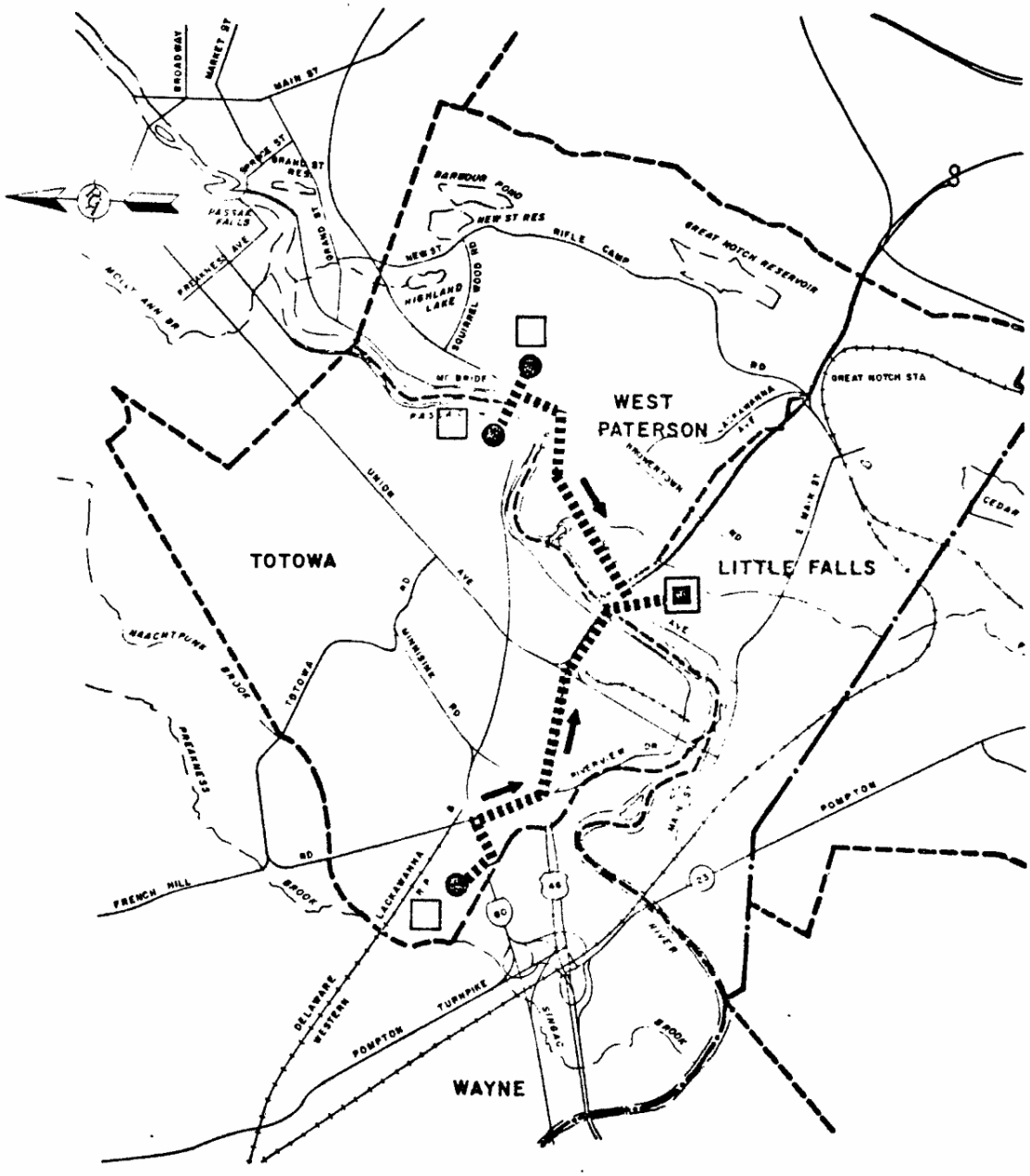
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 6B-2

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



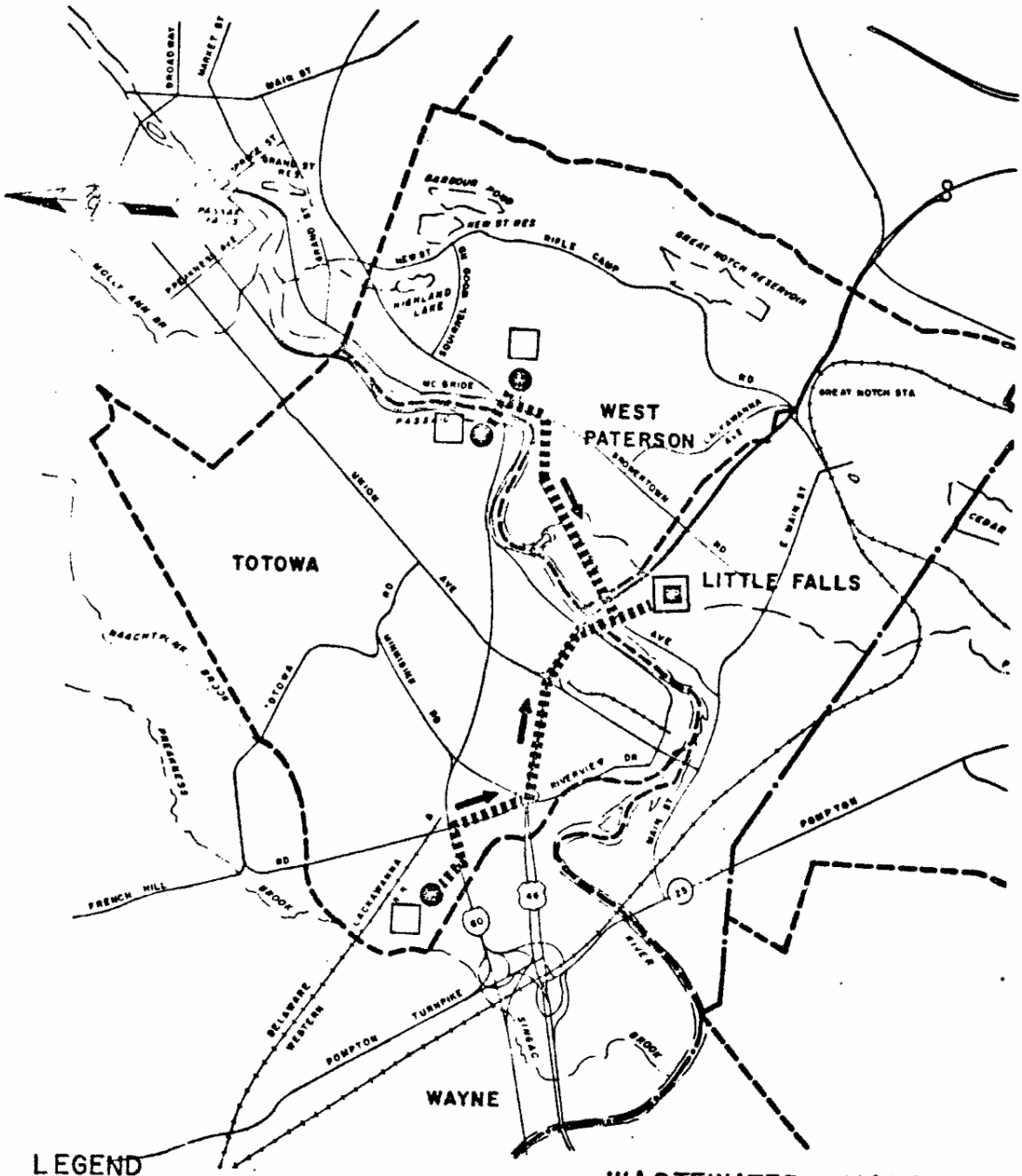
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 7A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



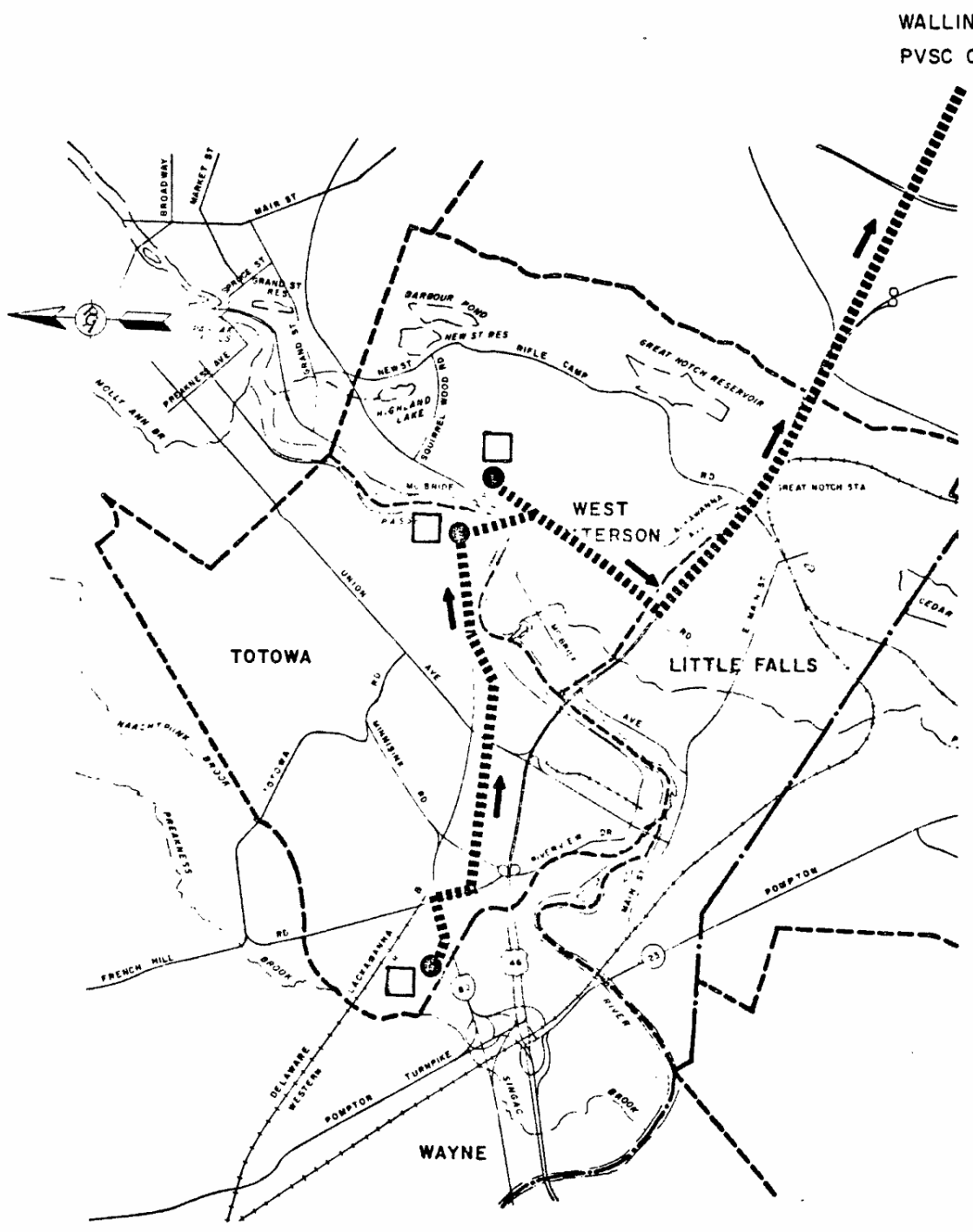
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA-WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 7B

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.



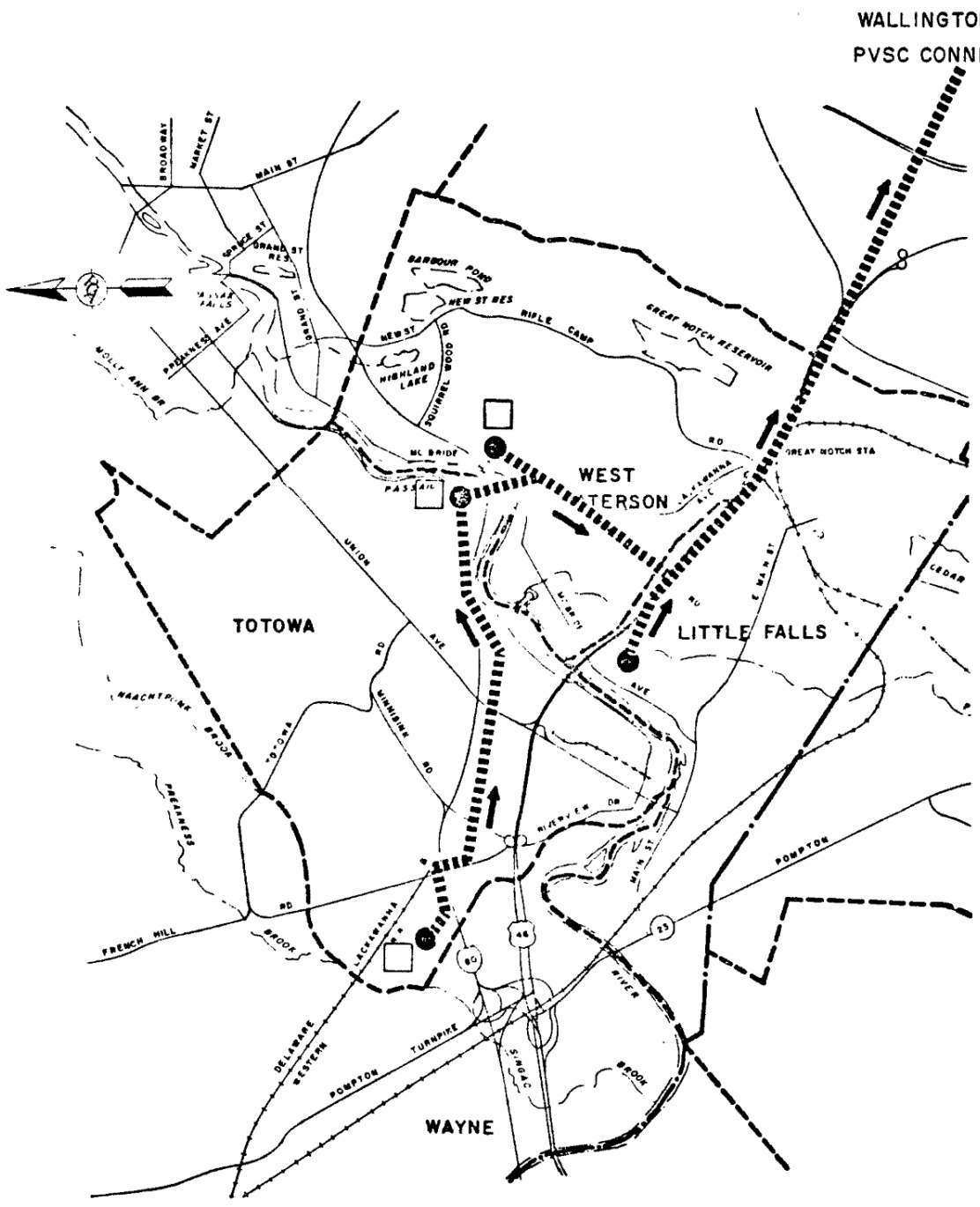
LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 8

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J



LEGEND

- PUMPING STATION
- ABANDONED PLANT
- TREATMENT PLANT-EXPANDED
- FORCE MAIN

WASTEWATER MANAGEMENT STUDY
FOR
TOTOWA - WEST PATERSON
SEWERAGE STUDY GROUP

ALTERNATE 8 A

PANDULLO, CHRISBACHER AND ASSOCIATES
CONSULTING CIVIL ENGINEERS
PASSAIC COUNTY, N.J. ATLANTIC COUNTY, N.J.