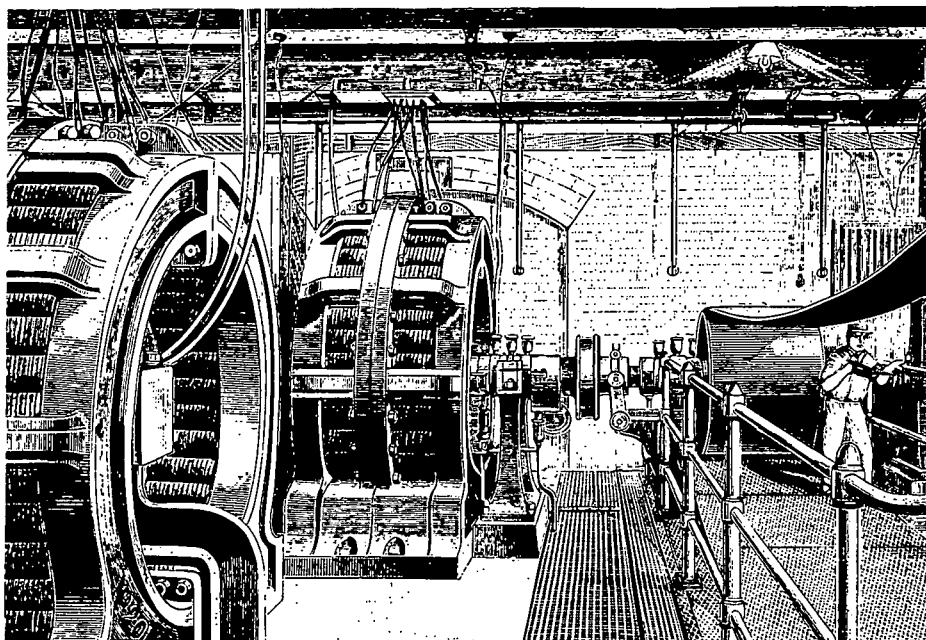


trenton ICES

Demonstration of a Grid Connected
Integrated Community Energy System
PHASE II
Volume 2



NOTICE ~~MINOR ONLY~~

Prepared for:
The U.S. Department of Energy
Contract No EC-77-C-02-4212

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Prepared by:
City of Trenton
Department of Planning and Development
10 Capitol Street, Trenton, New Jersey 08608

New Jersey Energy Research Institute
Public Service Electric & Gas Company
Richard G. Stein & Partners
Turner Construction Company
R.G. Vanderweil, Inc.

MASTER

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22 March 1976

trenton ICES
PHASE II
DRAFT FINAL REPORT
PREFACE

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This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

The following draft report consists of two sections.

At the conclusion of Phase II, Demonstration of a Grid-Connected Integrated Community Energy System, an economic analysis was performed. This analysis was based upon the assumption of Public Service Electric and Gas Company (PSE&G)'s ownership and operation of the ICES plant and distribution system. Therefore the parameters of the analysis were PSE&G's standard engineering practices, standard instrumentation and controls design, standard operating procedures and standard estimating methods. The capital costs were developed as a joint effort of the entire Demonstration Team. The value of electric energy was assumed to be the Pennsylvania-Jersey-Maryland Power Interconnection off-peak and on-peak incremental energy costs. Escalation rates for various cost components were determined by the PSE&G "Escalation Task Force." The resulting analysis showed the ICES operating at a levelized annual penalty in 1982 dollars of \$2.5 to \$3.0 million.

Subsequent to this economic analysis based on PSE&G ownership, the Team began to look at an analysis of the economic implications of an alternative ownership and also alternative escalation scenarios. This analysis, based on the U.S. Army Corp of Engineers procedures for feasibility studies of selective energy plants, was performed very quickly by Richard G. Stein and Partners, and has not yet been reviewed by the Team.

Public Service Electric and Gas Company has not had an opportunity to examine this analysis and does not wish in any way to appear to endorse or concur with its conclusions, prior to PSE&G review.

Richard G. Stein and Partners and R.G. Vanderweil Inc. do not take issue with the economic analysis based on PSE&G ownership, but wish to express the opinion that the analysis reflects only that specific ownership option with its particular internal and external constraints, assumptions and procurement procedures.

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Arthur J. Holand, Mayor
John P. Clarke, A.A. Director

700 Capitol Street

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Consequently the draft material submitted herein has been split into two sections. The first section contains material prepared directly by PSE&G. The second section contains the remainder of the workscope items. This organization in no way implies that any particular material submitted is solely the work of one party. Many workscope items were joint efforts of several Team members.

The final version of this report will either reconcile the differences apparent in this organization or will present clearly divided opinions within a single organizational structure.

trenton ICES

Demonstration of a Grid-Connected
Integrated Community Energy System

PHASE 2

Volume 1 and 2

Preliminary Design of ICES System
and
Analysis of Community Ownership

Prepared for:

The U.S. Department of Energy
Contract No. EC-77-C-02-4212

Prepared by:

City of Trenton
Department of Planning and Development
10 Capitol Street, Trenton, New Jersey 08608

Richard G. Stein and Partners
R. G. Vanderweil, Inc.
Turner Construction Company
Robert Silman Associates

March 22, 1978

Abstract

Phase 2 Preliminary design and evaluation for a Grid-Connected Thermally Controlled Integrated Community Energy System (ICES) for the City of Trenton, New Jersey has been carried out. The findings of this study are:

It is technically feasible, utilizing commercially available hardware.

Under utility ownership and operation, it will not be economically competitive with conventional alternatives for heating and cooling buildings (analysis contained in companion report under separate cover).

Under utility ownership and operation, no restrictions have been identified which would prevent the project from proceeding.

Under community ownership, preliminary analysis indicates that thermal energy produced by Trenton ICES will be approximately 12 percent less expensive than thermal energy produced by oil-fired boilers.

A review and update of institutional analyses performed during Phase 2 has identified no factors which would preclude community ownership and operation of the Trenton ICES.

The background data produced for the analysis of the Trenton ICES based on utility ownership and operation can, in large part, be used as the bases for a detailed analysis of community ownership. Approximately six weeks would be required for this analysis.

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TRENTON ICES

Demonstration of a Grid-Connected
Integrated Community Energy System

PHASE 2

Volume 1 and 2

Preliminary Design of ICES System
and
Analysis of Community Ownership

Prepared for:

The U.S. Department of Energy
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March 22, 1978

TABLE OF CONTENTS

Summary

Appendix A	(3.5.1e) Urban Renewal Disposition Agreement
Appendix B	(3.5.1e) Urban Renewal Plan Amendment
Appendix C	(3.5.1e) Use Variance Application
Appendix D	(3.5.1e) Planning Board Minutes and Schedule of Required Approvals
Appendix E	(3.5.2a) Load Demand Profiles
Appendix F	(3.5.2c) Preliminary Design - Drawings
Appendix G	(3.5.2c) Preliminary Design - Specifications
Appendix H	(3.5.1 c1) New Jersey Assembly Bill No. 519

Introduction

The Trenton Integrated Community Energy System (ICES) is a 10 megawatt (electric) facility with heat recovery of 68×10^6 Btuh in the form of 150 psig steam. The electrical generation is performed by four combustion turbines nominally rated at 2500 kw. Conventional auxiliary boilers are provided for exceptional peak demands and emergency standby.

The Trenton ICES project will be located in downtown Trenton, the State Capital of New Jersey and will serve a community totalling 3,700,000 square feet of floor area by 1982. This community will be formed of 19 buildings belonging to six different owners. The State of New Jersey, the largest single owner, is responsible for approximately 2.3 million square feet of building. The plant will be housed in its own structure and will contain an "Energy Information Center," a public viewing gallery with displays utilizing the color coded plant equipment to explain the functioning of ICES and the concept of co-generation.

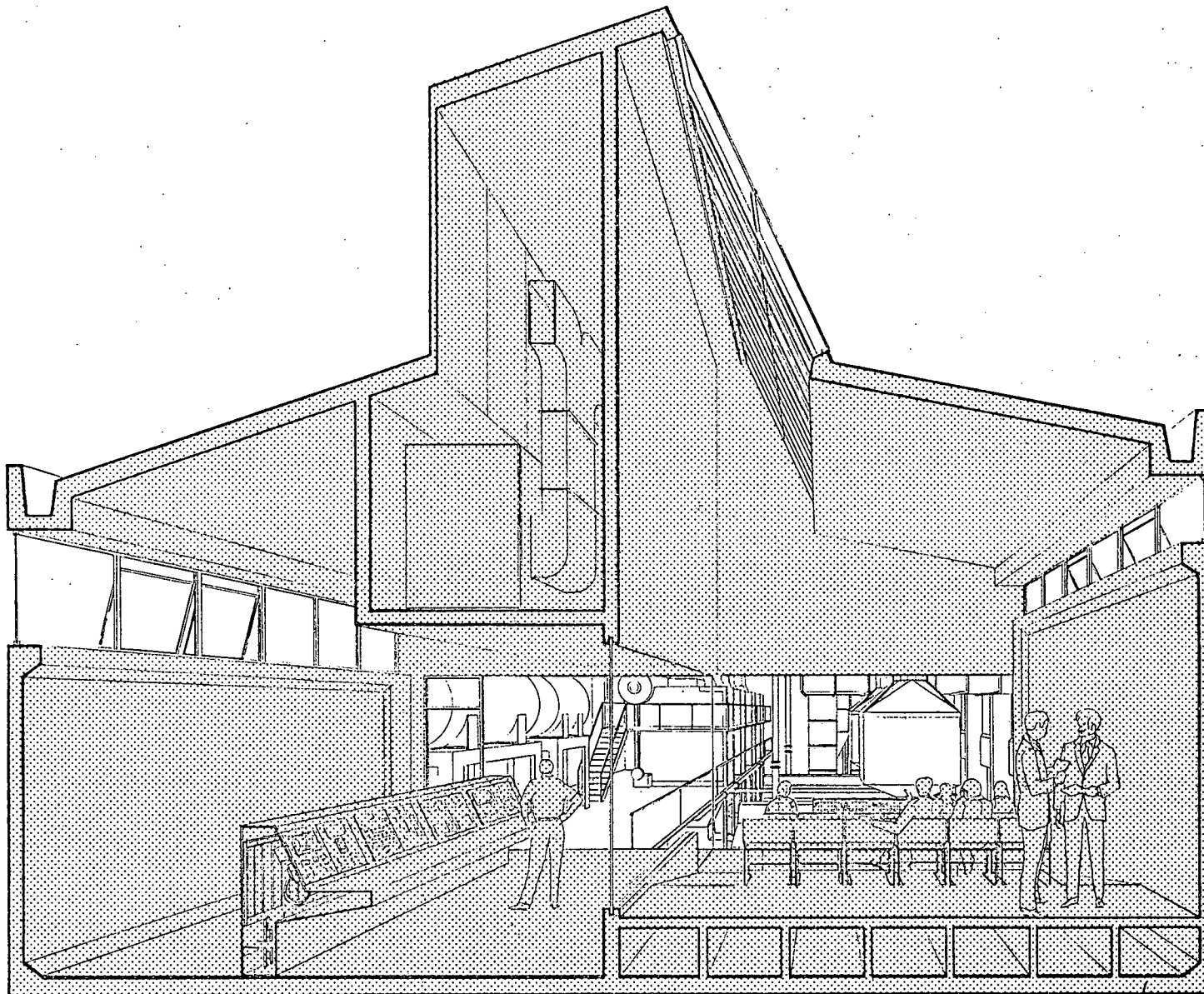
Early in Phase 1 of this project a multi-track analysis was undertaken to identify and evaluate alternative owning and operating patterns. The preferable alternative was given the primary track and secondary approaches were identified to be pursued only if the primary track failed to prove viable. The major primary track provided for the local electric utility ownership and operation of the system. This track was followed to minimize institutional problems and to take advantage of the experience of the utility. This track appeared to show economic competitiveness with conventional alternatives for providing thermal energy to

the buildings. Throughout Phase 1 and through the 90-day period of Phase 2, these findings are reflected in the Phase 1 final report and the Phase 2/90-day draft report.

On March 13, 1978, the utility informed the other members of the Demonstration Team, that based on data generated in Phase 2, thermal energy delivered by the Trenton ICES, if owned and operated by the utility, would result in an average annual penalty of \$2.5 to \$3 million (in 1982 dollars).

At this time, a secondary track from Phase 1, that of community ownership and operation, was pursued. Recognizing severe limitations in time, a basic methodology was adopted based on United States Army Corps of Engineers' Engineering Instructions for Preparation of Feasibility Studies for Total Energy, Selective Energy, and Heat Pump Systems, 1 July 1975. Using basically the same background data as the primary track analysis and based on the credit for the value of electricity, this alternative shows a net life cycle cost saving for thermal energy produced by ICES of approximately 12 percent.

It should be pointed out that this analysis has been carried out under highly restricting time constraints and should not be considered as definitive. It does, however, indicate that when the carefully prepared background data for the primary track economic analysis is subjected to a feasibility methodology used by a major institution (the United States Army), the project demonstrates strong economic viability.



CONTROL ROOM AND ENERGY INFORMATION CENTER

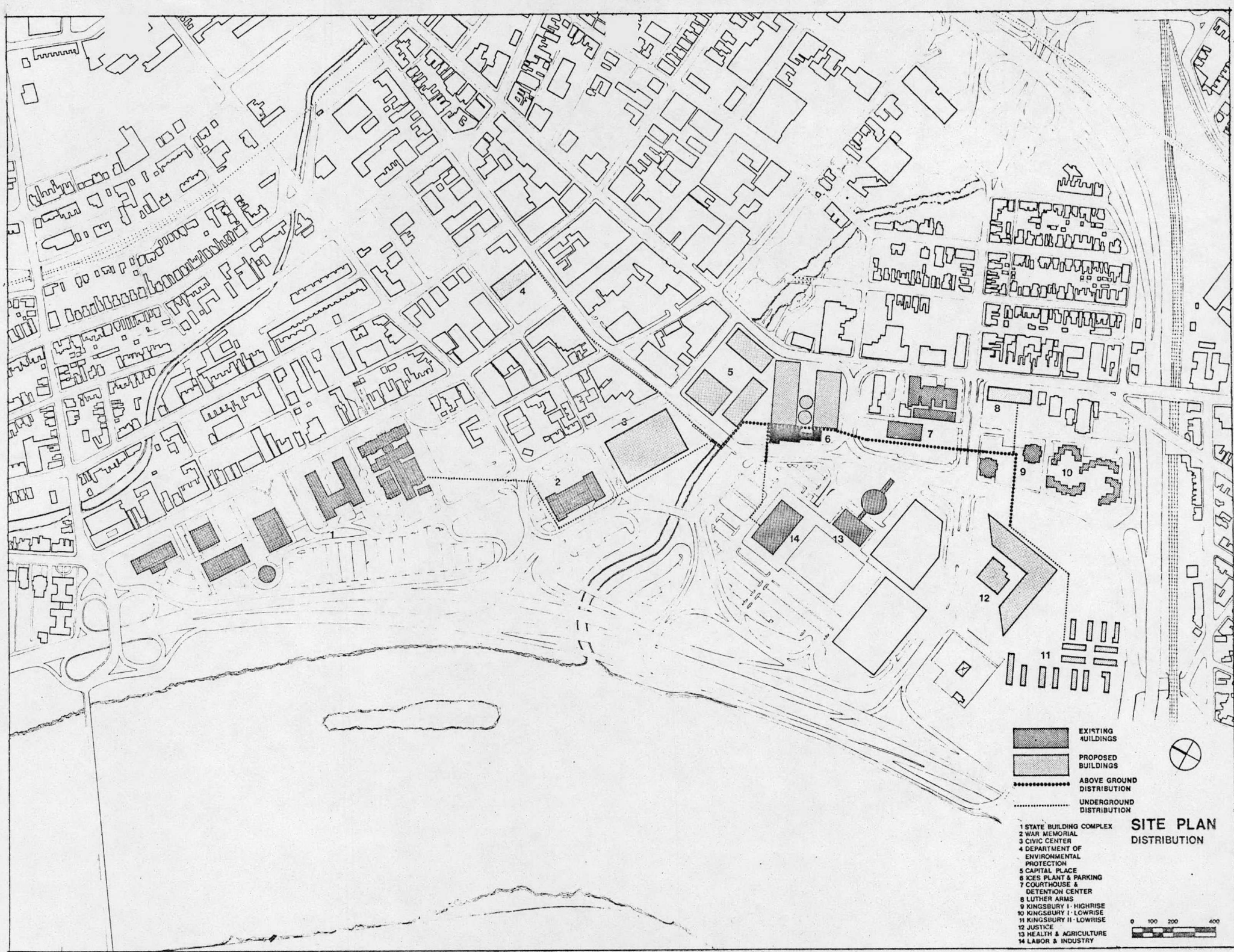
ICES DEMONSTRATION COMMUNITY





	<u>SQUARE FEET</u>	<u>CONSTRUCTION</u>	
		<u>START</u>	<u>COMPLETION</u>
Kingsbury I Towers	280,000	Existing	
Kingsbury I Lowrise	74,500	Existing	
Mercer County Detention Center	160,000	Existing	
Mercer County Courthouse	130,000	Existing	
Labor and Industry	300,000	Existing	
Health and Agriculture	144,000	Existing	
Statehouse Complex (incl War Mem)	795,525	Existing	
Lutheran Arms*	91,500	Existing	
Capital Place I*	175,000	Existing	
Existing Building Subtotal		2,150,525	
Justice Department	800,000	1978	1980
Capital Place Commercial	200,000	1979	1980
Kingsbury II	200,000	1980	1981
Civic Center	100,000	1981	1982
Dept. Environmental Protection	250,000	1981	1982
Future Building Subtotal		1,550,000	
TOTAL		3,700,525	

*Not yet complete but with anticipated completion ahead of ICES availability.

POTENTIAL FUTURE EXPANSION OF DEMONSTRATION COMMUNITY

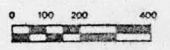
	<u>SQUARE FEET</u>	<u>CONSTRUCTION</u>	
		<u>START</u>	<u>COMPLETION</u>
NJ State Dept. of Treasury	180,000	Existing	
Mercer County Community College	18,000	Existing	
Mercer County Courthouse Extension	36,000	Not established	
Mercer County Administration Bldg	100,000	Not established	
Capital Place 3	100,000	Not established	
Capital Place 4	150,000	Not established	
Commercial Buildings (2)	80,000	Not established	
A State Office Building	250,000	Not established	
Potential Future		914,000	
GRAND TOTAL		4,614,525	

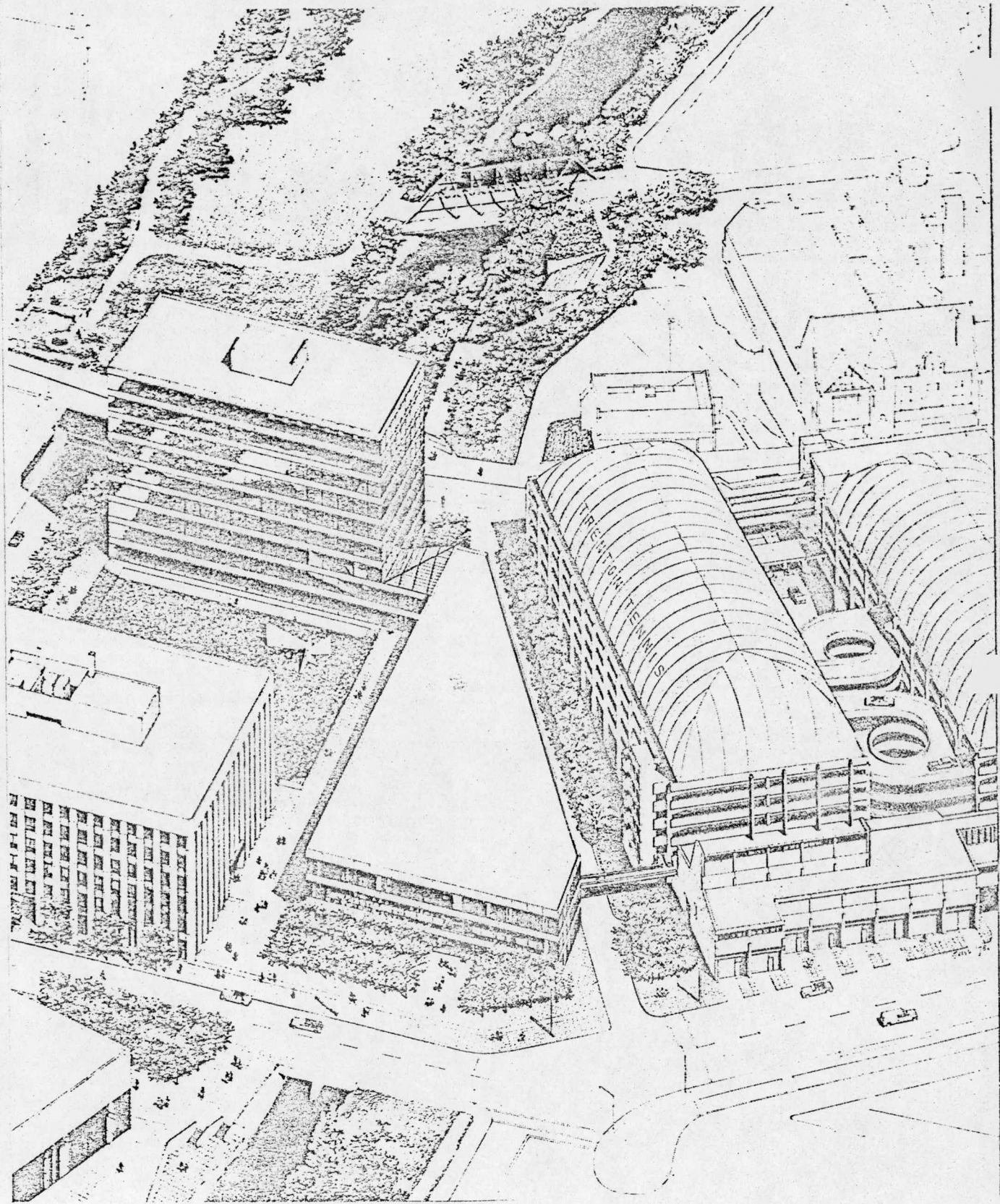


-  EXISTING BUILDINGS
-  PROPOSED BUILDINGS
-  ABOVE GROUND DISTRIBUTION
-  UNDERGROUND DISTRIBUTION

- 1 STATE BUILDING COMPLEX
- 2 WAR MEMORIAL
- 3 CIVIC CENTER
- 4 DEPARTMENT OF ENVIRONMENTAL PROTECTION
- 5 CAPITAL PLACE
- 6 ICES PLANT & PARKING
- 7 COURTHOUSE & DETENTION CENTER
- 8 LUTHER ARMS
- 9 KINGSBURY I - HIGHRISE
- 10 KINGSBURY I - LOWRISE
- 11 KINGSBURY II - LOWRISE
- 12 JUSTICE
- 13 HEALTH & AGRICULTURE
- 14 LABOR & INDUSTRY

SITE PLAN DISTRIBUTION





ICES PLANT WITH TRENTON PARKING AND CAPITAL PLACE DEVELOPMENT

Institutional Development

The major thrust of the institutional development carried out for the Trenton ICES Phase 2 work was centered around the primary track approach of utility ownership and operation of the plant. That material is included in a package of utility-related data under separate cover.

Some details of the background institutional analyses are, however, relevant. The Urban Renewal Disposition Agreement, included as Appendix A, provides the basis for the transfer of the property of which the ICES Plant would be located regardless of the owner.

The Urban Renewal Plan Amendment is basically applicable to any ownership situation. This is included as Appendix B. Note particularly the underlined portions on pages 5, 6, 7, and the drawing following Table 3 at the end of the Appendix.

The Trenton ICES plant will be located in an area zoned for commercial use and will therefore require a use variance. A copy of the application which must be filed to receive this variance is included as Appendix C. Additionally, on February 23, 1978, a meeting with the City of Trenton Planning Board was arranged by the Department of Planning and Development to determine whether there will be any fundamental objections to the construction of the ICES Plant in its proposed location. The minutes of this meeting, contained in Appendix D, indicate that there are at this time no outstanding

objections to the project in its proposed location.

It should be pointed out regarding the minutes of the February 23rd meeting that at the time the ICES Team was proceeding on the assumption that the utility would own and operate the plant, therefore, references to the utility contained in these minutes must be taken in that context. A possible change in owner-operator would not substantially alter the issues involved.

Also, in Appendix D, is a memorandum prepared by the Department of Planning and Development outlining the various applications to the City of Trenton Planning Board which will be required in order to proceed with the construction of the Trenton ICES and a schedule of all hearings and submissions to all administrative agencies required for the project.

Precedents for municipal or third party ownership of the Trenton ICES were reviewed by Mr. George Dougherty, Attorney for the City of Trenton, as part of the Phase I Interim analysis. This review identified no barriers which would preclude these ownership options. It further cited several precedents including the Refuse Transfer Station, owned and operated jointly by City of Trenton and Ewing and Lawrence townships, the Trenton Parking Authority and the Trenton Parking Utility. Because of time constraints in preparing this community ownership analysis, it has not been possible to update this review; however, a revision will be submitted as an addendum to this report.

The concept of community ownership implies some form of cooperative arrangement among the members of the Demonstration Community. They would not purchase energy from ICES as such but would share in the

owning and operating costs of the plant, the proportion based on their energy consumption. Financing might be carried out by Mercer County Improvement Authority, New Trenton Corporation or by private Governmental sources. Each of these alternatives implies a set of trade-offs involving the ability to sell tax-free bonds, reductions in owning and operating taxes, various tax advantages in the form of capital investment credit, depreciation allowance, possible forthcoming governmental inducements to co-generation and others. Again, because of limited time, these have not been explored, but it is felt that these items merit further analysis to determine the impact on economic viability of the various forms of community ownership cited above.

A further institutional question which would require a resolution under community ownership would be the terms on which the ICES system would be grid connected. It is expected that with the utility's past involvement with the ICES project and with efforts by Federal and State Governments to encourage the implementation of co-generation projects (note Assembly Measure No. 519, included as Appendix H), methods can be found to effect grid connection.

As part of the Phase 2 work, analytical data contained in Appendix E and Volume 2 of this report was modified and turned over to the utility to permit the analysis of the impact of individual buildings on the ICES community. The summaries of these data were prepared by the utility and are contained in a companion document to this report. If further analysis of community ownership options are pursued, these analyses will form a basis for determination of the impact of the involvement of each member initially identified as part of the ICES demonstration team.

Design Analysis

(3.5.2a) Two additional sets of profiles of community thermal characteristics, steam demand and ICES electric output were performed to permit sensitivity analyses of the Trenton ICES project. These are variations in the community demand as a function of time and variations in the ICES output as a function alternative operational modes. The community has been simulated for 1979, 1980, and two configurations in 1982. The 1979 simulation represents the basic existing demonstration community. The 1980 simulation includes the Justice Department Building which is the largest single addition to the Demonstration Community (800,000 square feet) and the Capital Place commercial development (200,000 square feet). The 1982 simulations represent the final demonstration communities with and without the Department of Environmental Protection building. The impact of the Department of Environmental Protection building has been analyzed separately because its inclusion requires the construction of a 1,300 foot steam line at a cost of approximately \$400,000.

The summaries of the simulations are contained in Appendix Q. The hourly profiles are contained in Volume 2 of this report.

Plant operation has been simulated to determine whether the value of off-peak electricity is sufficiently great to economically justify the added fuel required by the turbine/boiler set as compared with a conventional boiler. The output of the plant was also simulated with and without thermal storage in order to gain an accurate assessment of its inclusion. Additionally, a third storage alternative

was modeled in which a limited amount of storage was provided on an experimental basis to permit a field analysis of the impact of thermal storage on an ICES system. For this case, storage was assumed at the Justice Building (a new building with absorption chilling) and the office of the Department of Education in the Statehouse complex (an existing building with electric chilling). Summaries are included in Appendix Q.

(3.5.2c) The Trenton ICES Plant is a 10 megawatt (electric) generating plant with heat recovery facilities. The electric output of the plant is fed directly into the PSE&G grid. The thermal output of the plant is distributed in the form of 150 psig steam to the 19 buildings which form the ICES community. See page 4. This mode of distribution was selected for compatibility with buildings in the Statehouse complex which comprise 800,000 Square feet or approximately 22 percent of the entire demonstration community. These buildings are presently served by a central boiler which delivers 125 psig steam. The ICES system has been designed to deliver steam which is compatible with this system, taking into account transmission losses which will be incurred. Of the 6,000 total lineal feed of distribution lines, approximately 2,100 will be above grade. A portion of this will be suspended from an elevated walkway system which is planned as part of the development of the downtown Trenton area. The remaining above grade distribution will be suspended from the ceilings of above ground parking structures adjacent to the ICES site. The steam will be delivered at full pressure to the customers' buildings (or to a central point on the customers' property as in the case of the Statehouse and Labor and Industry/Health and Agriculture complexes). The conversion to the forms of thermal energy to be used within the buildings (hot water, low pressure steam, medium pressure steam, and chilled water) will be carried out by pieces of equipment within the individual buildings or complexes. This is somewhat of a departure from the Phase I concept of providing six thermal sub-

stations which would distribute steam, hot water and chilled water to clusters of buildings possibly belonging to different owners. Trenton ICES now delivers steam directly to thirteen points. While each of these points represents a single customer in the ICES system, each may also be considered to be a thermal substation in that the functions originally anticipated for the six thermal substations will occur at each point. This configuration permits several ownership alternatives for thermal substations, that is, they may be owned and operated as part of the ICES system, they may be owned by the ICES system and leased to the customers, or they may be owned by the customers. In the case of customer ownership, the ICES still represents a considerable potential first cost saving for the new buildings in that the need for boilers and boiler rooms, stacks and fuel storage facilities are eliminated.

The use of thermal storage in conjunction with the Trenton ICES system was carefully reviewed for implications under utility ownership. In this case, it was found not to be cost effective due in large part to complex centralized controls which the utility required and to cost overhead factors which the utility felt would be required under utility ownership. A reanalysis of the costs associated with thermal storage and the types of control which would be required under community ownership may indicate the cost effectiveness similar to that which was indicated during the Phase 1 and Phase 2/90-day reports.

The ICES plant remains largely unchanged in concept from Phase I. Electrical generation will be by four 2500 kilowatt (nominal) Solar Centaur combustion turbine units. The exhaust gases will be passed through Deltac waste heat boilers, each having a capacity of 17,500 pounds per hour and fitted with economizers. There will be one waste heat boiler for each combustion turbine. Thermal peaking capacity and emergency thermal standby capacity will be provided by two

30,000 pound per hour boilers. There will be three 50,000 gallon storage tanks. This will provide for 10 day's fuel supply under the most extreme anticipated conditions.

In a departure from the Phase I approach, the ICES plant will be built as a separate structure from the Garage facility. This will eliminate potential scheduling problems in the construction of the two facilities. The two buildings will, however, be designed together and constructed in such a way that the resulting complex will have architectural and urban continuity.

The Energy Information Center has been expanded to include a room where groups of up to 30 interested persons may be brought for discussions of the ICES concept or other significant energy questions. It is a viewing gallery, glazed on three sides. The main view looks into the turbine room with a view of all the major plant equipment. The second view is into the control room, and the third into the electric switchgear room. The fourth wall will be provided with a screen and necessary audio visual material so that presentations may be made. The walkway which runs between the parking facility and the ICES plant is still provides a view into the ICES plant so that pedestrians passing by may observe the ICES operation without having to detour into the Energy Information Center.

A thorough review of the area surrounding the ICES plant has indicated that the maximum expansion beyond the projected 1982 community would not be likely to exceed an additional 25 percent thermal demand, that is, that the installation of one additional 2.5 megawatt unit would provide adequate expansion capabilities. On this basis, one additional bay has been provided in the plant enclosure to accommodate this potential expansion.

Reduced copies of the ICES system preliminary design documents and outline specifications are contained in Appendix R of this volume. Additionally, full size prints are bound separately and included as Volume 3 of this report.

The preliminary design of the mechanical equipment in the ICES plant carried out during Phase 2 is based on taking the complete schematic design developed during Phase 1 and Phase 2/90-day and modifying these to conform to utility requirements. Fifteen sheets of plant equipment preliminary design are included in a companion document. If the ICES Project proceeds under community ownership, a review will be made to determine whether simplifications can be achieved in the preliminary design based on the elimination of the need to conform to standard utility practices. An addendum containing the schematic design with a statement regarding its compatibility with the Trenton ICES system as carried through preliminary design will be included as an addendum to this report.

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Cost Comparison for Community Ownership

A comparison of life cycle cost of the Trenton ICES Plant under community ownership versus conventional system for production of steam was prepared utilizing the format contained in the document prepared by the U.S. Army Corps of Engineers, entitled, "Engineering Instructions for Preparation of Feasibility Studies for Total Energy Selective Energy and Heat Pump Systems," dated 1 July 1975. This should not be taken as a definitive analysis; however, it is a method by which a large institutional organization determines whether or not to proceed with an ICES type project. With Community ownership, the ICES Deomonstration project is in a roughly analogous position. This analysis shows a cost saving for thermal energy produced by ICES over the life of the plant, amounting to roughly 12 percent. Under community ownership this saving would be shared by community members.

Because of the primary track approach in Phase 2, i.e. utility ownership and operation, all cost data were prepared to satisfy the utility. The assumption for this was that if the utility were to own and operate the plant, it would have to be satisfied with all data on which a decision to do so was made.

The capital cost data are broken down into four primary categories for each major piece of equipment. These are: The labor costs and material costs, that is, the basic cost of construction; the owner's construction overhead, that is, construction management

and the design costs, that is, engineering and architectural costs. In the preparation of estimates, there was general agreement regarding the labor and material costs, although there was some feeling that for a project constructed for community ownership under private construction management, savings on the order of 10 percent as compared with the utility figures might be achieved. For the analysis of community ownership, however, this potential saving was not taken into account and the labor and materials costs remain unchanged. In the areas of construction management and design costs, private consultants expressed a willingness to perform the work at total costs ranging from 30 to 50 percent of those costs indicated by the utility. Additionally, each felt that his portion of the work could be performed profitably within the general cost figures indicated. These lower overhead costs have been used for the community ownership analysis.

The cost of fuel is based on a 1978 price to consumer of \$0.485 per gallon (based on cost to consumer figures supplied by Exxon). In the case of ICES, the total cost of fuel input is divided by net steam delivered to the customers to produce a total fuel cost of \$10.35 per thousand pounds of steam in 1980 dollars. This assumes that the total fuel input to the ICES Plant goes to the production of steam and that the electric by-product is in effect free, thereby permitting the total value of electricity to be credited against the cost of producing ICES steam.

The conventional alternative (oil-fired boilers) is assumed to have an overall seasonal efficiency of 60 percent which, in turn, produces a 1980 fuel cost of \$6.43 per thousand pounds of steam.

The ICES operation and maintenance (O & M) costs are composed of three factors. - these are: the variable O & M, based on a 1978 cost of 7 mils per kilowatt hour; the fixed plant costs, based on a staff of eight men at \$25,000 per year in 1978 costs; and the distribution maintenance based on a lump sum cost in 1978 of

\$100,000 per year.

The O & M, considered for the conventional system, includes only the variable component which is estimated at 18 percent of fuel cost. This includes maintenance and repair and the cost of energy to operate the ancillary systems such as heaters and pumps, and burner motors. No allowance has been taken for the possible reduction in maintenance staff of the conventional buildings which might result from the replacement of steam produced by individual boilers with steam delivered directly to the buildings from the ICES Plant.

A value of electricity is based on the retail value developed during the Phase 1 report by the utility. This assumes that under community ownership the electricity produced by ICES will displace the need to purchase that amount of electric energy.

The analysis assumes an interest rate of 6 percent on the capital costs, the life of the plant of 25 years and escalation rates as outlined in the Corps of Engineers Manual. No credit is taken for any recovery value of the plant at the end of 25 years or for any tax advantages arising from investment credit, depreciation allowance, or other mechanisms. Similarly, no costs are charged for possible taxes on the plant. All of these factors should be carefully reviewed in a more detailed analysis of ICES Plant viability under community ownership.

Based on the above criteria and utilizing methodology detailed in the Corps of Engineers Manual, the ICES Plant shows a cost per thousand pounds of steam over the 25 year period of about \$276 as compared to a cost for similar thermal energy from the conventional system of about \$312. This represents a saving of 12 percent in the cost of thermal energy from the ICES plant over the life of the project.

APPENDIX A

(3.5.1e)

URBAN RENEWAL DISPOSITION
AGREEMENT

REDEVELOPMENT AGREEMENT
CITY OF TRENTON TO PUBLIC
SERVICE ELECTRIC AND GAS COMPANY

THIS AGREEMENT, consisting of this Part I and Part II (Form H-6209B, 9-69) annexed hereto and made a part hereof (which Part I and Part II are together hereinafter called "Agreement"), made on or as of the _____ day of _____ 1977, by and between the CITY OF TRENTON, a municipal corporation, acting as the Local Public Agency, (which, together with any successor public body or officer hereafter designated by or pursuant to law, is hereinafter called "Agency"), and having its office at City Hall, in the City of Trenton, County of Mercer, State of New Jersey, and PUBLIC SERVICE ELECTRIC AND GAS COMPANY, 80 Park Place Newark, New Jersey 07101, a corporation according to the laws of New Jersey (herein after called "Redeveloper")

W I T N E S S E T H :

WHEREAS, the Agency has undertaken an urban renewal project within the City of Trenton, in furtherance of the objectives of Chapter 306 of the Public Laws of 1949 of the State of New Jersey, as amended and supplemented, and Title I of the Federal Housing Act of 1949, as amended and supplemented, in accordance with a plan for the areas prepared by the Agency designated "The John Fitch Way General Neighborhood Renewal Plan" dated May 15, 1958; and

WHEREAS, the John Fitch Way General Neighborhood Renewal Plan contemplates, inter alia, the redevelopment by the Agency of portions of the areas shown thereon with buildings and improvements for a commercial or business use and for off-street parking in connection therewith; and

WHEREAS, the Agency has subdivided an area of 6.5 acres within the Project heretofore acquired and cleared by it for commercial or business use into 5 parcels, described in "Schedule A" attached hereto and made a part hereof, (parcel number 5 of which is hereinafter referred to as the "Property" and more particularly described in "Schedule B" attached hereto and made a part hereof; parcel number 1 is hereafter referred to "Phase I Property"; parcel number 2 is hereinafter referred to as "Plaza Park"; parcel number 3 is hereinafter referred to as "Phase II Property" and parcel number 4 is hereinafter referred to as "Parking Property"); and

WHEREAS, the Agency has considered Redeveloper's proposal for the redevelopment of the Property; and

WHEREAS, the Property constitutes (1) a portion of Project Area No. 1 so designated by and to be developed in accordance with the Urban Renewal Plans approved March 7, 1967 for "John Fitch Way G.M.R.P. Area--Project Area No. 1 and Project Area No. 2--N.J.R. 59 and N.J.R. 58" (the said two Urban Renewal Plans, as the same may have been or may hereafter from time to time be revised or amended hereinafter jointly referred to as the "Urban Renewal Plan"); and

WHEREAS, in order to enable the Agency to achieve the objectives of the Urban Renewal Plan and particularly to make the Property available for redevelopment by private enterprise for redevelopment for and in accordance with the uses specified in the Urban Renewal Plan, both the Federal Government and the City of Trenton, have undertaken to provide and have provided substantial aid and assistance to the Agency through Contracts for Loan and Capital Grant dated July 18, 1963, and July 2, 1964; and

WHEREAS, the Agency has offered to sell, and the Redeveloper is willing to purchase the Property and to redevelop the

Property for and in accordance with the uses specified in the Urban Renewal Plan and in accordance with this Agreement; and

WHEREAS, the Agency believes that the redevelopment of the Property pursuant to this Agreement, and the fulfillment generally of this Agreement, are in the vital and best interests of the City and the health, safety, morals, and welfare of its residents, and in accord with the public purposes and provisions of the applicable Federal, State and local laws and requirements under which the Project has been undertaken and is being assisted;

NOW THEREFORE, in consideration of the premises and the mutual obligations of the parties hereto, each of them does hereby covenant and agree with the other as follows:

SEC. 1. SALE: PURCHASE PRICE.

Subject to all the terms, covenants, and conditions of this Agreement, the Agency will sell the Property to the Redeveloper for, and the Redeveloper will purchase the Property from the Agency and pay therefor, the amount of _____ per square foot or a total sum of _____ in accordance with the calculations of square footage as indicated on a certified survey supplied by the Agency and prepared by Trenton Engineering Co., dated May 24, 1977 hereinafter called "Purchase Price", to be paid in cash or by certified check simultaneously with the delivery of the Deed conveying the Property to the Redeveloper.

SEC. 2. CONVEYANCE OF PROPERTY.

(a) Form of Deed. The Agency shall convey to the

Redeveloper title to the Property by Bargain and Sale Deed, Such conveyance and title shall, in addition to the conditions subsequent provided in Section 704 hereof, and to all other conditions, covenants and restrictions set forth or referred to elsewhere in this Agreement, be subject to:

1. Building and use restrictions specified in the Urban Renewal Plan.

2. Applicable local building and zoning laws and regulations which the Agency specifically represents either are, or prior to conveyance will be, in compliance with the Urban Renewal Plan through acts of the Agency or its representatives.

3. Such objection to title, if any, as may result from facts which a survey and inspection would disclose.

4. Sub-surface conditions affecting the Property not disclosed by any instrument of record in the office of the Clerk of Mercer County.

(b) Condemnation. In the event that the City of Trenton or any other governmental body or authority with the power of eminent domain shall condemn any portion of the Property prior to commencement of construction, the Redeveloper may at its option, terminate this Agreement, the Deposit provided for in Section 3 hereof shall forthwith be refunded to Redeveloper, and thereupon, neither party shall have any further claim against the other.

(c) Time and Place for Delivery of Deed. The Agency shall deliver the Deed and possession of the Property to the Redeveloper within sixty (60) days after the date of approval of the Construction Plans submitted by the Redeveloper to the Agency (as provided in Section 301 hereafter), all on _____, 1978, whichever date is later or on such earlier date as the parties hereto may mutually agree in writing.

Conveyance shall be made at the principal office of the Agency, and the Redeveloper shall accept such conveyance and pay the Purchase Price to the Agency at such time and place.

(d) Marketable Title--Defects in Title. The Agency will convey to Redeveloper a good and marketable title to the Property.

If, upon examination of the title, the Redeveloper finds any objections or defects which render the title unmarketable, Redeveloper shall give notice in writing to the Agency no later than thirty (30) days prior to the date of conveyance, stating in detail such objections and defects. In the event that the Agency fails to remove all objections or defects which render the title unmarketable within thirty (30) days, and if the Redeveloper is unwilling to waive such objections and defects, then this entire Agreement shall thereupon become null and void, the Agency shall forthwith refund to the Redeveloper the Deposit provided in Section 3 hercof, and thereupon, neither party shall have any further claim against the other.

For the purpose of this Agreement, title will be deemed to be unmarketable unless it is such title as a reputable title guaranty company authorized to do business in the State of New Jersey will approve and insure without exceptions (other than its regularly printed exceptions) at regular premiums.

Redeveloper will pay the costs of examining title to the Property. The Agency through its counsel shall make available such information and evidence as it may have as to condition of title to the Property for the use and benefit of the Redeveloper, his counsel and title searchers, including any and all

searches which may be in the possession of the City of Trenton concerning its acquiring title to the Property or parts thereof. However, the responsibility of investigating title shall be upon the Redeveloper. The Agency agrees that it will cooperate through its counsel in making available title notes and evidence.

(e) Recordation of Deed. The Redeveloper shall promptly file the Deed for recordation in the office of the Mercer County Clerk, and Redeveloper shall pay costs for recording the Deed, including a realty transfer fee, if any, and shall also pay for the costs of plotting the Deed with the City engineer of the City of Trenton.

(f) The Agency, has and will continue to deliver to the Redeveloper, copies of all reports of engineering studies, all engineering surveys, tests, borings, etc., concerning the Property in its possession, and all land surveys of the Property, and related data affecting Property which it may possess. Upon completion of the project and/or upon any default by the Redeveloper hereunder, the Redeveloper shall deliver to the Agency copies of all reports of engineering studies, all engineering surveys, tests, borings, etc., concerning the Property and any related data affecting the Property which it may possess.

SEC. 3. GOOD FAITH DEPOSIT.

(a) Amount. The Redeveloper has, prior to the execution of the Agreement by the Agency, delivered to the Agency a good faith deposit of an irrevocable letter of credit in the amount of _____ Dollars, herein called the "Deposit", as security for the performance of the obligations of the Redeveloper to be performed prior to the return of the Deposit to the Redeveloper, or its retention by the Agency as liquidated damages, as the case may be, in accordance with this Agreement

~~(b) Substitution of Cash Deposit. The Deposit herein shall be retained by the Agency until the completion of the improvements as hereinafter set forth, provided, however, that upon conveyance of the Property to the Redeveloper, if not already done so prior to that time, the Redeveloper may substitute in lieu of said Deposit negotiable bonds or other similar obligations of the United States in like amount, or such other bonds or negotiable instruments, securities or guarantee bonds as the Agency may, in writing, permit provided same are approved by the Department of Housing and Urban Development, or a surety bond approved, by the Department of Housing and Urban Development, as above, issued by a surety company licensed to do business in the State of New Jersey.~~

(c) Interest or Dividends. Interest or dividends if any, earned on the Deposit both before and after conveyance shall be the property of the Redeveloper, and such interest or dividends, if earned or received by the Agency, shall be promptly paid to the Redeveloper.

(d) Retention by Agency. Upon termination of this Agreement, as provided in Sections 703 and 704 hereof, or as otherwise herein provided, upon Redeveloper's default, the Deposit and/or proceeds thereof shall be retained by the Agency as liquidated damages.

(e) Return to Developer. Upon termination of this Agreement as provided in Section 702 hereof, the Deposit and/or proceeds thereof shall be returned to the Redeveloper by the Agency and neither party shall have any further claim against the other.

(f) Retention of Deposit after Conveyance. The Deposit shall be retained by the Agency after conveyance and until completion of the improvements on the Property as additional

security for the Redeveloper's obligations under this Agreement and shall be returned to the Redeveloper by the Agency upon award of the Certificate of Completion as provided in Section 307 hereof. ~~In case a surety bond is posted, the Agency shall also cause the governing body of the City of Trenton to pass a resolution releasing the surety company and the Redeveloper from the obligations covered by such surety bond and shall deliver a certified copy of said resolution to the Redeveloper along with the documentation of which the bond consists.~~

SEC. 4. TIME FOR COMMENCEMENT AND COMPLETION OF THE IMPROVEMENTS.

The Construction of the Improvements referred to in Section 301 and Section 4A hereof shall be commenced in any event within sixty (60) days after the date of the delivery of the Deed, and except as otherwise provided in the Agreement, all Improvements shall be substantially completed within ~~months~~ months after the date of commencement of construction. Said months shall be extended for a period of time equal to delay due to strikes, shortage of material, governmental restrictions, acts of God, fire or other casualty, delays due to the State of New Jersey or other events beyond the control of Redeveloper.

SEC. 4A. IMPROVEMENTS TO BE CONSTRUCTED.

(a) Type and Size of Improvements. Redeveloper agrees, as a minimum, to construct an electrical and thermal energy generating facility. (herein referred to as "Improvements") and to submit "Construction Plans", as defined in Section 301 hereof.

(b) Schematic Plans. Within thirty (30) days of the execution of this Agreement, Redeveloper shall submit schematic plans of Property for approval by the Agency, which approval shall be governed by the provisions of Section 5 and

Section 301 hereof, in the same manner as the approval required for "Construction Plans".

(c) Design Development Plans to be Submitted.

Within ninety (90) days of execution of this Agreement, the Re-developer shall submit the following design development plans for approval by the Agency, which approval shall be governed by the provisions of Section 5 and Section 301 hereof, in the same manner as the approval required for "Construction Plans".

1. A landscaping site plan showing the approximate location and type of plantings, pedestrian area designs, walkways, streets and sidewalks, and the treatment plan for the same, if any. This plan shall also show the relationship of the proposed improvements to existing and/or proposed surroundings, buildings, projects, etc.

2. Plans, Sections, and Elevations showing the buildings, including all typical and atypical floors, the site and site improvements, the exterior treatment of the building the color, type and texture of materials to be used for all exposed faces of the building, samples of materials proposed for landscaping, walks, steps, outdoor lighting fixtures, etc., the type, size and location of windows, balconies, entrances and exits, the screening of all exterior mechanical equipment to be placed or erected on any part of the building, the type, size, color and location of all exterior signs or other advertising.

3. A lighting plan demonstrating that all walkways, malls, parking areas and other areas accessible to pedestrians during the hours of darkness will be adequately lighted to insure pedestrian safety. Such plan will demonstrate the amount, placement, type and construction of the lighting.

4. A vehicular and pedestrian traffic circulation plan clearly showing the separation of movements.

5. A staging of improvements plan showing the order of proposed construction, including any temporary or interim construction or operating arrangements. This plan shall include the Redeveloper's estimate for the timing of final site preparation, foundations, construction, landscaping, installation of drives and sidewalks, if included in the project, and completion of construction, and should furnish such information and data necessary to enable the Agency and the City of Trenton to schedule any public improvements required.

The Redeveloper shall also submit an appropriate narrative statement citing the major types of operation to be housed within the Project.

(d) Approval by Agency Required for all Plans.

It is understood and agreed that the Agency has a vested interest in securing a unified, well-planned and aesthetically well-designed development of the Property. Accordingly, in order to accomplish that object the parties agree that the Agency shall have the right to reject the Construction Plans submitted by the Redeveloper in the event that it fails to approve the other plans to be submitted to the Agency for its approval pursuant to Paragraphs (a) & (b) & (c) of this Section.

(e) Report on Progress. Subsequent to conveyance of the Property to the Redeveloper, and until construction of the Improvements has been completed, the Redeveloper shall make, in such detail as may reasonably be required by the Agency, and forward to the Agency, a report in writing, monthly, concerning the actual progress of the Redeveloper with respect to such con-

struction. During such period, the work of the Redeveloper shall be subject to inspection by the Agency.

(f) Changes in Improvements to be Constructed.

The Redeveloper shall not be permitted to construct any Improvements on the Property other than those hereinbefore set forth, nor shall it be permitted to make any changes, alterations, or substitutions of any kind in any of the Improvements to be constructed, unless the Agency consents in writing to such changes, alterations, or substitutions, which consent shall not be unreasonably withheld. (No consent shall be necessary for any changes, alterations, or substitutions required by the State of New Jersey.) Proof of shortages or other unavailability of materials which were originally set forth in the plans or specifications previously approved shall be considered a reasonable ground for consenting to the making of a change or substitution in the Improvements, provided the Redeveloper replaces the materials which are so unavailable with materials equivalent in quality.

SEC. 5. TIME FOR CERTAIN OTHER ACTIONS.

(a) Time for Submission of Construction Plans.

The time within which the Redeveloper shall submit his "Construction Plans" (as defined in Section 301 hereof) to the Agency, in any event, pursuant to Section 301 hereof, shall be not later than seven (7) months from the date of the approval of the design development plans submitted by the Redeveloper to the Agency in accordance with the requirements of Section 4A(c).

(b) Time for Submission of Corrected Construction

Plans. Except as provided in Paragraph (c) of this Section 5, the time within which the Redeveloper shall submit any new or corrected Construction Plans as provided in Section 301 hereof shall be not later than forty-five (45) days after the date the

Redeveloper receives written notice from the Agency of the Agency's rejection of the Construction Plans referred to in the latest such notice.

(c) Maximum Time for Approved Construction Plans.

In any event, the Redeveloper shall submit Construction Plans conforming to the requirements of Section 301 hereof not later than thirty (30) days after the third rejection by the Agency as provided above.

(d) Time for Agency Action on Change in Construction Plans. The time within which the Agency may reject any change in the Construction Plans, as provided in Section 302 hereof, shall be thirty (30) days after the date of the Agency's receipt of notice of such change.

(e) Non-Applicability of Stock Provisions Since the Redeveloper is a publicly held corporation, none of the provisions of the Agreement relating solely to stock, stock interest and/or transfer of our assignment of stock should apply.

SEC. 6. PERIOD OF DURATION OF COVENANT ON USE.

The Covenant pertaining to the uses of the Property, set forth in Section 401 hereof, shall remain in effect for a period of forty (40) years from the date of approval of the latest revised Urban Renewal Plan by the City Council of the City of Trenton (which date shall not be later than the time and place for the delivery of the Deed, as set forth in Section 2(c) hereof) or until such date after said period of forty (40) years to which the Covenant may be extended by proper amendment of the Urban Renewal Plan, and at that time such Covenant shall terminate.

SEC. 7. NOTICES AND DEMANDS.

A notice, demand or other communication under this

Agreement by either party to the other shall be sufficiently given or delivered if dispatched by registered or certified mail, postage prepaid and return receipt requested, or delivered personally, and in the case of the Redeveloper, addressed to it at 200 Park Avenue, New York City, New York 10017, and in the case of the Agency, addressed to the Director of Planning and Development, 10 Capital Street, Trenton, New Jersey 08618, or at such other address with respect to either such party as that party may, from time to time, designate in writing and forward to the other as provided in this Section.

SEC. 8. SPECIAL PROVISIONS.

(a) All Improvements to be constructed on the Property shall be given in lieu tax consideration pursuant to the provisions of the Urban Renewal Corporation and Association Law of 1961, of the State of New Jersey as Amended and Supplemented (N.J.S.A.40:55C-40 et seq.) in accordance with the provisions of the Financial Agreement attached hereto as "Schedule E".

The Redeveloper or one or more Urban Renewal Corporations or Associations which is or are the nominee or designee of the Redeveloper, shall, within five (5) days following the approval by the Agency of the design development plans required by Section 4A(c), herein,

make application to the City of Trenton to enter into a Financial Agreement covering provisions for payment in lieu of taxes and payment of taxes assessed according to general law as other property in the City of Trenton is assessed and taxed, as set forth in the Financial Agreement attached hereto as "Schedule E" and made a part hereof, and covering all other provisions therein contained. The Redeveloper and the City

of Trenton shall execute such Financial Agreement within twenty (20) days from the date of such application. In the event that either party shall fail to execute such Financial Agreement within twenty (20) days from the date of such application or applications either party may terminate this Agreement, the Redeveloper shall be entitled to a refund of the Deposit, and neither party shall have any further claim against the other. Notwithstanding the failure of the City to execute the Financial Agreement and to grant the tax exemption as aforesaid, the Redeveloper shall have the alternative option of continuing hereunder pending such exemption or not, as it decides. Redeveloper shall not assign, transfer, or otherwise dispose of this Agreement or the Property without prior written consent of the Agency and the Department of Housing and Urban Development.

(b) The Agency may give the Redeveloper a Certification of Completion with respect to improvements on individual parts or parcels of the Property in accordance with Section 307 hereof, if the Agency is satisfied with the progress being made with respect to the construction of improvements on the entire Property.

(c) Construction of Agreements. Anything herein to the contrary notwithstanding, any dispute between the parties hereto concerning any provision of this Agreement shall be governed by the laws of the State of New Jersey.

(d) Payment and Performance Bonds. The Redeveloper shall, in connection with the Improvements to be constructed pursuant to this Agreement, require payment and performance bonds from his contractors or sub-contractors in an amount at least equal to fifty (50%) percent of the cost of construction of the Improvements, which shall specifically designate the Agency as the essential beneficiary thereof, in addition to the Redeveloper.

(e) The Redeveloper and its successors and assigns shall keep the Improvements now existing or hereafter erected on the Property insured, during their anticipated economic or useful life, under the national flood insurance program in an amount at least equal to the redevelopment cost of the Property (less estimated land cost) or to the maximum limit of coverage made available with respect to the particular type of Property under the National Flood Insurance Act of 1968, whichever is less. Prior to conveyance of the Property to the Redeveloper by the Agency, the Redeveloper shall furnish the Agency a copy of a flood insurance policy specifying such coverage or a binding commitment to provide such a policy: Provided, That if such coverage is not available to the Redeveloper at the time of conveyance, the Redeveloper shall furnish such evidence of insurance within fifteen (15) days of the date it becomes available.

SEC. 9 COUNTERPARTS.

This Agreement supersedes all of the terms and provisions of any prior Disposition Agreement by and between the parties and is executed in five (5) counterparts, each of which

shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Agency has caused this Agreement to be duly executed in its name and behalf by the Mayor of the City of Trenton, New Jersey and its seal hereunto duly affixed and attested by the City Clerk of the City of Trenton, New Jersey and the Redeveloper has caused this Agreement to be duly executed in its name, on or as of the day first above written.

ATTEST:

CITY OF TRENTON, NEW JERSEY

By Arthur J. Holland, Mayor

Margaret Ture, City Clerk of
Trenton, New Jersey

ATTEST:

By _____

SCHEDULE F

FINANCIAL AGREEMENT

THIS AGREEMENT, hereinafter referred to as the "Financial Agreement", entered into as of the _____ day of _____, 1977, between the CITY OF TRENTON, a municipal corporation, acting as the Local Public Agency, hereinafter referred to as the "Agency", and

W I T N E S S E T H :

WHEREAS, the Agency has undertaken an Urban Renewal project within the City of Trenton in furtherance of the objectives of Chapter 306 of the Public Laws of 1949 of the State of New Jersey, as amended and supplemented, and Title 1 of the Federal Housing Act of 1949, as amended and supplemented, in accordance with and for the areas shown on a plan prepared by the Agency designated "The John Fitch Way General Renewal Plan Area" dated May 15, 1958, as amended; and

WHEREAS, the said Urban Renewal Plan contemplates, inter alia, the redevelopment by the Agency of portions of the areas shown thereon with buildings and improvements for

WHEREAS, in connection with the disposition of approximately _____ square feet of land (hereinafter referred to as the "Property") in the commercial and business portions of the John Fitch Way G.N.R.P. Area - Project Areas No. 1 and 2, the Agency has entered into a Contract for Sale of

Land for Private Redevelopment with the Redeveloper dated
1977 (hereinafter sometimes also referred to as the "Agreement"); and

WHEREAS, pursuant to the aforesaid Agreement, the Redeveloper has agreed to construct a electrical and thermal energy generating facility

(said improvement being hereinafter sometimes referred to as the "Project"); and

WHEREAS, in accordance with the aforesaid Agreement and in accordance with the Urban Renewal Corporation and Association Law of 1961, as amended, the Redeveloper has heretofore made written application to the Agency for approval of the Project; and

WHEREAS, the City Council of the City of Trenton has heretofore by resolution adopted and approved the application; a copy of such application and a certified copy of such resolution of approval being attached hereto as Exhibit "A"; and

WHEREAS, the Agency believes that the in lieu tax consideration to be given to the Property pursuant to this Financial Agreement affords maximum redevelopment of the Property and is, therefore, in the best interests of the City and the health, safety, morals and welfare of its residents and is in accordance with the provisions of Chapter 40 of the Public Laws of 1961 of the State of New Jersey, as amended and supplemented, and the public purposes pursuant to which the redevelopment of the John Fitch Way G.N.R.P. Area has been undertaken and is being assisted in accordance with the applicable provisions of State and Federal law.

NOW THEREFORE, it is mutually agreed as follows:

1. The Redeveloper represents that the application attached to this Financial Agreement as "Exhibit A" and incor-

porated herein by this reference, sets forth the precise manner in which the Redeveloper proposes to develop, manage and operate the Project, the plans for financing the Project including, but not limited to, the estimated total Project cost, the interest and amortization rates on the total Project cost, the source of funds, the interest rates to be paid on construction financing, the source and amounts of paid-in capital, the terms, source and amount of projected permanent mortgage financing

Redeveloper covenants and agrees to use its best efforts to conform in the development, construction and operation of the Project to the matters and things set forth in s. application, that is, the precise manner in which Redeveloper proposes to develop, manage and operate the Project, and the plans for financing the Project, it being understood, however, with particular respect to the Project cost, interest rate, terms and mortgage amortization, , that the same are projected and estimated and may be modified as particular circumstances may require but that in all material respects it is the intent and agreement of the Redeveloper to comply as closely as shall be practicable with the information and representations set forth in said application.

2. The Agency hereby grants to the Redeveloper, but only to the extent hereinafter expressly set forth in Paragraph 3 (a) hereof, exemption from real property taxation on the Improvements to be constructed on the Property for a period of not more than twenty (20) years from the date of the execution of this Financial Agreement or for a period of not less than fifteen (15) years from the date of the commencement of the operation of the Project, whichever period ends first. For purposes of

this Financial Agreement the date of the commencement of the operation of the Project shall be the "Completion Date" hereinafter defined.

3. (a) The Redeveloper shall pay for each year for which tax exemption is claimed and granted, as an annual service charge in lieu of real property taxes on the improvements required to be constructed by the Agreement, beginning on the "Completion Date" (hereinafter defined), an amount equal to two (2) percent of the portion of the construction costs not exempted under New Jersey Public Utility Law In no event shall any payment made pursuant to this Financial Agreement, together with taxes on land, in any year after the first year of occupancy of the Project be less than the total taxes assessed on all real property in the area covered by the Project in the calendar year immediately preceding the acquisition of said area by the City (which is).

Since the "Completion Date" may not be the start of a calendar year, and the in lieu payments are due on a calendar year basis, the aforesaid annual service charge shall be adjusted on a pro rata basis for any year after the "Completion Date" which is less than a full calendar year.

(d) As used in this Financial Agreement, the

term "Completion Date" is defined as the date on which

4. Against the annual services charge as provided herein, the Redeveloper shall be entitled to a credit for the amount, without interest, of the real estate taxes on the land comprising the Property paid by it in the last four (4) preceding quarterly installments.

5. The Redeveloper further covenants and agrees as follows:

(a) To pay the annual service charge as provided for in Paragraph 3 hereof, annually, within thirty (30) days after the close of each calendar year. In the event that such payment is not made, the Agency may proceed to enforce the collection thereof in the same manner and with the same rights as are applicable to delinquent real estate taxes or in any other manner authorized by Chapter 40 of the Laws of 1961 and the amendments thereto.

(b) To submit annually, coincidentally with its submittal to the N.J. Board of Public Utilities Commissioners, its auditor's report to the Mayor and governing body of the City, which reports shall remain confidential except as otherwise provided by law.

(c) Upon request of the Agency to permit inspection of the property, equipment, buildings and other facilities of the Redeveloper, and to permit examination and audit of its books, contracts, records, documents and papers by authorized representatives of the Agency.

(d) At all times prior to the expiration or other termination of this Financial Agreement, to remain bound by the provisions of Chapter 40 of the Laws of 1961, as amended and supplemented.

(e) Not effect or execute any agreement, lease, conveyance, or other instrument whereby the Property or any part thereof, is restricted upon the basis of race, religion, color or national origin, in the sale, lease or occupancy thereof nor discriminate upon the basis of race, color, creed or national origin in the sale, lease or rental, or in the use or occupancy of the Property or any improvements erected or to be erected thereon, or any part thereof.

5. It is understood and agreed that, notwithstanding anything herein expressed or implied to the contrary, at the end of twenty (20) years from the date of the execution of this Financial Agreement or at the end of fifteen (15) years from the date of the commencement of the operation of the Project, (which, for purposes of this Financial Agreement shall be the "Completion Date" hereinbefore defined) whichever period ends first, the tax exemption upon the Project shall thereupon absolutely cease and the Property and Improvements shall thereupon be assessed and taxed according to general law as other property in the City of Trenton is assessed and taxed, and at the same date all restrictions and limitations herein contained as provided by law shall absolutely terminate and be at an end and the Redeveloper shall thereupon render its final account to the Agency.

7. After having received a Certificate of Completion in accordance with the terms of the Disposition Agreement with the Agency, the Redeveloper shall not voluntarily transfer the Project, or any part thereof, to anyone other than a qualified urban renewal association or corporation, subject to the condition that the transferee shall assume all the Redeveloper's obligations under this Financial Agreement and conditioned further that the transferee otherwise qualify under all other applicable requirements of law.

8. The Redeveloper may at any time after the expiration of one (1) year from the "Completion Date" of the Project notify the governing body of the City that as of a certain date designated in said notice it relinquishes its tax exemption status. As of the date so set, the tax exemption, the service charges, the profit and dividend restrictions, and all other restrictions and limitations imposed by this Financial Agreement and by Chapter 40 of the Laws of 1961 of New Jersey, as amended and supplemented shall terminate.

9. Upon any termination of such tax exemption, obligations and restrictions, whether by affirmative action of the Redeveloper as provided in Paragraph 9 above or by the provisions of Chapter 40 of the Laws of 1961, as amended and supplemented (except that notwithstanding that any such amendment or supplement may by its provisions generally extend the statutory term of tax exemption, it is expressly agreed between the parties that such general extension shall be deemed inapplicable to this Financial Agreement and that the exemption period hereof shall continue to be as set forth in Paragraph 2 hereof), or pursuant to this Financial Agreement, the date of such termination shall be deemed to be the end of the fiscal year of the Redeveloper, and within ninety (90) days after the date of such termination the Redeveloper shall pay to the municipality a sum equal to the amount of the reserve, if any, maintained

pursuant to Paragraph 27 of Chapter 40 of the Laws of 1961 (N.J.S.A.40:55C-66), as amended and supplemented, as well as the excess profit, if any, payable pursuant to such Paragraph 27 (N.J.S.A.40:55C-66), as amended and supplemented, and pursuant to Paragraph 6 (g) of this Financial Agreement by reason of the treatment of such date as the end of the fiscal year.

10. In the event of a default in or breach of this Financial Agreement, or of the Agreement with respect to the Property, or any of the other terms or conditions of those agreements by Redeveloper; and such default or breach is not cured within sixty (60) days after receipt of written demand by the Agency to do so, then the Agency may terminate this Financial Agreement and such termination shall be deemed to be a termination of tax exemption as herein provided. The provisions of N.J.S.A. 55:17-1 through 11 are hereby incorporated herein by reference, and the parties hereto agree to abide by such statutory requirements. Further, any notice of alleged default on the part of the Redeveloper shall be delivered to said Redeveloper and also to its Mortgagee, who shall have an opportunity to cure any alleged default in accordance with the terms hereof.

11. In the event of any dispute between the parties concerning this Financial Agreement, the matters in controversy shall be resolved by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) shall be entered in the Superior Court of New Jersey sitting in Mercer County.

Anything in the foregoing to the contrary notwithstanding, any dispute between the parties hereto concerning any provision of this Financial Agreement shall be governed by the laws of the State of New Jersey.

12. If any clause, sentence, subdivision, paragraph

section or part of this Financial Agreement be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder hereof, but shall be confined in its operation to the clause, sentence, subdivision, paragraph section or part hereof directly involved in the controversy in which said judgment shall have been rendered.

13. This Financial Agreement may be modified from time to time only by written agreement duly executed by the parties hereto, provided said modification is consistent with the provisions of Chapter 40 of the Laws of 1961, as amended and supplemented.

IN WITNESS WHEREOF, the Agency has caused this Financial Agreement to be duly executed in its name and behalf by the Mayor of the City of Trenton, New Jersey, and the Redeveloper has caused this Financial Agreement to be duly executed by its officers, as of the day and year first above written.

ATTEST:

CITY OF TRENTON

Margaret Ture, Clerk

By _____

Arthur J. Holland, Mayor

ATTEST:

By _____

APPENDIX B

(3.5.1e)

URBAN RENEWAL PLAN AMENDMENT

PROJECT AREA NOS. 1 & 2,
 JOHN FITCH WAY GENERAL
 NEIGHBORHOOD RENEWAL PLAN
 AREA, N.J. R-59, N.J. R-68
 CITY OF TRENTON, MERCER COUNTY,
 NEW JERSEY

URBAN RENEWAL PLAN (AMENDED)*

Date: March, 1969
 Revised March, 1975
 Latest Revision Feb., 1978

<u>A. TABLE OF CONTENTS</u>	<u>PAGE NUMBER</u>
A. <u>Table of Contents</u> -----	1
B. <u>Description of Project</u> -----	1
1. <u>Boundaries of Urban Renewal Area</u> -----	1
2. <u>Urban Renewal Plan Objectives</u> -----	4
3. <u>Types of Proposed Renewal Actions</u> -----	4
C. <u>Land Use Plan</u> -----	5
1. <u>Land Use Plan, URP Map No. 2</u> -----	5
2. <u>Land Use Provisions and Building Requirements</u> -----	5
D. <u>Project Proposals</u> -----	15
1. <u>Land Acquisition</u> -----	15
2. <u>Rehabilitation and Conservation</u> -----	16
3. <u>Redeveloper's Obligations</u> -----	17
4. <u>Underground Utility Lines</u> -----	17
E. <u>Other Provisions Necessary to Meet State and Local Requirements</u> -----	18
F. <u>Procedure for Changes in Approved Plan</u> -----	20
<u>ATTACHED MAPS</u>	
1. U.R.P. Map No. 1, Project Boundary Map, dated October, 1968.	
2. U.R.P. Map No. 2, Land Use Plan, dated October, 1968. revised June, 1974 latest revision February, 1978	

*This Amended Urban Renewal Plan supersedes all prior Urban Renewal Plans for Project Area Nos. 1 and 2, John Fitch Way General Neighborhood Renewal Plan Area, which prior Urban Renewal Plan shall have no further force or effect.

B. DESCRIPTION OF PROJECT

1. Boundaries of Urban Renewal Area

The Project Boundary Map, URP Map No. 1, dated October, 1968 illustrates the single and individual boundary lines that encompass the John Fitch Way Urban Renewal Project Area Nos. 1 and 2 (N.J. R-59 and N.J. R-68). The following boundary descriptions apply to each project separately as shown on Map URP No. 1, dated October, 1968. This Urban Renewal Plan applies to the total area of the two John Fitch Way Projects encompassing both administrative areas.

a. Boundary of John Fitch Way Project Area No. 1 (N.J. R-59) BEGINNING at the point of intersection of the westerly line of South Broad Street and the northerly line of Market Street; thence

westerly along the northerly line of Market Street to the westerly line of South Warren Street;
thence

southerly along the westerly line of South Warren Street to the northerly line of Parcel 17, Block 24;
thence

westerly approximately 160 feet along the northerly line of said parcel; thence

southerly approximately 70 feet along the westerly line of said parcel; thence

westerly along the northerly line of said parcel to the easterly line of Bloomsbury Street; thence

southerly along the easterly line of Bloomsbury Street to the extension of the southerly line of Parcel 10, Block 28; thence

westerly along the southerly line of said parcel to
the easterly bank of the Delaware River; thence

northerly along the easterly bank of the Delaware River
to the northerly bank of the Assunpink Creek; thence

easterly along the northerly bank of the Assunpink Creek
to the westerly line of Peace Street; thence

southerly along the westerly line of Peace Street to
the northerly line of John Fitch Way; thence

southerly to the north-westerly corner of Parcel 1,
Block 28; thence

easterly along the southerly line of John Fitch Way
to the westerly line of South Warren Street; thence

southerly to the point of intersection of the easterly
line of South Warren Street and the southerly line of
Factory Street; thence

easterly along the southerly line of Factory Street to
the westerly line of South Broad Street; thence

southerly along the westerly line of South Broad Street
to the point of Beginning

- b. Boundary of John Fitch Way Project Area No. 2 (N.J. R-68)
BEGINNING at the point of intersection of the northwest

right-of-way line of Peace Street and the northeast
right-of-way line of West Lafayette Street;

thence in an easterly direction along the northeast
right-of-way line of West Lafayette Street to its point
of intersection with the west right-of-way line of South
Warren Street;

thence diagonally across South Warren Street in a south-
easterly direction to the point of intersection of the east
right-of-way line of South Warren Street with the north
right-of-way line of East Lafayette Street;

thence in an easterly direction along the north right-
of-way line of East Lafayette Street to its intersection
with the east right-of-way line of South Broad Street;

thence in a southerly direction along the east right-of-
way line of South Broad Street to its point of intersection
with the southeast right-of-way line of Factory Street,
(extended);

thence in a southwesterly direction along the southeast
right-of-way line of Factory Street to its intersection
with the southwest right-of-way line of Lamberton Street;

thence diagonally across South Warren Street in a north-
westerly direction to the point of intersection of the
west right-of-way line of South Warren Street with the
south right-of-way line of John Fitch Way;

thence in a westerly direction along the south right-of-way line of John Fitch Way to the point of intersection with the southwest right-of-way line of Memorial Drive, (extended);

thence in a northwesterly direction along the southwest right-of-way line of Memorial Drive to its intersection with the northwest right-of-way line of Peace Street, (extended); thence in a northeasterly direction along the northwest right-of-way line of Peace Street to its intersection with the northeast right-of-way line of West Lafayette Street, or, to the point of Beginning;

2. Urban Renewal Plan Objectives

- a. Establishment of new uses as part of the State of New Jersey Office Building Program and the Mercer County Office Building Program.
- b. Provision of land to aid the First Lutheran Church of Trenton in realizing modernization plans.
- c. Establishment of a new downtown focus; viz., a large shopping mall incorporating retail and other facilities which could include stores, theatres, a hotel or motel, and offices, and which shall include integrated parking facilities to be provided by the Trenton Parking Authority or Parking Utility.
- d. Provision of new traffic ways for state and local purposes based on the City's Master Plan for downtown traffic ways and regional highway proposals;
- e. Enhancement of historical Trent House by the expansion of its grounds.
- f. Provision of an open public plaza adjacent to projected office tower construction.

g. Construction of a thermal/electrical generating station (Integrated Community Energy System- ICES) by Public Service Electric and Gas Company, which will provide energy for 18 buildings existing/proposed (private housing, governmental offices and other public uses). The buildings serviced by the proposed generating station are either located in the Urban Renewal Project Area or are in close proximity of said area. As a support element of the generating station, Public Service Electric and Gas Company will also construct and bury fuel storage tanks underground at the site of the proposed parking garage (to be constructed by Trenton Parking Utility or Trenton Parking Authority) which will be located adjacent to the generating station (see attachment A- Trenton ICES Phase I Final Report).

3. Types of Proposed Renewal Actions.

Proposed action within the Urban Renewal Area is basically a program of clearance and redevelopment. Buildings that are structural-ly sound and complement the proposed re-use are to remain as incidental properties not to be acquired. No rehabilitation or conservation is proposed. Project improvements consist of street widen-ings and construction of new streets, construction of new utilities and the relocation and capping of utilities, and the provision of an open public plaza.

C. LAND USE PLAN

1. Land Use Plan, URP Map No. 2

Land Use Plan, URP Map No. 2, dated October, 1968, annexed hereto, is included as part of this Urban Renewal Plan. This Plan encom-passes the project areas of John Fitch Way 1 and 2 (N.J.R-59 and N.J.R-68), both areas being administrative areas only and having no individual bearing on sections C. 2, D, E or F of this Urban Renewal Plan. The controls of the above mentioned sections shall apply to the project area as shown on URP Map No. 2 as a single entity.

URP Map No. 2 indicates the Unified Development Business Area, public and semi-public uses, utility easements, street rights-of-way, site of the PSE&G generating station, parking garage, and the general course of the Assunpink Creek.

2. Land Use Provisions and Building Requirements

a. Land Use Provisions for Areas Shown on URP Map No. 2

1) Unified Development Business Area

a) Permitted Land Uses

All retail and service facilities including specialty, financial, eating, and eating and drinking establishments found or permitted in a regional or downtown shopping center or district.

Department, variety, discount or other stores containing a number of different retail uses. Automotive tire, battery and accessory facilities together with service, including installation, facilities.

Parking facilities, either at grade level or enclosed in parking structures, to be provided by the Trenton Parking Authority or Parking Utility.

Offices

Hotels, motels or other types of units designed primarily for similar uses

Theatres, convention halls and large meeting rooms

Pedestrian malls and bridges

Any structural elements necessary to cover the Assunpink Creek, such structures to be of a nature that will not impede the normal flow of the Creek

Public Transportation facilities.

All uses which are necessary or incidental to the foregoing uses.

A limited capacity generating station for thermal and electrical energy, with the following limitations:

- (1) Electric turbine generators with no more than 20 megawatts capacity.
- (2) Oil storage within the plant with no more than 15,000 gallon capacity.
- (3) Buried fuel storage tanks with no more than 200,000 gallon capacity adjacent to the proposed site.

b) Prohibited Land Uses

Dwellings and related residential uses but this prohibition shall not extend to permanent guests in a hotel, motel or other type of similar housing

Industrial or manufacturing uses except such manufacturing as is customarily incidental to retail, service, specialty and department store establishments and "limited" capacity utility generating station.

Billboards and all other signs not directly related to uses in the Unified Development Business Area

2) Public:

a) Permitted Land Uses: The Public areas as shown on the Land Use Plan, URP Map No. 2, dated October, 1968, shall be limited to the following:

(1) State Offices:

In the area designated on the Land Use Plan, URP Map No. 2, dated October, 1968, as "State Offices" the permitted uses shall be State of New Jersey Government Office buildings and appropriate supporting facilities, such as parking facilities, landscaping and observation platforms.

(2) County Offices:

In the area designated on the Land Use Plan URP Map No. 2, dated October, 1968, as "County Offices" the permitted use shall be Mercer County Office building or buildings, detention center, such supporting facilities as parking and landscaping.

(3) Park:

In the area designated on the Land Use Plan, URP Map No. 2, dated October, 1968, as "State Park" the permitted use shall be park including such appropriate supporting facilities as pedestrian walks, benches, lights, retaining walls and landscaping

In the area designated on URP Map No. 2 Land Use Plan, dated October, 1968, as "Trent House Park", the permitted uses shall be public park, and eating and drinking establishments, including appropriate supporting facilities as off-street parking, pedestrian walks and landscaping.

In the area designated on URP Map No. 2 Land Use Plan as "Public Plaza" the permitted use shall be paved and landscaped open areas, street furniture, fountains and outdoor art sculptures, small canopies, information kiosks and lighting

(4) Parking:

In the area designated on the Land Use Plan, URP Map No. 2, dated October, 1968, as parking, the permitted use shall be parking including such appropriate supporting facilities as pedestrian walks, toll booth, bumper stops, benches, lights, walls, fences, and landscaping

(5) Utility Easements.

3) Semi-Public

a) Permitted Land Uses: The Semi-Public areas as shown on the Land Use Plan, URP Map No. 2, dated October, 1968, shall be limited to the following uses:

- (1) Church uses.
- (2) Landscaping.
- (3) Off-Street Parking.
- (4) Rectories, parish houses and parochial schools.

b) Prohibited Land Uses: The following uses are prohibited in the area designated "Semi-Public" on URP Map No. 2.

- (1) Dwellings, motels and related residential uses.
- (2) Industrial or manufacturing uses.
- (3) Billboards and all signs not directly related to uses in the "Semi-Public" areas.
- (4) Commercial uses

b. Additional Regulations to be Imposed on Properties to be Acquired for Redevelopment.

1) Lot, Yard, and Building Regulations: Lot, yard and building regulations for all uses shown on the Land Use Plan, URP Map No. 2, are specified in Table No. 1.

2) Off-Street Parking Regulations: Minimum off-street parking space requirements shall be as specified in Table No. 2, and all parking spaces shall be subject to the regulations following Table No. 2.

3) Off-Street Loading Regulations in the Unified Development Business Area.

The aggregate total number of off-street loading spaces required within the Unified Development Business Area shall be determined by utilizing Table No. 3. In determining Gross Floor Area, the total interior gross floor area of all the uses in each of the two classifications of Table No. 3 shall be added together to determine the compliance of each classification with Table No. 3.

4) Specific Density Controls in the Unified Development Business Area.

When used herein the term "interior gross floor area" shall mean the total floor area designed for tenant occupance and exclusive use, including basements, mezzanines and upper floors, if any, expressed in square feet measured from the center line of joint partitions and from outside wall faces.

- a) The total aggregate square feet of interior gross floor area for all retail, specialty, service, eating, eating and drinking, and department store establishments, exclusive of offices taken into account for the purpose of determining compliance with section C.2.b.4) c) of this Urban Renewal Plan, shall be not more than 250,000 square feet.
- b) Offices, exclusive of offices taken into account for the purpose of determining compliance with section C.2.b.4) a) of this Urban Renewal Plan, shall contain in the aggregate a maximum of 700,000 square feet of interior gross floor area.
- c) Only one hotel, motel, or other type of transient housing facility containing a maximum of 400 guest rooms shall be allowed.
- d) Any theaters and auditoriums designed for permanent seating shall contain in the aggregate a maximum of 2,500 seats.

5) Assunpink Creek Controls in the Unified Development Business Area:

- a) On any property in the Unified Development Business Area containing a portion of the Assunpink Creek where a building in the Unified Development Business Area is situated within one hundred twenty-five (125) feet of the center line of the creek, the creek area on the property shall be covered.
- b) Where the Assunpink Creek is not covered in the Unified Development Business Area, an area seventy-five (75) feet in width as measured from the center line of the creek shall be graded and landscaped.

6) External Sign Controls

- a) No sign shall extend more than eighteen inches from a building wall over a sidewalk or other public way, but this limitation shall not apply to signs extending over a sidewalk or other public way within the Unified Development Business Area, and shall not prohibit signs which extend eighteen inches or less from a building wall which itself projects over a sidewalk or other public way, outside the Unified Development Business Area.
- b) The total area devoted to signs for uses occupying only the first floor of a building shall not exceed ten percent of the gross area of the portion of the street faces of the building devoted to the use.
- d) The total area devoted to signs for uses located above the first floor of a building shall not exceed ten percent of the gross area of the portion of the street faces of the building devoted to the use.
- e) Signs may be illuminated, but shall not have neon tubing exposed directly to public view.

- f) All signs shall be non-flashing, non-moving, and may not project further than 18 inches from the face of the building upon which they are attached and shall not be less than 8 feet from pedestrian grade level.
- g) Signs shall not extend above the roof level of the buildings to which they are affixed.
- h) Due to the probability of excessive street noise originating from Broad Street traffic any development of the "Public Plaza" land use parcel must include certain noise attenuation measures in order to assure a reasonably quiet environment for persons utilizing the public plaza in a passive manner. The following controls are required as methods of reducing street noise to acceptable levels:
The placement of public sitting areas consisting of benches, tables, canopies or any similar outdoor furniture shall be located no less than 100 feet from the South Broad Street right-of-way line.
Such sitting areas must be depressed five feet or more below the Broad Street sidewalk level.

c. Duration of Controls

This Urban Renewal Plan and/or any modification thereof shall be in force and effect for a period of twenty (20) years from the date of approval of this Urban Renewal Plan by the City Council of the City of Trenton, New Jersey

d. Applicability of Provisions and Requirements to Properties

Not-To-Be Acquired.

The properties listed under section D.1.b. of this Plan are not-to-be acquired. The uses, regulations and controls listed under sections C.2.a and C.2.b of this Plan shall apply to all properties not-to-be acquired and shall be provided for in the agreement for the sale of additional land to the property owners.

In the event that the improvements on any or all of the not-to-be acquired properties are removed, the re-use of that property shall

be in accordance with the Land Use Provisions and Building Requirements for new construction outlined under sections C.2.a. and C.2.b.

D. PROJECT PROPOSALS.

1. Land Acquisition.

a. Identification of Real Property to be Acquired.

Real property to be acquired includes all of the parcels and street vacations indicated on URP Map No. 1, Project Boundary Map, with the exception of Block 3, parcels 18 and 23; Block 6, Parcel 40; and Block 27, parcels 3, and parcel 2

All real property scheduled for acquisition has been acquired and cleared with the exception of the Cooper Street right-of-way fronting on Parcel 18, Block 3 and scheduled for vacation. The Trinity Lutheran Church, owner of the property, has agreed to give up any rights which it might have to the right-of-way when Cooper Street is vacated. This agreement will be included in the disposition agreement for property proposed for sale to the Church. Therefore, the inclusion of a Land Acquisition Map with this amended Urban Renewal Plan is not applicable. No property is proposed to be acquired for conservation or rehabilitation.

b. Statement of Special Conditions under which Properties not Designated for Acquisition May be Acquired.

Properties designated not-to-be-acquired are shown on URP Map No. 1, Project Boundary Map, and consist of the following individual parcels:

<u>Block No.</u>	<u>Parcel No.</u>
3	18 and 23
6	40
27	3, and part of 2

Each such not-to-be acquired parcel shall be subject to the specific regulations, controls and restrictions applicable thereto as set forth in section C.2.d..

There are no special conditions under which properties not designated for acquisitions may be acquired.

c. Exemption from Acquisition

Not applicable- all properties proposed for acquisition have been or will be acquired.

2. Rehabilitation and Conservation

No rehabilitation or conservation action is to be carried out within the Project Area.

3. Redevelopers' Obligations.

In order to achieve the objectives of this Urban Renewal Plan, each redeveloper shall be governed by the following controls:

a. Every redeveloper, corporation, association, individual and partnership carrying out this Urban Renewal Plan or any part thereof shall, in carrying out this Urban Renewal Plan comply with the provisions of this Plan and all applicable laws, rules, regulations, local codes and local ordinances of the City of Trenton. All applicable laws, rules, regulations, local codes and local ordinances presently do or promptly will be amended to conform to this Urban Renewal Plan and shall remain in conformity with this Urban Renewal Plan.

b. The regulations and controls in this Urban Renewal Plan will be implemented by appropriate covenants or other provisions in the agreement for land disposition and conveyance executed pursuant hereto.

4. Underground Utility Lines.

All utility lines, public and private, within the project area have been placed underground.

E. OTHER PROVISIONS NECESSARY TO MEET STATE AND LOCAL REQUIREMENTS.

The laws of the State of New Jersey require that any redevelopment

project by undertaken in accordance with a redevelopment plan for the Project Area. The term "Urban Renewal Plan" as used herein is synonymous with the term "Redevelopment Plan" as defined by State Law.

The Trenton Planning Board by resolution (Exhibit A attached) has approved this Urban Renewal Plan for Project Areas No. 1 and 2 of the John Fitch Way GNRP Area. It has further indicated that the proposals in this Urban Renewal Plan are in accordance with local plan objectives and the Master Plan of the City of Trenton.

1. Land Use.

Land Use Plan, URP Map No. 2, indicates proposed uses following redevelopment. The land uses as shown on Land Use Plan, URP Map No. 2 are in general conformity with the proposals made by the Master Plan of the City of Trenton.

2. Improved Traffic.

The proposed traffic pattern for the John Fitch Way GNRP Area, Project Areas Nos. 1 and 2 is in accord with the City's long-range traffic plans. The elimination of alleys and streets is in accord with the City's plans for the development of the area and for the general improvements of downtown traffic conditions.

3. Public Transportation.

There are no proposed changes in existing Public Transportation.

4. Public Utilities.

The public utilities proposals are in conformance with the local objectives and needs.

5. Recreational and Community Facilities.

Approximately one acre will be devoted to a park area. This proposed re-use area is located along the proposed extension of Market Street, adjacent to the historic Trent House, and is shown on Land Use Plan, URP Map No. 2. The

The area will be graded and landscaped to enhance the adjoining Trent House property. This park area is in accord with local planning objectives.

6. Regulations and Controls.

All standards relating to land coverage, lot dimensions, yard sizes, building heights, and the like are given in section C. of this Urban Renewal Plan, and are in accord with the Zoning Ordinance of the City of Trenton as amended.

7. Relocation Plan.

All proposed relocation in the Project Area has been completed. A "Relocation Plan", organized and administered by the Central Relocation Bureau of the Department of Planning and Development, was followed during the relocation period. This plan provided for physical, environmental and locational standards for families and individuals who were displaced. Standard rental housing, sales housing and public housing were made available to displaced families and individuals. Interviews, referrals, inspection, and mortgage financing assistance were conducted or made available to each family or individual. The Relocation Staff will maintain a continuing responsibility, within its means, to families displaced as a result of the Project. Relocation payments were made according to the eligibility of occupants. The Relocation Staff services also included a responsibility to business concerns which were displaced.

F. PROCEDURE FOR CHANGES IN APPROVED PLAN.

This Urban Renewal Plan may be amended from time to time upon compliance with the requirements of law; provided that, with respect to any land in the Project Area previously disposed of by the City of Trenton for use in accordance with the Urban Renewal Plan, the City of Trenton receives the written consent of the then owner of such land whose interests therein may be materially and adversely affected by such amendment.

TABLE NO. 1

Lot, Yard and Building Regulations

<u>Type of Regulations</u>	<u>Unified Dev. Business Area</u>	<u>Public</u>	<u>Semi-Public</u>
<u>Minimum Lot Dimensions</u>			
Area (Square Feet)	10,000	10,000	10,000
Width (Feet)	50	50	50
Depth (Feet)	100	100	100
<u>Minimum Yard Size***</u>			
Front Yard	None	25 feet**	15 feet**
Rear Yard	None	10 feet	10 feet
Side Yard	None	None	None
Street set-back	None	25 feet**	15 feet**
<u>Maximum Building Height*</u>			
Office and/or Hotel or Motel, Detention center and Parking Structures	260 feet or 22 stories	210 feet or 14 stories	
Other Permitted Uses	75 feet or 6 stories	15 feet or one story	60 feet
<u>Maximum Lot Coverage***</u>			
Percent of Lot Area which may be covered with buildings	100%	60%	60%
<u>Minimum Service Areas</u>			
Percent of Gross Floor Area to be used for Parking, Loading, Pedestrian Mall uses, and Public Transporta- tion Facilities	33%	--	--
<u>Building Intensity (F.A.R.)</u>	Limited by the above regulations		

* Measured from grade at the highest elevation of peripheral streets. Nothing herein contained shall be interpreted to limit or restrict the height of a chimney flue, water tank, elevator bulkhead, stage tower, scenery loft or similar structure.

** None on South Broad Street.

***These controls shall not apply to the parcels to be disposed for County use.

TABLE NO. 2

Minimum Off-Street Parking Space Requirements

<u>TYPE OF BUSINESS USE</u>	<u>MINIMUM REQUIRED NUMBER OF OFF-STREET PARKING SPACES</u>
<u>Retail Stores</u> -----	One space for each 800 square feet of gross floor area
<u>Service Establishments</u> -----	Same as Retail Stores.
<u>Eating and Eating and Drinking Establishments</u> ---	No spaces required for lunch rooms or taverns; one space for each 4 seats in excess of 40 for a restaurant or cafeteria.
<u>Offices</u> -----	Same as Retail Stores
<u>Hotel, Motel or other type of Similar Housing</u> ---	None.
<u>Theater</u> -----	None.
<u>All Business Uses</u> -----	One space for every 5 full time employees in addition to the above requirements.
<u>State and County Offices</u> -----	One space for each 600 square feet* of net floor area, devoted to office use.
<u>Semi-Public</u> -----	Minimum of 25 spaces.**
<u>Park</u> -----	Minimum of 15 spaces.

*Note: In the area designated on URP Map No. 2, Land Use Plan, as "County Offices" access and egress from the parking areas shall be at least 100 feet from Market Street.

**Note: Evidence of permission to use off-street parking facilities located on other parcels within 900 feet of a semi-public use may be used to satisfy up to 50 per cent of the required off-street parking spaces.

GENERAL SPECIFICATIONS

A parking space for purposes of this Table No. 2 is defined as an area of approximately 180 square feet (approximately 9 x 20 feet). All parking spaces shall be provided with proper, convenient and safe street access.

All off-street parking spaces in the Unified Development Business Area shall be in one or more structures. Up to 25% of the parking requirement may be provided outside of the Unified Development Business Area but at a distance no farther than 400 feet from said area.

Outdoor parking spaces, aisles and passageways and accesses shall be paved.

Outdoor parking spaces may be deemed to be part of the open space of the lot on which they are located.

TABLE NO. 3

Off-Street Loading Requirements

<u>Total Gross Floor Area of all facilities referred to in either column 2 or column 3 (In Thousand Square Feet)</u>	<u>Total Number of spaces required for retail and service facilities (including depart- ment stores), and eating and drinking establishments</u>	<u>Total Number of spaces required for office, hotel or motel and theatre establish- ments</u>
2-15	1	1
15-50	2	1
50-100	3	2
100-150	4	3
150-300	5	4

One additional space for each additional 150,000 square feet or fraction thereof in excess of 300,000 square feet.

GENERAL SPECIFICATIONS

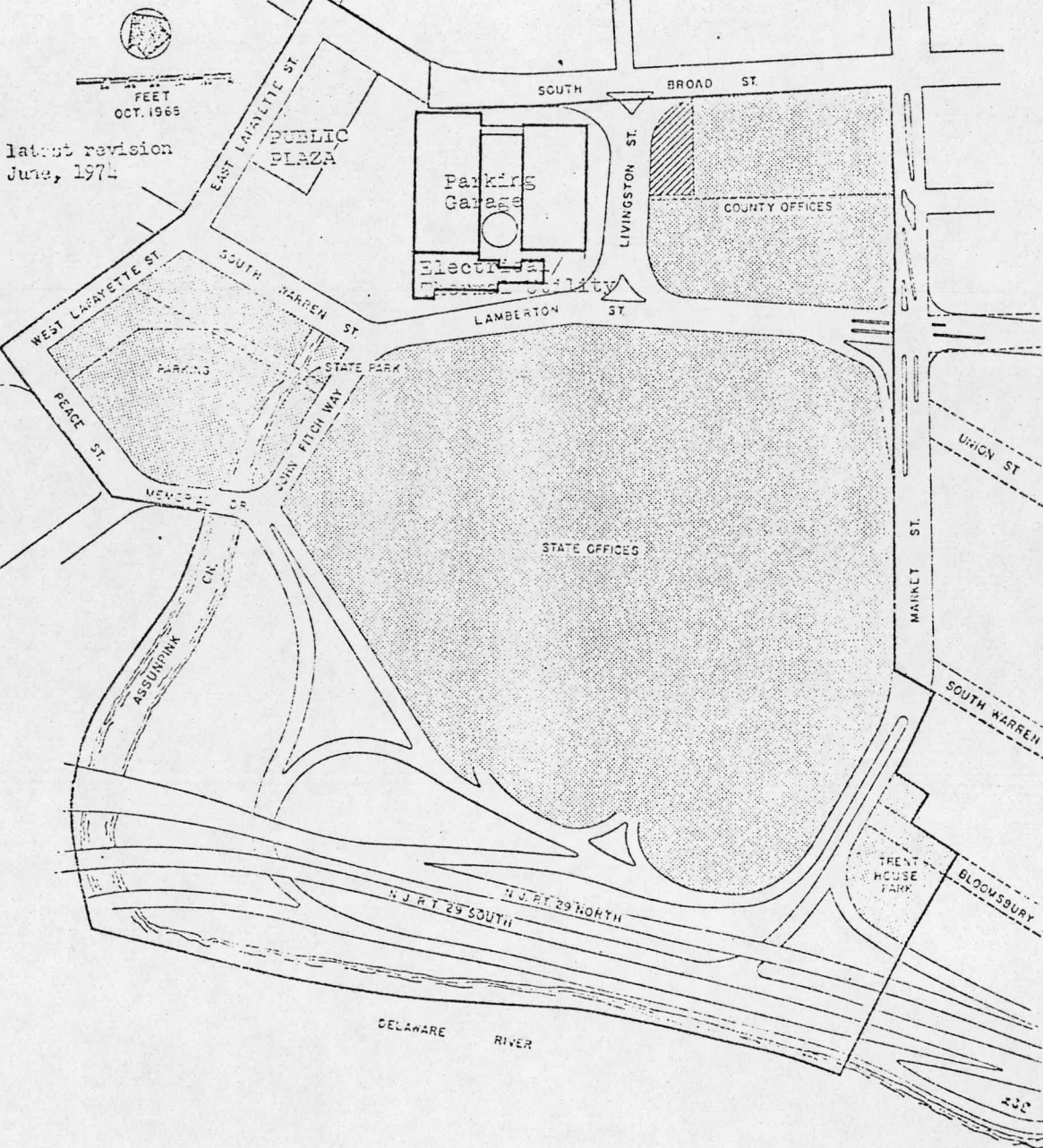
The term "loading space", as used herein, is an area off the public right-of-way for the purpose of truck loading and unloading.

A loading space shall have a minimum width of 10 feet, a minimum depth of 35 feet, and a minimum vertical height clearance of 14 feet.

JOHN FITCH WAY G.M.R.P. AREA
 PROJECT AREAS NO.1 AND NO.2
 CITY OF TRENTON, NEW JERSEY
 DEPARTMENT OF PLANNING & DEVELOPMENT

LAND USE MAP U.R.P. NO.2
 (N.J.R.-59 & N.J.R.-68)

- LEGEND**
- UNIFIED DEVELOPMENT BUSINESS AREA
 - SEMI-PUBLIC LAND USE
 - PUBLIC LAND USE
 - LAND USE PLANNING BOUNDARY
 - PUBLIC RIGHT-OF-WAY
 - EASEMENTS



APPENDIX C

(3.5.1e)

USE VARIANCE APPLICATION

City of TRENTON, NEW JERSEY PLANNING BOARD

Schedule of Forms

- FORM TPB - 1 Instructions to Applicants ✓
- FORM TPB - 2 Application for Development ✓
- FORM TPB - 3 Application for Preliminary Site Plan Approval ✓
- FORM TPB - 4 Application for Final Site Plan Approval ✓
- FORM TPB - 5 Application for Conditional Use
- FORM TPB - 6 Application for a Bulk (Hardship) Variance ✓
- FORM TPB - 7 Site Plan Check-List ✓
- FORM TPB - 8 Conditional Uses & Variances: Criteria
For Evaluation ✓
- FORM TPB - 9 Notice of Hearing to Property Owners ✓
- FORM TPB - 10 Proof of Service ✓

City of TRENTON, NEW JERSEY PLANNING BOARD

Instructions to Applicants

These instructions and the accompanying application forms are designed to assist applicants in the preparation and submission of applications for Preliminary Site Plan Review, Final Site Plan Review and Permits for Conditional Use in accordance with the Zoning Ordinance of the City of Trenton. Copies of the Ordinance are available from the Planning Board Secretary or City Zoning Officers in the offices of the Department of Planning and Development at 10 Capitol Street, Trenton, New Jersey, 08618.

- 1) Applications are commenced by filing form TPB -2 (APPLICATION FOR DEVELOPMENT) and appropriate supplemental Planning Board forms and necessary supporting documents with the Secretary of the Planning Board in quadruplicate. The following fee is required for all applications: \$25.00 for owner, occupant, resident, and all others \$50.00.
- 2) Applications must be signed by the legal or equitable owner of the premises, his duly authorized agent, or the holder of an option or contract to purchase or other enforceable proprietary interest in such land.
- 3) Applications must be accompanied by drawings to scale showing all details, adjoining properties affected, and all features involved and the appropriate fee.
- 4) The complete application with ALL necessary documents and the appropriate fee must be filed no later than at least fifteen (15) days before the hearing date.
- 5) Notice of a hearing requiring public notice shall be served upon all owners of property within 200 feet of the subject property, whether located in the City of Trenton or in a municipality which abuts the City boundary at least 10 days prior to the hearing, exclusive of the day of the hearing, as set forth in N.J.S.A. 40:55 D-12b. A sample form of Notice is available free of charge from the Secretary of the Planning Board. A list of all owners of property to be notified of the Public Hearing date for a particular case must be obtained by the applicant and are available at the office of the City Engineer, City Hall, Trenton, New Jersey for a fee of \$10.00.
- 6) An Affidavit of Service of Notice shall be presented to the Secretary of the Planning Board at, or prior to, the time of hearing.
- 7) Applicants are advised that members of the Board may wish to conduct on-site inspections of proposals prior to the time of hearing.
- 8) At every hearing the burden is upon the applicant to present evidence in the form of testimony in support of his application. Applicants are advised that all witnesses at a hearing will be sworn and that the giving of false testimony shall be considered perjurious.
- 9) County Planning Board approval may be required in order that a building permit for the subject development may be issued as set forth in N.J.S.A. 40:27-6 et. seq.
- 10) Public meetings of the Board are held on the fourth Thursday of each month at 7:00 p.m. in the City Council Chambers unless otherwise posted; except in the case of holidays, wherein the scheduled hearing shall be conducted on the preceding fourth Tuesday of the month.
- 11) The office of the Building Inspector at 10 Capitol Street, Trenton, will furnish forms upon request and is prepared to give general advice concerning their submission. **NEGLECT OR FAILURE TO COMPLY WITH THESE RULES OR REGULATIONS WILL BE DEEMED SUFFICIENT CAUSE TO DENY AN APPLICATION.**

City of TRENTON, NEW JERSEY PLANNING BOARD

Application for Development

APPLICATION IS HEREBY MADE FOR APPROVAL OF (check appropriate box)

PRELIMINARY SITE PLAN APPROVAL

FINAL SITE PLAN APPROVAL

CONDITIONAL USE PERMIT

VARIANCE

OTHER-DESCRIBE:

AS SHOWN AND DESCRIBED ON THE ACCOMPANYING MAPS, DOCUMENTS AND APPROPRIATE PLANNING BOARD FORMS (four copies of all applications shall be filed with the Secretary to the Planning Board - City of Trenton).

1. Applicant's Name _____
 Address _____

 Telephone _____

2. Name and address of present owner of site for proposed development if different than that listed in #1 above:
 Owner's Name _____
 Address _____

3. Location of Proposed development: (address and lot and block number from City Tax Map)
 Address _____

 Lot(s) _____ Block(s) _____

4. List of maps and other material accompanying this application:
 (Include name and address of preparer)
 (1) _____
 (2) _____
 (3) _____
 (4) _____
 (5) _____
 (6) _____

5. County Planning Board approval required: Yes No
 If yes, date application filed with County: _____

FOR PLANNING BOARD USE:

Application complete and accepted Date: _____

Received by: _____

Fee: _____

Extension of time agreed to by applicant (if applicable)

Date: _____

Received by: _____

Affidavit of Proof of Service of Notice of Public Hearing

Date submitted: _____

Technical approval (Chief Building Inspector) _____

Planning approval (Director, Division of Planning) _____

County Planning Board approval _____

Soils Erosion and Sedimentation Control approval _____

Delaware and Raritan Canal State Park Commission approval _____

ACTION OF TRENTON PLANNING BOARD:

Approved on _____

Disapproved on _____

Conditionally approved on _____

Date(s) of Hearing _____

Date of Decision Published _____

Date of Notice to Applicant (within 10 days) _____

COMMENT:

City of TRENTON, NEW JERSEY PLANNING BOARD

Application for Preliminary Site Plan Approval

(To be used in connection with and attached to Form TPB-2)

(Site Plan documents shall be to scale and shall show those existing and proposed conditions of the lot as set forth in Section 19-14.2a(1) of the Zoning Ordinance)

APPLICANT'S NAME, ADDRESS AND TELEPHONE NUMBER:

(SIGNATURE) _____

1. Application is hereby made for permission to erect:

2. The lot for which application is made has the following dimensions and size:

Frontage	Depth
Width	Area

and has the following existing structures and uses:

and is currently zoned:

3. The proposed building is of the following size:

Front Footage:	Stories:
Depth:	Height:

Setbacks:

Front:	Left Side:
Rear:	Right Side:

Gross Floor Area:	Building Coverage:
-------------------	--------------------

4. Has there been any previous appeal, request or application to this or any other City Board or to the Building Inspector (Zoning Officer) involving these premises? (If Yes, state date and disposition of said matter)

5. The Applicant certifies that the following actions have been taken, or if not, shall supply an explanation in the space provided under paragraph (g) below:
- a. The layout arrangement of the land development as shown on the site plan is consistent with the requirements of Sections 19-1 through 19-10 of the Trenton Zoning Ordinance.
 - b. The land development as shown on the site plan is in compliance with the City of Trenton Flood Control Ordinance.
 - c. Where required by N.J.S.A.40:27-6 et seq., if the planned development is along a county road, application for site plan review has been made to, or obtained from, the County Planning Board.
 - d. As required by Section 19-11.2(g) of the Trenton Zoning Ordinance, Certification of a Soil Erosion and Sedimentation Control plan in accordance with the City of Trenton Soil Erosion and Sedimentation Control Ordinance has been obtained from the Building Inspector, or will be obtained. (Final Site Plan approval is conditioned upon such certification).
 - e. The site plan shows and adequately provides for streets, water supply, drainage, shade trees, screening, storm and sanitary sewage disposal, garbage disposal and other utilities necessary for essential services to residents and occupants of the land development.
 - f. The site plan shows and adequate provision exists for the following considerations (as set forth in Section 19-11.3 of the Zoning Ordinance):
 - 1) Circulation, 2) Parking, 3) Landscaping,
 - 4) Historic Districts and Buildings, and
 - 5) Environment.
 - g. Check the appropriate box:
 - I, the Applicant, certify that the actions described above (a-f) have been completed.
 - I, the Applicant, certify that the actions described above (a-f) have not been fully completed and offer the following status report on each requirement:

Note: The Applicant may also set forth any other information that you feel may help the Planning Board make an informed decision on this application.

THE FOLLOWING INFORMATION TO BE COMPLETED BY THE DEPARTMENT OF PLANNING AND DEVELOPMENT STAFF:

6. Delaware & Raritan Canal Commission Approval:

The use is within/outside the Delaware & Raritan Canal Commission area of jurisdiction. If within the area, any comment rendered by the Commission has been attached.

7. Staff Comment: Items #1 through #6

8. RECOMMENDATION OF PLANNING DIVISION:

In granting this Preliminary Site Plan Application:

- We have no objection
- We object because of the following reasons
- We have no objection providing the following conditions are imposed

City of TRENTON, NEW JERSEY PLANNING BOARD

Application for Final Site Plan Approval

(To be used in connection with and attached to Form TPB-2 and 3)

APPLICANT'S NAME, ADDRESS AND TELEPHONE NUMBER:

(SIGNATURE) _____

1. Set forth the date of Preliminary Site Plan Approval and any conditions imposed upon the developer by the Planning Board, indicating the manner in which those conditions have been complied with.

2. State whether Final Site Plan Approval is sought for all or only part of that which was given Preliminary Approval by the Planning Board.

3. State whether conditions imposed by City of Trenton Flood Control and Soil Erosion and Sedimentation Control Ordinances have been complied with.

4. If County Site Plan Approval is required, state whether same has been obtained, and if not, the status of said application.

5. COMMENT BY DEPARTMENT OF PLANNING AND DEVELOPMENT STAFF
ON ITEMS #1 THROUGH #4

6. RECOMMENDATION OF PLANNING DIVISION:

In granting this Final Site Plan Application:

- We have no objection
- We object because of the following reasons
- We have no objection providing the following conditions are imposed:

5. Has there been any previous appeal, request, or application to this or any other City Board or to the Building Inspector involving these premises? (If YES, state the nature, date, and disposition of said matter):

6. The strict application of said provisions would result in (complete one or both of the following in detail):
 - a. The following peculiar and exceptional practical difficulties:

 - b. The following exceptional and undue hardship:

7. Said difficulties or hardship are by reason of (complete one or more of the following in detail):
 - a. Exceptional narrowness, shallowness or shape of the property, as follows:

 - b. Exceptional topographic conditions, as follows:

 - c. Other extraordinary and exceptional situation or condition of the property, as follows:

8. Said reasons are unique and peculiar to the lands or buildings for which the variance is sought and do not apply generally to lands or buildings in the neighborhood, because:

9. The requested variance is the minimum reasonable needed, because:

10. Supply a statement showing why relief can be granted without substantial detriment to the public good and will not substantially impair the intent and purpose of the Zoning Ordinance.

THE FOLLOWING INFORMATION COMPLETED BY THE DEPARTMENT OF PLANNING
AND DEVELOPMENT STAFF:

11. Delaware & Raritan Canal Commission Approval:

The use is within/outside the Delaware & Raritan Canal
Commission area of jurisdiction. If within the area, any
comment rendered by the Commission is attached.

12. Staff Comment: Items #1 through #10.

13. RECOMMENDATION OF PLANNING DIVISION:

In granting this Bulk (Hardship) Variance Application:

- We have no objection
- We object because of the following reasons
- We have no objection providing the following
conditions are imposed

City of TRENTON, NEW JERSEY PLANNING BOARD

Site Plan Check-List

The following checklist is designed to assist applicants in preparing preliminary and final site plans for board review. The applicant should check off each item to ensure that it is included on the plan. ITEMS OMITTED MAY DELAY CONSIDERATION BY THE BOARD. Utility plans, landscaping plans, architectural elevations, etc. may be shown on separate sheets.

The project description, together with supporting documentation, should be sufficiently complete so that those reviewing the application will be able to understand what the proposed site development entails in terms of the standards and criteria for review.

Sections 19-11.1 through 19-11.6 of the Zoning Ordinance of the City of Trenton explain the criteria and standards as to each of these categories as set forth below. If applicant believes that any of the categories are not applicable to its site development, it shall so indicate.

PRELIMINARY SITE PLAN CHECK-LIST

MAP LAYOUT, DATA, LOT BOUNDARIES, DIMENSIONS, TOPOGRAPHIC IDENTIFICATION:

Name and title of applicant; owner and person preparing map.

Place for signature of Chairman and Secretary of Planning Board.

Place for signature of the Chief Building Inspector.

Tax map lot and block numbers.

Date, scale and "north" sign.

Key map of the site with reference to surrounding areas and to existing street locations, watercourses, etc.

Zone district in which property in question falls, zone district of adjoining properties and all property within 200-foot radius of the property in question.

Names of owners of all contiguous land and adjacent property.

Dimensions of lot, setbacks, front yard, side yards and rear yard; size, kind and location of fences.

Location dimensions and details of all signs and exterior lighting including type of standards, location, radius of light and intensity of footcandles.

The entire property in question, even though only a portion of said property is involved in the site plan; provided, however, where it is physically impossible to show the entire property on the required sheet, a separate map at an appropriate scale may be submitted.

Significant existing physical features of the land.

Bearings and distances of property lines.

Existing and proposed contours of site at 2 foot intervals for areas less than 5 percent grade and 10 foot intervals above 5 percent grade.

Existing and proposed spot elevations based upon the U.S. Coastal Geodetic datum at all building corners, all floor levels, center lines of abutting roads, top and bottom curbs, property corners, buffers and other pertinent locations.

BUILDING DIMENSIONS, ELEVATION, GENERAL FLOOR PLANS:

General floor plans and elevations.

The outside dimensions of existing and/or proposed principal building(s) and all accessory structures. (More detailed building, floor plans apply to Final Site Plan Checklist)

PARKING & LOADING FACILITIES:

Plans of off-street parking area layout and off-street loading facilities showing location and dimensions of individual parking spaces, loading areas, aisles, traffic patterns and driveways for ingress and egress, speed retarding devices: roadway bumps, mechanical gates to parking lots; pedestrian walkways.

CIRCULATION: SITE, STREET, & WALKWAY ILLUMINATION; PROVISIONS FOR HANDICAPPED PERSONS; EMERGENCY VEHICLES:

All driveways and streets within 200 feet of site; street widths; curb-cuts, inclines for handicapped persons; location of curb-cuts.

All existing and proposed curbs and sidewalks.

Provisions for fire-fighting and emergency vehicle egress.

Illumination of streets and walkways-location of fixtures.

LANDSCAPING:

Location of all existing trees or tree masses, indicating general sizes and species of trees.

Landscaping and buffering plan showing what will remain and what will be planted, indicating names of plants and trees and dimensions, approximate time of planting and method of planting (base rooted, ball and burlap).

ENVIRONMENTAL CONSERVATION, UTILITIES, LAND TO BE RESERVED OR DEDICATED:

Existing and proposed sanitary sewerage disposal system and water supply system.

All existing and proposed utility lines within and adjacent to the subject property; facilities for refuse, garbage removal.

Storm drainage plan showing location of inlets, catch basins, pipes, swales, berms and other storm drainage facilities including roof leaders, indicate existing and proposed runoff calculations.

Existing drainage, flood plains, marshes, waterways.

Rights-of-way, easements and all lands to be dedicated to the municipality or reserved for specific uses.

Soil, erosion control plans; conservation of existing environmental amenities.

HISTORIC DISTRICTS & BUILDINGS: DELAWARE & RARITAN CANAL AREA:

Location and identity of historic landmarks and districts.

FINAL SITE PLAN CHECK-LIST

DETAILED FLOOR PLANS; CONSTRUCTION & SAFETY FEATURES:

Foundation, floor, roof and structural plans.
Door, window and finish schedules.

Mechanical floor and ceiling plans including equipment,
distribution location and size and flow, location of
dampers and safeguards.

Location, construction, size and character of all exitways.

Details of chimneys, vents, ducts and their connections.

Details of all temporary construction safeguards.

Details of elevator, dumbwaiter, moving stairs and conveyor
equipment.

CONSTRUCTION MATERIALS; FIRE RESISTANCE & PROTECTION:

Material designations.

Details of plastics used in construction.

Details of fire protection systems including design considerations.

Detail of maintenance of fire resistance ratings where
penetrations are made in building assemblies.

PLUMBING, ELECTRICAL, & HEATING EQUIPMENT; MATERIALS; PLANS:

Electrical floor and ceiling plans including lighting, receptacles,
line diagram and sizes of wire, conduits and breakers.

Plumbing floor plan including fixtures, pipe sizes, equipment,
isometrics, fixture schedule and sewage disposal.

Details of heating appliances and systems.

DATA REQUIRED; SPECIFICATIONS:

Fire resistance rating of all structural elements and
supporting data.

When required adequate engineering details of structural,
mechanical, plumbing and electrical work including
computations, stress diagrams and other technical data.

Seal and signature of licensed engineer or architect
affixed to each sheet.

Notation of the release of plans by the DCA where required.

Designation of number of occupants to be accommodated in
rooms and spaces except one, two and multi-family.

Any other specifications, standard required pursuant to the City, State,
BCCA, building and construction codes and amendments thereto.

THE APPLICANT MUST COMPLY WITH THE CITY OF TRENTON FLOOD CONTROL ORDINANCE
AND THE SOIL EROSION AND SEDIMENTATION CONTROL ORDINANCE.

City of TRENTON, NEW JERSEY PLANNING BOARD

Conditional Uses & Variances Criteria for Evaluation

CONDITIONAL USES are permitted in particular zoning districts by authorization of the Trenton Planning Board after the Applicant demonstrates that such a use in the district will comply with the conditions and standards for the location of such a use as contained in the City Zoning Ordinance. These conditions address, among other standards, the following concerns:

1. Suitability of the use to its environment considering the general height and use of the structure, and the surrounding open space and treatment of grounds as to general fitness of the structure or use to its proposed location.
2. Adequacy of provisions for off-street automobile parking or storage or loading space.
3. Adequacy of street capacity and egress to ensure that the use will not create an adverse impact upon public health, comfort and convenience as required for the preservation of the general character of the neighborhood wherein the use is situated.
4. That the use granted will not be contrary to the public interest, and will not materially increase traffic, fire hazard, panic or other danger; nor be injurious to health, morals or to the general welfare.

VARIANCES are permitted in particular instances by authorization of either the Trenton Planning Board or the Zoning Board of Adjustment and allow departure from permitted uses and/or prescribed minimum lot area, height, setbacks, parking, and building and floor area limits as set forth in the City of Trenton Zoning Ordinance for each zoned district.

The Zoning Board of Adjustment shall have the power to decide variances because exceptional practical difficulties of undue hardship would result upon the developer as a result of the strict application of the Zoning Ordinance in situations as follows:

1. Exceptional narrowness, shallowness or shape of a specific piece of property.
2. Exceptional topographic conditions.
3. That the variance if granted would not result in substantial detriment to the public good and would not impair the intent and purpose of the zone plan and Zoning Ordinance.
4. Special conditions and situations which are unique and peculiar to the property.

The Planning Board may grant a variance in lieu of the Zoning Board of Adjustment in the case of exceptional narrowness, shallowness or shape of a specific piece of property as follows:

1. From lot area, lot dimension, setback and yard requirements.
2. Provided that the area variance shall not be granted for more than one lot.
3. Provided that the area variance shall be part of a conditional use or site plan application.

City of TRENTON, NEW JERSEY PLANNING BOARD

Notice of Hearing to Property Owners

TO WHOM IT MAY CONCERN:

In compliance with Chapter XIX Section 19-13.4 of the Zoning Ordinance of the City of Trenton, New Jersey, notice is hereby served upon you to the effect that (I) (we)

do hereby propose to (give detailed information and location of proposed development): _____

The Revised Zoning Ordinance of the City of Trenton requires that this proposed _____

be subject to review and approval by the Planning Board of the City of Trenton at a Public Hearing.

Any person or persons affected by this application may have an opportunity to be heard at the public meeting to be held _____, 19____, at _____ P.M. in the City Hall, Trenton, New Jersey.

All documents relating to this application may be inspected by the public between the hours of 9:00 A.M. and 4:30 P.M. in the office of the Secretary of the Planning Board in the Department of Planning and Development at 10 Capitol Street, Trenton, New Jersey.

Date Signature of Applicant

NOTE: This notice must be personally served or sent by certified or registered mail at least 10 days before the day of the hearing, and proof of service given to the Secretary of the Planning Board at least 2 days before the day of the hearing.

City of TRENTON, NEW JERSEY PLANNING BOARD

Proof of Service

STATE OF NEW JERSEY,
County of Mercer, ss.

_____ of full age, being duly sworn according to law, deposes and says, that he resides at _____ in the City of _____ in the County of _____ and State of _____; that he is the applicant in a proceeding before the Planning Board, City of Trenton, Mercer County, New Jersey, being an application under the Zoning Ordinance and which has the Docket Number _____ and relates to premises _____

that he gave notice of this proceeding to each and all of the owners of property affected by said application, in the manner provided by law on _____ 19_____, a true copy of the notice and the names and addresses of those so notified are attached to this affidavit.

Sworn to before me, this _____ day of _____, 19_____

Signature of Applicant

Notary Public

STATUTORY REQUIREMENTS CONCERNING NOTICE

The Planning Board shall fix a reasonable time for the hearing of the appeal, giving due notice thereof to the appellant. Said appellant shall at least 10 days prior to the time appointed for said hearing give personal notice to all owners of property situate within or without the municipality, as shown by the most recent tax lists of the municipality or municipalities, whose property or properties as shown by said lists are located within 200 feet of the property to be affected by said appeal. Such notice shall be given by sending written notice thereof by registered or certified mail to the last known address of the property owner or owners, as shown by the most recent tax lists of said municipality or by handing a copy thereof to the said property owners or by leaving a copy thereof at their usual place of abode.

Where the owner is a partnership, service upon any partner as above provided shall be sufficient, and where the owners are corporations, service upon any officer, as above set forth, shall be sufficient. The appellant shall by affidavit present satisfactory proof to the said planning board at the time of the hearing that said notices have been duly served as aforesaid. Upon the hearing any party may appear in person or by agent or by attorney. (Laws 1968, Chap. 34, Sec. 1, N.J.S.A. 40:55-44)

APPENDIX D

(3.5.1e)

PLANNING BOARD MINUTES AND
SCHEDULE OF REQUIRED APPROVALS.

MINUTES

Planning Board Meeting
February 23, 1978; 8:00 P.M. City Hall

Members Present:

Carl Shipper, Chairman
Louis Mitchell, Vice-Chairman
May Medoff
William Palanky
Luis Torres
Arthur J. Holland, Mayor
Robert Giangrasso
Kenneth Butko, Councilman

Planning Board Attorney:

Lawrence Welle, Esq.

Citizen's Advisory Committee:

Jessamine Merrill

Department of Planning & Development Staff:

Frank Straker, Chief Building Inspector
James Pizarro, Zoning Inspector
Jules Teitel, Principal Planner
James Greenberg, Principal Planner

Mr. Shipper opened the meeting with reference to the Open
Public Meetings Act.

Public hearing:

C-09427; C-09428 Application for Preliminary and Final
Site Plan Approval.

Zoning Ordinance, Sub-sections 19-11.1; 19-11.2;
19-11.3; 19-13.4; 19-14.6; 19-14.7 for
construction of Residential Town Houses.

Applicant: Christopher Eurke; James Maguire, Esq.;
Attorney for applicant.

Address of Project: Area bounded by Ohio Avenue, Pear Street,
Strawberry Street and alleyway to the northerly side of block.

Attorneys for the opposition identified themselves at the outset of the hearing as follows:

Joseph O'Donnell, Esq. and Arthur Sypek, Jr. Esq. representing a neighborhood citizen's group of sizeable attendance at the hearing; and Frederick Cammerzell, Esq., representing Cammerzell Tool and Dye Works, Inc.

Mr. Shipper in turn, conveyed the Board's policy of hearing the applicant's presentation prior to the opposition; whereupon, James Maguire, Jr. Esq., presented himself as representative of the applicant. Mr. Maguire in acknowledging the degree of apparent opposition, requested a 30-day continuance of the hearing with the understanding that citizens' groups and their attorneys would be contacted during this interim, and that a compromise plan of lower density could be consequently developed. Mr. Maguire nevertheless, briefly outlined the basic features of the proposed plan as comprising only single-family houses and no apartments and built within strict compliance with the Zoning Ordinance. Mr. Welle advised the applicant that since simultaneous preliminary and final site plan review was requested, the applicant could either proceed for preliminary approval, or to temporarily withdraw the application and return with a new plan.

Mr. Butko objected to the request for postponing the case because of the time and cost to the City, as well as to the effort of the neighbors attending the hearing. Mr. Giangrasso stated the Planning Board's option to proceed with the case if the members present so desire, but Mrs. Medoff stated she had no objection to continuing the case. Mr. Shipper outlined the advantage of proceeding with his case and then offered the developer the opportunity to reappear with a revised plan if the Board rejects plan. Mr. O'Donnell however, preferred to go ahead because of the large turnout of residents, although he approved of meeting privately with the developer. Mr. Maguire reaffirmed his initial intention of continuing the hearing. Mr. Shipper agreed to permit both opposing sides to get together and work out a compromise, and asked Mr. Welle to prepare a waiver of time limits agreeable to both sides. Mr. Butko moved to continue the hearing for one month, and it was seconded by Mr. Torres. A roll call vote of 6-0 unanimously approved of the motion for continuance; namely, Shipper, Medoff, Palanky, Torres, Giangrasso and Butko (Mayor Holland and Mr. Mitchell had not yet arrived).

A consensus of approval from those attending the meeting as well as the Planning Board favored that the scheduled meeting of March 23rd be rescheduled for the following Thursday of March 30th, because of the March 24th Easter holiday.

Calvary Apostolic Church: Report.

In Mr. Sypek's presence, Mr. Teitel recounted the decision of the Superior Court in ordering the Calvary Apostolic Church to be remanded back to the Municipal Court and Planning Board in upholding the provisions of the City Zoning Ordinance. It was revealed that Mr. Sypek, attorney for the applicant, had requested all zoning forms pursuant to a Conditional Use application; and Mr. Sypek in acknowledging receipt of application forms agreed to file, although not until the April public hearing date because of time needed for obtaining expert witnesses.

Trenton Integrated Community Energy System: (ICES):

Mr. James Greenberg introduced the representatives of Public Service Electric and Gas Company which will build the project. Mr. Thomas Sharp, PSEG Engineer, Electric Planning Department outlined the purpose of ICES which was conceived in 1976, essentially to build a comparatively small electric thermal energy plant in close proximity to prospective users. Among these are the State House and Cultural Complex, War Memorial Building, Old Barracks, the N.J. Department of Labor and Industry and Department of Agriculture Buildings, Capitol Place Complex, and possibly the Lutheran Housing Corporation apartment building. The federal government selected Trenton as a pilot city and to continue work into the second phase to be funded at \$680,000. He acknowledged that Urban Renewal Plan and site plan approval will be required by the Planning Board. A three-part presentation consisted of a general overview, technical aspects, and the environmental impact. As part of the general overview the Phase I study has been completed and includes a garage and roof-top tennis courts adjacent to the ICES plant. The thermal energy will be fed directly via piping conduits to customers and the electrical energy will be conveyed through a downtown grid system which also conserves heat otherwise wasted and rejected into the atmosphere; also, otherwise rejected fuel is conserved and recycled into heat or coal consumption. He continued, the project is technically feasible, economically competitive, will conserve fuel, and will be operated by P.S.E.G. Company, and is tailor-made to serve Trenton.

Mr. Dana Cooley, Engineer P.S.E.G. Company Engineering and Construction Department stated that the environmental impact was favorably assessed and sub-surface conditions are suitable following a geological investigation. Furthermore, historic landmarks and areas will be preserved, Assunpink Creek will not be subject to pollution, street openings will be minimized as a result of overhead steam conduits, and atmospheric pollution e.g. oxides and nitrogen compounds are well within the N.J. D.E.P. standards of tolerance.

Mr. Helmut Baranek, P.S.E.G. Engineer, Construction and Engineering Department, described the production process which automatically controls turbine output and energy conversion as geared to demand.

A discussion followed the presentation. Mr. Shipper asked the extent of piping below and above ground; the answer 50% above and 50% underground along walkways. Mr. Shipper in turn, asked about the possibility of blackouts and remedial measures available; the reply, 4-gas turbines are available and the process is self-starting. Mrs. Medoff asked if the retail stores along the Commons can adapt to the ICES system; the answer, size of use is the controlling factor, and smaller customers will require concomitantly lower steam pressure which presents a problem along with the economic feasibility of distance, although future technological development using a step-down station may provide such a solution.

Mr. Torres cited the prevailing extent of government buildings as selected users of the system, and does this indicate the possibility of forthcoming revenue payments; the answer, the close availability of properties is the determining factor rather than type of revenue source. Mr. Mitchell asked if residential properties could tie-in with the system, and the answer was "no" because of the high steam pressure and the distance dispersion of users. Mr. Greenberg, however, cited the possibility of Luther Arms and Kingsbury Towers.

Mr. Shipper questioned the savings of ICES over the conventional energy system; the answer, a savings of up to 35% is possible if considering the total amount of energy consumed in relation to fuel which can be conserved and the cost of energy production. Mr. Shipper continued, is there any danger of rupture to steam overhead lines and resulting hazard? The answer; conduits can stand pressure of 725-lbs in contrast to the standard of 125-lbs pressure.

Mr. Torres questioned the possibility of job loss; the answer, not even at the initial production stage of development, and jobs will even increase because of the extensive use of the building trades. Mrs. Medoff suggested that an official from the Department of Environmental Protection be present during future I.C.E.S. meetings, and Mayor Holland suggested that user applicants within the community be consulted prior to implementing the I.C.E.S. system.

Other Agenda Items:

New forms and related newspaper notice; form letter to applicants:

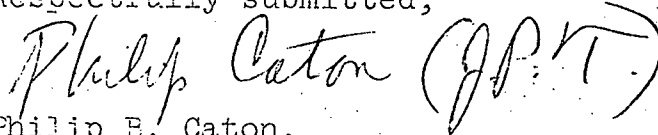
Mr. Teitel distributed drafts of the above items to members and asked for comment, but because of the late hour, the members agreed to reserve comment for the following meeting and had taken their copies home for review.

Urban Growth Zone Legislation:

Mr. Teitel distributed copies of the State act that initiated these zones, and added, that N.J. State Economic Development Authority policy is to include the mayor of any city so included in this industrial land development as a member of a committee as means of providing some degree of local autonomy.

The meeting was adjourned at 10:35 P.M. with a reminder that the next hearing date has been rescheduled for March 30 th.

Respectfully submitted,



Philip E. Caton,
Director of Planning
Planning Board Secretary

CITY OF TRENTON, NEW JERSEY

TO: Philip Caton, Dir. of Planning, James Greenberg, Nelson Mayo,
Principal Planners

MEMORANDUM

FROM: Jules P. Teitel,
Principal Planner

DATE March 7, 1978

Subject: Application Procedures Suggested for the
Trenton ICEA Project

As a prerequisite for the ICES implementation, Planning Board approval should include the following applications:

1. Amendment to the accompanying Urban Renewal Plan: (Mr. Nelson Mayo, Principal Planner, has worked-out a schedule for legal advertisements and hearings). The site in question is situated within a proposed "Unified Development Business Area". Since this category is not included in the City Zoning Ordinance use districts, it is not certain as to what uses are or are not permitted within a "Unified Development Business Area". However, the Zoning Ordinance does include a "Planned Commercial Development" (Sect. 19-6.4) which constitutes a floating zone situated within a Business A-zoned district. As stated in the ordinance, the Planned Commercial Development is intended to permit the use of land for residential, commercial, or light industrial development incidental to retail business conducted on the premises. The context of the zoning ordinance could just as well include an Electrical Thermal Utility plant, namely ICES, in this case. The ordinance further defines the Planned Commercial Development use as a contiguous area of five or more acres to be developed according to a plan as a single entity containing one or more structures to accommodate commercial, or office, or residential uses. The measured area is 6.6 acres as allocated for a Unified Development Business Area in the John Fitch Way, Urban Renewal Plan #2, which exceeds the minimum permissible area of 5.0 acres.

It is therefore recommended that the block bounded by E. Lafayette St., South Warren St., Lamberton St., Livingston St., and South Broad St. excluding the area allocated for a Public Plaza, be changed from a "Unified Development Business Area" to a "Planned Commercial Area", and that the Urban Renewal Plan be amended accordingly. This will bring the Urban Renewal land use classification into closer conformity with the Zoning Ordinance use districts as it pertains to the ICES project.

2. Site Plan Application: (forms enclosed)
A preliminary and final site plan approval is required pursuant to the Zoning Ordinance insofar as the project is over 1,000 sq. ft. (A site plan criteria check-list is included with the necessary application forms enclosed).
3. Use Variance; (forms enclosed)
Since the Business-A zoned district, where ICES will be built, specifically prohibits the storage of underground tanks and 550-gallons above ground storage tanks of flammable liquid pursuant to Sub-Section 19-6.1 (h); a use variance will therefore be required. Also, the use variance should include in the text, permission to erect an electrical and steam turbine generating system as a separate item in addition to the fuel storage tanks.


The Planning Board may simultaneously (at the hearing) grant both the preliminary site plan application as well as the use variance. Final site plan approval, however, may have to wait for the following months' hearing. Possibly, the amendment to the Urban Renewal Plan may be given simultaneous Planning Board approval along with the use variance and preliminary site plan approval.

CITY OF TRENTON, NEW JERSEY

TO: Philip E. Caton, Director
Division of Planning

MEMORANDUM

DATE March 9, 1978

FROM:  Nelson Mayo
Principal Planner

Re: John Fitch Way I,II, Urban Renewal Plan Amendment (ICES)

Outlined below is the schedule for amending the above Urban Renewal Plan:

- May 1, 1978 - Approval of Phase II (ICES)
Federal Department of Environmental Protection.
- May 4, 1978 - Resolution from City Council requesting
Planning Board to hold Public Hearing on
Amendment to Urban Renewal Plan.
- May 8, 1978 - Submission of proposed planning changes and
Environment Assessment to HUD for their
review and approval.
- May 8, 1978 - A-95 Review Process.
- May 11, 1978 - Resolution from Planning Board, setting
date of public hearing (June 22, 1978).
- June 7, 1978 - Notice of Public Hearing.
- June 14, 1978 - Notice of Public Hearing.
- June 22, 1978 - Date of Public Hearing and Resolution by
Planning Board approving the proposed changes.
- June 29, 1978 - Letter from LPA Attorney approving Public
Hearing proceedings and planning changes.
- July 6, 1978 - Resolution from City Council approving
amendment to Urban Renewal Plan.
- July 11, 1978 - Submission of all required information
and data to HUD.

NM:vmd

CC: John P. Clarke
Jim Greenberg ✓
Jules Teitel

APPENDIX E

(3.5.2a)

LOAD DEMAND PROFILES

INTRODUCTION

The purpose of this review is to summarize and gather into one document the procedures, assumptions, and various ICES simulations that were conducted in order to optimize system performance. A chronological format is used, with Phase I (January-May 1977) simulation described first and then Phase II (October 1977-March 1978).

PHASE I

Thermal Loads

The demonstration community of existing and future buildings was defined and its building characteristics were estimated. Based on these characteristics, thermal and electrical profiles were established for each building type, and correlated with actual energy data where same existed. (Electrical profiles were necessary, since they affect both the heating and cooling load profiles.)

On an hour by hour basis, the thermal loads for all buildings were summed, to result in an annual thermal load profile for the entire demonstration community.

Storage and Thermal Substations

Storage in Phase I was selected in order to shave the peaks, using the criterion that the peak day thermal demand of the buildings would be shaved down to the level of the average demand for that same peak day. This resulted in 630,000 gal. of storage. The storage was assumed to be located in six geographically separate thermal substations, corresponding to six convenient groupings of buildings in the community.

Thermal Demand of Plant

The thermal demand profile on the plant was then calculated, based on the thermal loads of the community as modified by storage. Each storage was simulated to give a steam demand on the plant, so that the thermal demand profile on the plant was given by the sum of the six individual steam demand profiles.

Some inaccuracy resulted from the assumption that all thermal loads of the community could be satisfied via storage. This is not actually the case, as there are steam loads, some of which occur year around, that cannot be served from storage.

A complete list of all assumptions used in Phase I is included as Appendix 1.

Plant Simulation

Knowing the thermal demand seen by the plant, an hourly performance simulation of the plant was made in order to establish electric generation and fuel use.

Plant simulation was based on a simplified gas turbine performance curve. Combustion air was assumed to be preheated by recovered heat in order to fix the peak output of the gas turbines at 2500 kW regardless of ambient temperature. This was based on manufacturer's information, and was subsequently changed for Phase II.

The turbines were simulated as tripping off at 500 kW minimum load, independent of ambient air temperature.

The simulated control strategy was to have storage available in order to shave the thermal peak whenever it occurred.

Results and Assumptions

Table 1 is a summary of the Phase I results in terms of annual oil use, electric generation on and off peak, and steam production. The simulated results are adjusted for module availability. The adjusted results are given on page D/1-36 of Appendix 2.

Appendix 1 is a tabulation of all the assumptions that went into the Phase I profiles. Appendix 2 is taken from Phase I (Appendix D/1 of the Phase I Report) and is a detailed description of the Phase I simulation.

PHASE II

Updated Thermal Load Profile

The first step in Phase II was an updating of the thermal load profile of the community. This was done merely by changing floor areas to reflect the most current figures. This thermal load profile was stored and was used in all subsequent plant simulations. It did not differ widely from the Phase I profile.

Existing Building Mechanical System Survey

It was also necessary to identify the existing building mechanical systems to determine the true composition of the community load profile. The community thermal requirement for heating was separated into two components, one of steam and one of hot water. These requirements determined which existing buildings can utilize storage and therefore the eventual type of ICES service connections. The Phase II plant simulations reflect the composition of the community load profile as described above.

Improved Gas Turbine Performance Characteristics

Discussion with gas turbine manufacturers led us to modify the program so that the maximum level of gas turbine output could float as a function of ambient temperature, and to abandon the original scheme which had combustion air pre-heating and a 2500 kW fixed maximum output. The manufacturer's gas turbine characteristic curve is included as Appendix 3, and the algorithms used to model this curve, along with a discussion of same, are included in Appendix 4.

TABLE 1
PHASE I SIMULATION
SUMMARY OF RESULTS

Mo	8 am - 8 pm			8 pm - 10 pm			10 pm - 8 am		
	<u>Wkdy</u>	<u>Sat</u>	<u>Sun</u>	<u>Wkdy</u>	<u>Sat</u>	<u>Sun</u>	<u>Wkdy</u>	<u>Sat</u>	<u>Sun</u>
	<u>Electricity (mWh)</u>								
1	1946	298	331	313	51	69	1250	202	250
2	1506	285	346	254	46	61	975	204	203
3	1012	204	286	192	40	61	821	193	223
4	465	48	66	79	8	18	402	51	30
5	594	107	30	49	4	6	106	11	8
6	1136	205	156	99	19	16	81	21	13
7	1504	265	153	132	18	20	110	21	16
8	1444	371	281	112	26	29	96	28	22
9	753	132	101	63	7	12	63	12	11
10	590	72	47	101	14	11	385	60	58
11	840	237	227	167	42	44	616	187	165
12	1734	278	343	301	51	59	1058	203	208
Total									29,465

	<u>Steam (1000 lb)</u>								
1	11527	1753	2238	1877	300	402	7402	1197	1474
2	8912	1686	2044	1505	270	361	5779	1209	1202
3	6027	1217	1699	1146	238	359	4384	1150	1324
4	2836	306	415	485	51	108	2457	321	484
5	3595	664	211	313	32	40	811	106	30
6	6739	1220	935	605	115	94	652	153	118
7	8901	1571	938	796	112	121	833	157	126
8	8542	2195	1674	674	159	176	737	207	172
9	4516	796	620	398	43	75	561	104	99
10	3572	450	307	617	85	68	2397	379	363
11	5008	1413	1353	996	252	262	3679	1118	985
12	10257	1646	2056	1775	299	350	6279	1201	1232
Total									176,840

	<u>Oil (bbl)*</u>								
1	5019	769	982	821	130	177	3223	520	645
2	3885	734	892	656	118	158	2513	526	523
3	2610	525	737	496	103	157	2117	499	576
4	1199	122	170	202	20	45	1037	132	205
5	1531	277	78	127	10	15	271	27	19
6	2930	528	401	256	48	40	208	53	32
7	3878	683	406	340	47	53	283	55	40
8	3723	956	726	238	67	76	247	73	58
9	1941	341	260	163	18	31	161	30	28
10	1522	187	120	261	35	28	992	156	148
11	2165	611	585	430	110	113	1587	482	425
12	4472	718	897	775	131	153	2728	524	537
Total									75,958

* Does not include 23 barrels used in boiler.

These algorithms were built into the program, and the following were deleted: the fixed 2500 kW maximum output, the gas turbine performance characteristics shown in Appendix 2, and the combustion air preheating.

Revised Control Strategy

The higher value of on peak electric generation relative to off peak caused us to revise the storage control strategy. Instead of having a completely charged storage to be used for peak shaving, the new strategy called for storage to be recharged during daytime hours. This shifted a larger fraction of the plant electric output to the daytime period. This characteristic was programmed into the simulation.

Simulation with Fixed Trip-Off Points

A set of simulations was run with the new algorithms, to determine the effects of gas turbine trip-off point. For each simulation the trip-off point was fixed at a certain kilowatt level, such as 1000 kW, independent of outside ambient.

Results for a 1500 kW trip-off point are included as Table 2 (2 pages long).

Floating Trip-Off Points

The next series of Phase II simulations allowed the gas turbine trip-off point to float, as a percentage of the maximum turbine output. Maximum turbine output is a function of ambient temperature as described above. These simulations showed that, as expected, a higher "plant" thermal efficiency existed for high trip-off points, but this resulted in less electricity generated and more auxiliary fuel burned. The overall "system" efficiency (i.e., taking account of PS's energy consumption to make up the electricity deficiency) however remained fairly constant.

The results of this series of simulations are shown in Table 3.

TABLE 2
FIXED TRIP-OFF POINT - 1500 KW

ELECT (M.H)

10-NOV-77

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2708	451	512	388	65	76	604	93	153
2	2282	444	503	307	56	77	273	82	40
3	1758	393	486	234	51	75	210	39	46
4	817	87	149	83	10	19	58	6	13
5	426	100	8	27	7	0	100	7	0
6	1250	220	202	138	29	18	135	28	11
7	1826	316	208	191	33	27	300	78	42
8	1750	429	336	198	43	38	256	86	57
9	750	145	116	68	12	13	77	15	11
10	829	112	93	106	17	11	114	10	6
11	1477	412	400	208	53	58	126	51	33
12	2583	446	507	364	62	75	349	65	76
101	18486	3554	3520	2313	436	496	2601	559	487
25,560			3,245			3,647			
32,452									

STEAM (1000 LB)

10-NOV-77

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	16474	2871	3401	2203	361	507	3738	586	939
2	15724	2881	3413	1736	315	436	1889	515	306
3	12290	2669	3297	1352	292	429	1542	303	355
4	6497	751	1106	664	80	139	784	130	149
5	4265	872	220	435	69	40	1086	146	80
6	8934	1598	1401	961	202	133	1331	308	196
7	12095	2039	1399	1330	209	170	2471	541	400
8	11523	2812	2211	1271	274	263	2165	662	539
9	5924	1059	829	586	84	103	985	187	154
10	6527	901	812	781	106	86	1105	136	111
11	10055	2733	2697	1207	306	334	1070	372	273
12	17541	2910	3369	2059	347	422	2321	423	479
101	112985	24096	24155	14585	2645	3062	20487	4309	3981
175,134			20,292			28,777			
227,173									

OIL (BARRELS) - Turbine

10-NOV-77

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	7072	1182	1331	1044	175	221	1620	248	404
2	5978	1163	1308	837	152	205	751	224	108
3	4666	1050	1275	657	143	204	589	115	122
4	2200	237	398	244	29	56	174	17	36
5	1165	276	22	77	21	0	267	20	0
6	3440	584	581	396	76	50	378	78	30
7	4904	872	573	544	90	74	845	218	115
8	4680	1160	925	560	116	106	722	239	164
9	2040	401	322	204	34	35	213	40	32
10	2247	301	247	303	48	33	313	27	17
11	3956	1092	1061	583	144	156	354	142	90
12	6768	1175	1325	985	167	206	952	178	212
TOT	49115	9493	9367	6433	1196	1346	7177	1546	1329

67,975

8,975

10,051

87,001

OIL (BARRELS) - Aux. Boiler

10-NOV-77

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	775	80	128	7	0	6	99	17	25
2	668	88	133	0	0	0	92	15	21
3	529	100	123	4	0	0	88	20	23
4	406	56	54	43	5	7	107	23	18
5	367	54	41	63	6	10	116	25	19
6	166	40	20	18	4	5	115	31	30
7	84	0	14	25	0	0	136	11	32
8	59	7	4	0	0	4	132	29	43
9	275	31	18	36	2	5	120	23	20
10	387	60	62	40	2	5	105	18	18
11	358	89	92	2	0	0	85	21	20
12	691	92	118	0	0	0	90	15	13
TOT	4765	696	808	238	19	41	1284	248	282

6,270

298

1,814

8,381

TABLE 3
 FLOATING TRIPOFF POINTS

Trenton ICES - 77.21
 November 18, 1977
 R.G.Vanderweil Engineers, Inc.

SUMMARY OF SIMULATION RESULTS

	Electric (MWH)			Steam (1000 #)	Turb. Oil (Barrels)	Blr. Oil (Barrels)	Overall Thermal Efficiency
	On Peak	Off Peak	Total				
1. 32% Max. kW trip-off (New Program)	25,747	7,990	33,737	227,173	91,471	6,417	60.29%
2. 60% Max. kW trip-off (New Program)	24,903	7,843	32,746	227,173	87,587	7,918	61.187%
3. 80% Max. kW trip-off (New Program)	24,060	7,372	31,432	227,173	81,835	9,849	62.89%
4. 99% Max. kW trip-off (New Program)	21,319	6,389	27,708	227,173	70,733	15,327	64.457%

Notes:

1. New Program: - unit trip-off is a percent of max. kW capability which is a function of ambient temperature: also includes optimum number of units selection.
2. All runs consider storage for heating and cooling.
3. Overall Thermal Efficiency = $\frac{\text{Electric (WH x 3.413)} + \text{Steam (\# x 1000) Btu}}{(\text{Turb. Oil} + \text{Blr. Oil}) \text{ Barrels} \times 5.8 \times 10^6 \text{ Btu}}$

Size of Storage

Additional simulations were run to test the effects of zero storage, and then to test the effects of large storage and small storage. Heretofore, all simulations had been based on the Phase I storage. The results of the simulations are given in Table 4.

Selection of Storage Size

The simulations showed (Table 4) that storage size does not have significant impact on thermal efficiency. Larger storage improves somewhat the amount of on peak power generated and is therefore desirable. The law of diminishing returns comes into play however: doubling storage from 635,000 to 1,270,000 gal. increases on peak power only 3%.

With the new operating strategy of having storage empty at 8 a.m., storage size is based on the criteria that it should handle the integrated thermal load of the buildings it serves for a 10 hour nighttime period. Only hot water heating system load is considered for this. Some buildings require steam, but since this cannot be supplied from storage it has been excluded in the storage sizing procedure. Table 5 indicates storage capacities required to meet the 10 hour integrated load for different outside temperature conditions. For a 10 hour mean temperature of 14° (only 2% of off peak hours exceed this), a storage capacity of 1,213,000 gallons is read from Table 5. For a 10 hour mean of 26° (exceeded by 10% of off peak hours) 625,000 gallons of storage suffice.

Based on the foregoing, the 625,000 gal. storage of Table 5, consistent with Phase I, was considered to be the optimum selection.

Storage is now located at 13 thermal substations, as opposed to the six substations of Phase I. This selection was made on the basis of simplifying the piping and controls. The 13 substations permit a storage unit to be associated with each chiller plant of the demonstration community.

TABLE 4

VARYING STORAGE SIZE

	<u>Electric (MWH)</u>			<u>Steam (1000#)</u>	<u>Turb. Oil (Barrels)</u>	<u>Blr. Oil (Barrels)</u>	<u>Overall Thermal Efficiency</u>
	<u>On Peak</u>	<u>Off Peak</u>	<u>Total</u>				
<u>Nov. 21, 1977</u>							
1. 32% Max. kW trip-off Zero Storage	22,946	14,871	36,917	223,127	102,287	1,418	58.04%
2. 99% Max. kW trip-off Zero Storage	16,604	10,863	27,467	223,127	70,112	14,879	64.28%
<u>Dec. 5, 1977</u>							
1. 80% Max. kW trip-off 317,500 gal. storage	22,642	9,751	32,394	226,681	84,617	8,486	62.45%
2. 80% Max. kW trip-off 635,000 gal. storage	24,060	7,372	31,432	227,173	81,835	9,849	62.89%
3. 80% Max. kW trip-off 1,270,000 gal. storage	24,753	6,262	31,015	227,987	80,589	10,550	63.15%

TABLE 5
STORAGE CAPAC REQUIRED FOR
OFF-PEAK HOURS (10 hrs.)
HOT WATER SYSTEMS ONLY

Trenton ICES 77 21
R. G. Vanderw Ingr., Inc.
12-19-77

BUILDING OR BUILDING GROUP	STORAGE CAPACITY (GALLONS)					
	Hours 22-31 Temperature 11-17 10 Hr. Mean 14 ^o		Hours 334-343 Temperature 28-34 10 Hr. Mean 31 ^o		Hours 309-318 Temperature 23-29 10 Hr. mean 26 ^o	
Dept. of Education	91000		36700		50000	
Cultural Center Complex	195000		78600		105000	
DEP	47600		14000		20000	
Civic Center	77400		27100		46000	
Capitol Place Complex	101400		34000		44000	
Mercer County Courthouse	23600		8000		12000	
Mercer County Detention Ctr.	54000		20400		30000	
L & I	57000		16800		24000	
H & A	27400		8100		12000	
Luther Arms	NA		NA		NA	
Kingsbury I Complex	160500		62500		88000	
Justice Complex	199500		59200		80000	
Kingsbury II Complex	178600		72200		96000	
	1213000		437600		625000	
	P.Hrs.	OP.Hrs. ¹	P.Hrs.	OP.Hrs. ¹	P.Hrs	OP.Hrs ¹
# of Hrs. = or mean temp.	24	82	472	763	249	450
% of heating hrs.(4344)	.55%	1.88%	10.86%	17.56%	5.70%	10.36%
Total % of htg.hrs.	243		28.4%		16.1%	

1. Data extrapolated from AFM-88-8. Engineering weather data for McGuire AFB, N.J.

"Process" Steam and Revised Operating Mode

The final Phase II simulations take into account two refinements. "Process" steam, space heating steam, and steam distribution losses are segregated from the remaining thermal loads. These cannot be supplied from storage. Previous simulations neglected this, but for the final simulations this amount of steam has been considered as the base ICES plant steam demand, independent of storage. Only the community hot water heating system demand is supplied via storage. The magnitudes of the peak segregated loads for the reference year are shown in Table 6.

In addition, the operating strategy has been refined, (a) to prohibit use of the auxiliary boiler for charging storage during on peak hours, and (b) to eliminate use of gas turbines at night. Refinement (a) will improve the base load on the gas turbines, and the electrical revenue. Previously, during periods of extreme on peak thermal demand, charging of the storage resulted in times when all gas turbines plus the auxiliary boiler were on line. Refinement (b) calls for gas turbine operation at night only if storage is depleted and the auxiliary boiler cannot handle the load. This will reduce plant O&M expenses.

Table 7 (2 pages) is a summary of the results of the final simulation.

SUMMARY OF TRENTON ICES SEGREGA LOADS, ENERGY AND STORAGE CAPACITY

Building Identification	Mod.	Area Sq. Feet	Htg. Peak MMBH	Clg. Peak MMBH	Htg. Energy MMBTU	Clg. Energy MMBTU	Stor. Cap. Gals.	Htg. Medium	Remarks
Dept. of Education	ST1P	89800	3	Elec.	7555	Elec.	50000	HW	
Cultural Center Complex	ST1P	192425	7	Elec.	13428	Elec.	105000	HW	
State House Complex	ST1P	513300	17	Elec.	32087	Elec.	-	Steam	Includes WH and process steam
Dept. of Envir. Protection	OF22F	250000	3	4(D)	3237	3420	20000	HW	
Civic Center	C1V2P	100000	5	12(D)	8413	5823	46000	HW	Clg. includes WM
Kingsbury I Complex	HR1P LR1P	354500	6	7(S)	11607	5768	88000	HW	
Kingsbury II Complex	LR1P	200000	6	6(D)	12000	4779	96000	HW	
Justic Complex	CRT3P OF22P	800000	9	19(D)	9034	16343	80000	HW	
Justic Complex Kit. Vent.	VENT1		3	0	2564	0	-	HW	
Capitol Place Complex	COM1P OF12P	375000	5	8(D)	6045	5590	44000	HW	
L & I	OF22P	300000	3	Elec.	3467	Elec.	24000	HW	
H & A Building	OF22P	144000	2	Elec.	2828	Elec.	12000	HW	
H & A Vent (Labs)	SENP		4	-	10851	-	-	Steam	
H & A Process (Lab)	LABP		3	-	6264	-	-	Steam	
Dentention Center	HR1P	160000	3	Elec.	5462	-	30000	HW	
Dentention Center Process Laundry	LAUN		2		4015			Steam	
Dentention Center Kitchen	KIT		1		5870			Steam	
MC Courthouse	CRT3P	88800	2	2(S)	3525	577	12000	HW	
MC Jail	HR1P	41200	1	-	4336	-	-	Steam	
MC Process Kitchen	KIT		.5		2890		-	Steam	
Luther Arms	HR1P	91500	2	1(S)	4361	414	18000	HW	
Hot water total:			2		7200				
Losses Total:			2		17520				

TABLE 7

SUMMARY OF RESULTS

Off-Peak No Elec. Generation (Sunday Inclusive)
80% Maximum kW Trip-Off

ELECT (MWH)

05-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	CUN	WKDY	SAT	SUN
1	2268	368	5	365	65	0	10	0	3
2	1815	343	0	287	58	0	0	0	0
3	1508	357	0	208	52	0	0	0	0
4	1027	169	0	117	15	0	0	0	0
5	366	69	0	40	12	0	0	0	0
6	903	163	0	129	24	0	0	0	0
7	1309	212	0	176	31	0	0	0	0
8	1234	292	0	164	39	0	0	0	0
9	519	96	0	63	12	0	0	0	0
10	903	98	0	112	18	0	0	0	0
11	1284	341	0	203	53	0	0	0	0
12	2099	344	0	346	63	0	0	0	0
TOT	15236	2850	5	2211	445	0	10	0	3

On-Peak: 20,742

Off-Peak: 18

Total: 20,760

STEAM (1000 LB)

05-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	13051	2083	2470	2072	365	472	9447	1667	1909
2	10496	1993	2325	1660	334	431	7918	1593	1698
3	9096	2213	1789	1323	323	435	6312	1445	1688
4	7269	1216	422	891	119	78	2534	320	374
5	4130	697	297	446	110	36	1132	185	92
6	6823	1209	1065	929	175	134	1174	230	186
7	9168	1471	1077	1224	208	161	1534	272	204
8	8629	2018	1679	1145	273	225	1403	342	291
9	4822	797	691	578	99	97	886	162	138
10	6670	806	390	856	128	56	2606	446	481
11	7927	2095	1618	1256	335	341	4936	1512	1473
12	12134	1996	2238	1972	358	379	8793	1590	1652
TOT	100215	18594	16061	14352	2827	2845	48675	9764	10186

On-Peak: 135,988

Off-Peak: 87,531

Total: 223,519

OIL (BARRELS) - Turbine

05-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	5980	967	14	977	176	0	28	0	8
2	4820	901	0	764	153	0	0	0	0
3	3953	935	0	539	137	0	0	0	0
4	2670	438	0	305	40	0	0	0	0
5	951	178	0	103	32	0	0	0	0
6	2373	428	0	339	65	0	0	0	0
7	3429	557	0	459	81	0	0	0	0
8	3228	761	0	426	101	0	0	0	0
9	1358	254	0	163	31	0	0	0	0
10	2357	255	0	291	48	0	0	0	0
11	3376	894	0	526	139	0	0	0	0
12	5554	902	0	913	167	0	0	0	0
TOT	40049	7470	14	5805	1170	0	28	0	8

On-Peak: 54,494 Off-Peak: 50 Total: 54,544

OIL (BARRELS) - Aux. Boiler

05-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	65	3	588	6	0	111	2295	408	459
2	45	11	571	8	1	106	1944	391	418
3	81	31	440	29	5	107	1552	355	415
4	267	46	103	46	6	19	622	78	92
5	439	63	73	46	8	9	276	45	22
6	244	36	262	26	4	33	287	56	45
7	182	26	265	25	3	40	375	66	50
8	165	32	413	25	6	55	343	84	71
9	370	44	170	45	6	24	216	39	34
10	301	55	96	47	5	14	639	109	118
11	97	30	396	18	7	84	1214	372	362
12	49	11	549	2	0	93	2159	391	406
TOT	2304	387	3925	323	50	694	11923	2396	2491

On-Peak: 3064 Off-Peak: 21,429 Total: 24,493

Failure Analysis

The Phase I economic analysis was based upon a failure analysis of the gas turbine waste heat boiler module. This used an 85% availability figure for the module. This results in the following probabilities:

<u>Available</u>	<u>Probability</u>
one or more modules	.9995
two " " "	.9880
three or " "	.8786
four or " "	.5101

In order to get the total annual power generated, all the power generated by the first module is factored down by .9995, the second by .9880, etc. The results of applying this analysis to the figures in Table 7 are given in Table 8.

TABLE 8

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>
Elec (MWH) On Peak	20742	19419
Off Peak	18	18
Total	20760	19437
Steam (1000 lbs)		
On Peak	135988	135988
Off Peak	87531	87531
Total	223519	223519
Turbine Oil (Barrels)		
On Peak	54494	52372
Off Peak	50	50
Total	54544	52422
Boiler Oil (Barrels)		
On Peak	3064	5050
Off Peak	21429	21429
Total	24492	26479

Plant Simulation

The final ICES plant simulations were narrowed to the following:

1. No off-peak electricity generation
 - a. ICES community with storage
 - b. ICES community without storage
 - c. ICES community with storage for Dept. of Education and Justice Complex only
2. On-peak/off-peak electricity generation
 - a. ICES community with storage
 - b. ICES community without storage
 - c. ICES community with storage for Dept. of Education and Justice Complex only

The following Summary of Results represent the 6 cases simulated..

Summary of Results
 (1982 ICES Community w/ DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip Off

ELECT (MWH)

26-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM			
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN	
1	2268	368	5	365	65	0	10	0	3	
2	1815	343	0	297	58	0	0	0	0	
3	1508	357	0	208	52	0	0	0	0	
4	1027	169	0	117	15	0	0	0	0	
5	366	69	0	40	12	0	0	0	0	
6	903	163	0	129	24	0	0	0	0	
7	1309	212	0	176	31	0	0	0	0	
8	1234	292	0	164	39	0	0	0	0	
9	519	96	0	63	12	0	0	0	0	
10	903	98	0	112	18	0	0	0	0	
11	1284	341	0	203	53	0	0	0	0	
12	2099	344	0	346	63	0	0	0	0	
TOT	15236	2850	5	2211	445	0	10	0	3	
On Peak: 20,742			Off Peak: 18			Total: 20,760				

STEAM (1000 LB)

26-Jan-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM			
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN	
1	13051	2083	2470	2072	365	472	9447	1667	1909	
2	10496	1993	2325	1660	334	431	7918	1593	1698	
3	9096	2213	1789	1323	323	435	6312	1445	1688	
4	7269	1216	422	891	119	78	2534	320	374	
5	4130	697	297	446	110	36	1132	185	92	
6	6823	1209	1065	929	175	134	1174	230	186	
7	9168	1471	1077	1224	208	161	1534	272	204	
8	8629	2018	1679	1145	273	225	1403	342	291	
9	4822	797	691	578	99	97	886	162	138	
10	6670	806	390	856	128	56	2606	446	481	
11	7927	2095	1618	1256	335	341	4936	1512	1473	
12	12134	1996	2238	1972	358	379	8793	1590	1652	
TOT	100215	18594	16061	14352	2827	2845	48675	9764	10186	
On Peak: 135,988			Off Peak: 87,531			Total: 223,519				

Summary of Results
 (1982 ICES Community w/ DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip Off

OIL (BARRELS) Turbine										26-Jan-70	
8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM					
MO	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN		
1	5980	967	14	977	176	0	28	0	8		
2	4820	901	0	764	153	0	0	0	0		
3	3953	935	0	539	137	0	0	0	0		
4	2670	438	0	305	40	0	0	0	0		
5	951	178	0	103	32	0	0	0	0		
6	2373	428	0	339	65	0	0	0	0		
7	3429	557	0	459	81	0	0	0	0		
8	3228	761	0	426	101	0	0	0	0		
9	1358	254	0	163	31	0	0	0	0		
10	2357	255	0	291	48	0	0	0	0		
11	3376	894	0	526	139	0	0	0	0		
12	5554	902	0	913	167	0	0	0	0		
TOT	40049	7470	14	5805	1170	0	28	0	8		
On Peak:		54,494		Off Peak:		50		Total:		54,544	

OIL (BARRELS) Aux. Boiler										26-Jan-78	
8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM					
MO	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN		
1	65	3	588	6	0	111	2295	408	459		
2	45	11	571	8	1	106	1944	391	418		
3	81	31	440	29	5	107	1552	355	415		
4	267	46	103	46	6	19	622	78	92		
5	439	63	73	46	8	9	276	45	22		
6	244	36	262	26	4	33	287	56	45		
7	182	26	265	25	3	40	375	66	50		
8	165	32	413	25	6	55	343	84	71		
9	370	44	170	45	6	24	216	39	34		
10	301	55	96	47	5	14	639	109	118		
11	97	30	396	18	7	84	1214	372	362		
12	49	11	549	2	0	93	2159	391	406		
TOT	2304	387	3925	323	50	694	11923	2396	2491		
On Peak:		3,064		Off Peak:		21,429		Total:		24,493	

Summary of Results Adjusted for Failure
 (1982 ICES Community W/ DEP)
 No Off-Peak Elec. Genration (Sun Inclusive)
 80% Max. k.w. Trip Off
 85% Module Availability

	Before Failure Analysis	After Failure Analysis
Elec (MWH) On Peak	20742	19419
Off Peak	18	18
Total	20760	19437
Steam (1000 lbs)		
On Peak	135988	135988
Off Peak	87531	87531
Total	223519	223519
Turbine Oil (Barrels)		
On Peak	54494	52372
Off Peak	50	50
Total	54544	52422
Boiler Oil (Barrels)		
On Peak	3064	5050
Off Peak	21429	21429
Total	24493	26479

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment.

Summary of Results
 No Storage Simulation
 (1982 ICES Community w/DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip-Off

ELECT (MWH)

16-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2217	358	5	355	64	0	3	0	3
2	1753	338	0	280	57	0	0	0	0
3	1261	253	0	202	50	0	0	0	0
4	460	34	0	76	15	0	0	0	0
5	286	64	0	40	12	0	0	0	0
6	875	156	0	121	24	0	0	0	0
7	1272	203	0	166	29	0	0	0	0
8	1203	281	0	158	38	0	0	0	0
9	504	90	0	59	12	0	0	0	0
10	497	66	0	93	18	0	0	0	0
11	1066	285	0	188	53	0	0	0	0
12	2040	337	0	335	62	0	0	0	0
TOT	13435	2465	5	2073	433	0	3	0	3

On Peak: 18,406 Off Peak: 11 Total: 18,417

STEAM (1000 LB)

16-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	12775	2035	2524	2026	357	458	9418	1586	1835
2	10256	1945	2313	1620	326	405	7646	1594	1585
3	7761	1650	2148	1281	306	410	6915	1652	1803
4	4126	457	764	682	111	149	4465	687	865
5	3488	637	249	402	100	28	520	135	52
6	6571	1161	1005	887	167	124	964	190	136
7	8892	1423	1029	1178	200	153	1304	232	164
8	8377	1958	1619	1103	263	215	1193	292	241
9	4558	749	643	534	91	89	666	122	98
10	4377	611	484	722	120	83	3489	574	559
11	6785	1824	1857	1150	325	339	5656	1621	1479
12	11858	1948	2284	1926	350	395	8405	1568	1617
TOT	89824	16398	16919	13511	2716	2848	50641	10253	10434

On Peak: 122,449 Off Peak: 91,095 Total: 213,544

Summary of Results
 No Storage Simulation
 (1982 ICES Community w/DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip-Off

OIL (BARRELS) - Turbine

16-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	5834	943	14	947	174	0	8	0	7
2	4626	893	0	747	151	0	0	0	0
3	3313	664	0	522	130	0	0	0	0
4	1197	88	0	196	39	0	0	0	0
5	746	165	0	103	31	0	0	0	0
6	2297	408	0	316	64	0	0	0	0
7	3338	531	0	433	75	0	0	0	0
8	3147	732	0	408	99	0	0	0	0
9	1322	237	0	152	31	0	0	0	0
10	1305	174	0	243	47	0	0	0	0
11	2812	745	0	492	138	0	0	0	0
12	5388	888	0	888	165	0	0	0	0
TOT	35325	6470	14	5447	1145	0	8	0	7

On Peak: 48,387 Off Peak: 29 Total: 48,416

OIL (BARRELS) - Aux. Boiler

16-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	66	5	605	9	0	108	2292	388	442
2	71	7	569	8	0	100	1878	392	390
3	119	47	528	27	5	101	1701	406	443
4	342	62	188	56	5	37	1097	169	213
5	400	56	61	36	6	7	126	33	12
6	227	35	247	29	3	30	235	46	33
7	171	29	253	29	4	38	319	57	40
8	152	34	398	25	5	53	292	71	59
9	327	41	158	40	4	22	162	30	24
10	345	54	119	42	4	20	857	141	137
11	141	46	457	14	6	83	1391	399	364
12	64	9	562	6	0	97	2065	386	398
TOT	2424	425	4144	321	42	696	12412	2517	2554

On Peak: 3,212 Off Peak: 22,323 Total: 25,535

16 February 1978

Summary of Results Adjusted for Failure
No Storage Simulation
(1982 ICES Community W/DEP)
No Off-Peak Elec. Generation (Sun. Inclusive)
80% Max. kW Trip Off
85% Module Availability

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>
Elec (MWH) On Peak	18406	17635
Off Peak	11	11
Total	18417	17646
Steam (1000 lbs)		
On Peak	122449	122449
Off Peak	91095	91095
Total	213544	213544
Turbine Oil (Barrels)		
On Peak	48387	47147
Off Peak	29	29
Total	48416	47176
Boiler Oil (Barrels)		
On Peak	3212	4369
Off Peak	22323	22323
Total	25535	26692

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment.

Summary of Results
 with Storage for DOE and Justice Complex Only
 (1982 ICES Community w/DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip-Off

ELECT (MWH)

18-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2417	387	3	358	64	0	8	0	3
2	1971	375	0	284	57	0	0	0	0
3	1449	293	0	205	50	0	0	0	0
4	589	49	0	76	15	0	0	0	0
5	290	54	0	33	5	0	0	0	0
6	853	154	0	111	17	0	0	0	0
7	1237	193	0	157	22	0	0	0	0
8	1184	278	0	140	37	0	0	0	0
9	489	82	0	58	7	0	0	0	0
10	588	77	0	93	18	0	0	0	0
11	1233	323	0	188	53	0	0	0	0
12	1266	376	0	338	62	0	0	0	0
TOT	14566	2642	3	2040	408	0	8	0	3

On Peak: 19,656 Off Peak: 14 Total: 19,670

STEAM (1000 LB)

18-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	13902	2198	2466	2034	357	469	8602	1430	1748
2	11365	2151	2261	1633	326	420	6916	1421	1467
3	8763	1862	2058	1286	306	420	6299	1466	1665
4	4775	521	687	682	111	138	4016	622	776
5	3481	606	264	385	76	28	614	103	52
6	6489	1136	994	860	152	122	956	177	125
7	8732	1386	1000	1136	182	147	1279	217	143
8	8261	1941	1582	1052	256	209	1155	281	201
9	4496	719	630	541	80	81	657	107	87
10	4922	669	446	729	120	78	3214	517	499
11	7639	2011	1748	1150	325	338	5059	1451	1342
12	13095	2151	2258	1928	352	392	7602	1391	1481
TOT	95920	17351	16394	13416	2643	2842	46369	9183	9586

On Peak: 129,330 Off Peak: 84,374 Total: 213,704

Summary of Results
 with Storage for DOE and Justice Complex Only
 (1982 ICES Community w/DEP)
 No Off Peak Elec. Generation (Sunday Inclusive)
 80% Max. kW Trip-Off

OIL (BARRELS) Turbine			18-Feb-78						
8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM			
MO	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	6350	1024	7	957	174	0	21	0	8
2	5209	992	0	759	151	0	0	0	0
3	3824	772	0	531	130	0	0	0	0
4	1536	127	0	196	39	0	0	0	0
5	759	141	0	83	13	0	0	0	0
6	2246	406	0	290	47	0	0	0	0
7	3249	505	0	411	57	0	0	0	0
8	3105	724	0	363	98	0	0	0	0
9	1289	214	0	150	19	0	0	0	0
10	1544	202	0	243	47	0	0	0	0
11	3253	850	0	492	138	0	0	0	0
12	5978	991	0	897	166	0	0	0	0
TOT	38341	6949	7	5373	1079	0	21	0	8

On Peak: 51,742 Off Peak: 36 Total: 51,778

OIL (BARRELS) Aux. Boiler			18-Feb-78						
8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM			
MO	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	63	4	590	6	0	110	2092	350	419
2	39	7	556	6	0	103	1698	349	361
3	101	42	506	25	5	103	1549	360	410
4	314	56	169	56	5	34	986	153	191
5	394	63	65	44	11	7	149	25	12
6	240	31	244	38	9	30	233	43	30
7	187	35	246	33	10	36	312	53	35
8	152	35	389	40	4	51	282	69	49
9	334	48	155	43	8	20	159	26	21
10	348	52	109	44	4	19	789	127	122
11	112	38	430	14	6	83	1244	357	330
12	49	6	556	3	0	96	1867	342	364
TOT	2332	416	4014	352	62	693	11361	2253	2344

On Peak: 3,162 Off Peak: 20,665 Total: 23,827

Summary of Results Adjusted for Failure
 (1982 ICES Community W/DEP)
 with Storage for DOE and Justice Complex Only
 No Off-Peak Elec. Generation (Sun. Inclusive)
 80% Max. kW Trip-Off
 85% Module Availability

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>
Elec (MWH) On Peak	19656	18475
Off Peak	14	14
Total	19670	18489
Steam (1000 lbs)		
On Peak	129330	129330
Off Peak	84374	84374
Total	213704	213704
Turbine Oil (Barrels)		
On Peak	51742	49844
Off Peak	36	36
Total	51778	49880
Boiler Oil (Barrels)		
On Peak	3162	4935
Off Peak	20665	20665
Total	23827	25600

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment.

Summary of Results
 (1982 ICES Community w/DEP) with Storage
 Off Peak Elec. Generation
 80% Max. kW Trip Off

ELECT (MWH)

27-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2268	368	432	365	65	83	1631	294	337
2	1815	343	405	287	58	76	1359	274	292
3	1508	357	282	208	52	73	988	222	279
4	1027	169	25	117	15	0	177	5	10
5	366	69	13	40	12	0	106	10	0
6	903	163	130	129	24	17	100	21	7
7	1309	212	144	176	31	22	155	30	10
8	1234	292	241	164	39	29	138	38	26
9	519	96	79	63	12	10	56	12	5
10	903	98	25	112	18	0	280	46	57
11	1284	341	246	203	53	55	707	239	226
12	2099	344	386	346	63	65	1489	273	278
TOT	15236	2850	2408	2211	445	430	7186	1464	1527

On Peak: 20,742 Off-Peak: 13,015 Total: 33,757

STEAM (1000 LB)

27-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	13051	2083	2470	2072	365	472	9447	1667	1909
2	10496	1993	2325	1660	334	431	7918	1593	1698
3	9096	2213	1789	1323	323	435	6312	1445	1688
4	7269	1216	422	891	119	78	2534	320	374
5	4130	697	297	446	110	36	1132	185	92
6	6823	1209	1065	929	175	134	1174	230	186
7	9168	1471	1077	1224	208	161	1534	272	204
8	8629	2018	1679	1145	273	225	1403	342	291
9	4822	797	691	578	99	97	886	162	138
10	6670	806	390	856	128	56	2606	446	481
11	7927	2095	1618	1256	335	341	4936	1512	1473
12	12134	1996	2238	1972	358	379	8793	1590	1652
TOT	100215	18594	16061	14352	2827	2845	48675	9764	10186

On Peak: 135,988 Off Peak: 87,531 Total: 223,519

Summary of Results
 (1982 ICES Community w/DEP) with Storage
 Off Peak Elec. Generation
 80% Max. kW Trip Off

OIL (BARRELS) Turbine

27-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	5980	967	1135	977	176	217	4287	771	386
2	4820	901	1078	764	153	207	3576	720	765
3	3953	935	743	539	137	196	2600	587	744
4	2670	438	66	305	40	0	461	13	27
5	951	178	36	103	32	0	279	25	0
6	2373	428	337	339	65	44	259	56	18
7	3429	557	372	459	81	57	405	80	25
8	3228	761	627	426	101	75	356	99	69
9	1358	254	206	163	31	25	145	31	12
10	2357	255	65	291	48	0	742	120	151
11	3376	894	647	526	139	146	1852	628	593
12	5554	902	1004	913	167	169	3925	718	731
TOT	40049	7470	6316	5805	1170	1135	18888	3848	4020

On Peak: 54,494 Off Peak: 34,207 Total: 88,701

OIL (BARRELS)

27-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	65	3	12	6	0	1	83	6	10
2	45	11	6	8	1	0	63	14	12
3	81	31	43	29	5	4	176	45	26
4	267	46	68	46	6	19	372	72	78
5	439	63	51	46	8	9	119	30	22
6	244	36	56	26	4	6	132	23	35
7	182	26	38	25	3	5	134	19	35
8	165	32	28	25	6	10	130	25	30
9	370	44	44	45	6	9	129	21	26
10	301	55	58	47	5	14	241	43	37
11	97	30	49	18	7	6	214	39	43
12	49	11	9	2	0	2	92	13	20
TOT	2304	387	463	323	50	85	1886	351	374

On Peak: 3,064 Off Peak: 3,159 Total: 6,223

Summary of Results Adjusted for Failure
 (1982 ICES Community w/DEP) with Storage
 Off Peak Elec. Generation
 80% Max. kW Trip Off
 85% Module Availability

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>
Elec (MWH) On Peak	20742	19595
Off Peak	13015	12332
Total	33757	31927
Steam (1000 lbs)		
On Peak	135988	135988
Off Peak	87531	87531
Total	223519	223519
Turbine Oil (Barrels)		
On Peak	54494	52651
Off Peak	34207	33110
Total	88701	85761
Boiler Oil (Barrels)		
On Peak	3064	4786
Off Peak	3159	4185
Total	6223	8971

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment.

Turbine Operating Hours

<u>No. of Turbines</u>	<u>On Peak</u>	<u>Off Peak</u>
0 Units	933	2192
1 "	705	582
2 "	1166	702
3 "	1103	629
4 "	475	273

Summary of Results
 No Storage Simulation
 (1982 ICES Community w/DEP)
 Off Peak Elec. Generation
 80% Max. kW Trip-Off

ELECT (MWH)

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2217	358	441	355	64	82	1622	277	324
2	1753	338	399	280	57	72	1301	275	272
3	1261	253	355	202	50	71	1130	273	306
4	460	34	95	76	15	20	599	87	121
5	286	64	7	40	12	0	34	9	0
6	875	156	121	121	24	17	93	17	4
7	1272	203	138	166	29	22	141	26	9
8	1203	281	228	158	38	27	131	32	21
9	504	90	75	59	12	8	51	9	5
10	497	66	49	93	18	10	510	84	84
11	1066	285	287	188	53	57	882	270	238
12	2040	337	397	335	62	68	1419	268	274
TOT	13435	2465	2593	2073	433	452	7912	1626	1658

On Peak: 18,406 Off Peak: 14,241 Total: 32,647

STEAM (1000 LB)

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	12775	2035	2524	2026	357	458	9418	1586	1835
2	10256	1945	2313	1620	326	405	7646	1594	1585
3	7761	1650	2148	1281	306	410	6915	1652	1803
4	4126	457	764	682	111	149	4465	687	865
5	3488	637	249	402	100	28	520	135	52
6	6571	1161	1005	887	167	124	964	190	136
7	8892	1423	1029	1178	200	153	1304	232	164
8	8377	1958	1619	1103	263	215	1193	292	241
9	4558	749	643	534	91	89	666	122	98
10	4377	611	484	722	120	83	3489	574	559
11	6785	1924	1857	1150	325	339	5656	1621	1479
12	11858	1948	2284	1926	350	395	8405	1568	1617
TOT	89824	16398	16919	13511	2716	2848	50641	10253	10434

On Peak: 122,449 Off Peak: 91,095 Total: 213,544

Summary of Results
 No Storage Simulation
 (1982 ICES Community w/DEP)
 Off Peak Elec. Generation
 80% Max. kW Trip-Off

OIL (BARRELS) - Turbine

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	5834	943	1164	947	174	214	4234	730	849
2	4626	893	1041	747	151	197	3385	719	712
3	3313	664	937	522	130	189	2934	712	802
4	1197	88	248	196	39	52	1573	228	317
5	746	165	19	103	31	0	88	24	0
6	2297	408	313	316	64	44	241	44	12
7	3338	531	356	433	75	56	368	68	24
8	3147	732	593	408	99	69	341	82	56
9	1322	237	195	152	31	19	133	25	12
10	1305	174	130	243	47	26	1331	219	222
11	2812	745	750	492	138	154	2303	713	619
12	5388	888	1046	898	165	177	3708	699	715
TOT	35325	6470	6791	5447	1145	1197	20639	4263	4340

On Peak: 48,387 Off Peak: 37,230 Total: 85,617

OIL (BARRELS) Aux. Boiler

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	66	5	15	9	0	1	81	9	8
2	71	7	10	8	0	0	73	12	11
3	119	47	27	27	5	1	114	23	15
4	342	62	49	56	5	8	238	42	39
5	400	56	50	36	6	7	73	19	12
6	227	35	56	29	3	4	91	20	26
7	171	29	36	29	4	4	99	16	25
8	152	34	34	25	5	10	88	22	26
9	327	41	39	40	4	10	83	15	17
10	345	54	46	42	4	5	129	21	17
11	141	46	46	14	6	3	137	21	25
12	64	9	6	6	0	1	89	13	17
TOT	2424	425	412	321	42	54	1294	234	240

On Peak: 3,212 Off Peak: 2,234 Total: 5,446

Summary of Results Adjusted for Failure
 No Storage Simulation
 (1982 ICES Community w/DEP)
 Off Peak Elec. Generation
 80% Max. kW Trip Off
 85% Module Availability

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>	
Elec. (MWH)	On Peak	18406	17635
	Off Peak	14241	13752
	Total	32647	31387
Steam (1000 lbs)	On Peak	122449	122449
	Off Peak	91095	91095
	Total	213544	213544
Turbine Oil (Barrels)	On Peak	48387	47148
	Off Peak	37230	36444
	Total	85617	83592
Boiler Oil (Barrels)	On Peak	3212	4370
	Off Peak	2234	2968
	Total	5446	7338

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment

Turbine Operating Hours

<u>No. of Turbines</u>	<u>On Peak</u>	<u>Off Peak</u>
0 Units	1085	1735
1 "	820	761
2 "	1187	1192
3 "	1042	530
4 "	248	160

Summary of Results
with Storage for DOE and Justice Complex Only
(1982 ICES Community w/DEP)
Off Peak Elec. Generation
80% Max. kW Trip-Off

ELECT (MWH)

28-Feb-78

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	2417	387	437	358	64	83	1482	242	303
2	1971	375	392	284	57	74	1188	247	251
3	1449	293	340	205	50	71	1012	234	284
4	589	49	78	76	15	16	498	75	98
5	290	54	5	33	5	0	41	0	0
6	853	154	116	111	17	14	84	15	2
7	1237	193	134	157	22	21	130	20	7
8	1184	278	225	140	37	27	116	28	16
9	489	82	72	58	7	8	47	5	3
10	588	77	43	93	18	10	453	74	69
11	1233	323	275	188	53	54	760	226	215
12	2266	376	392	338	62	68	1278	241	254
TOT	14566	2642	2507	2040	408	447	7088	1407	1502

On Peak: 19,656 Off Peak: 12,951 Total: 32,607

STEAM (1000 LB)

28-Feb-78

NO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	13902	2198	2466	2034	357	469	8602	1430	1748
2	11365	2151	2261	1633	326	420	6916	1421	1467
3	8763	1862	2058	1286	306	420	6299	1466	1665
4	4775	521	687	682	111	138	4016	622	776
5	3481	606	264	385	76	28	614	103	52
6	6489	1136	994	860	152	122	956	177	125
7	8732	1386	1000	1136	182	147	1279	217	143
8	8261	1941	1582	1052	256	209	1155	281	201
9	4496	719	630	541	80	81	657	107	87
10	4922	669	446	729	120	78	3214	517	499
11	7639	2011	1748	1150	325	338	5059	1451	1342
12	13095	2151	2258	1928	352	392	7602	1391	1481
TOT	95920	17351	16394	13416	2643	2842	46369	9183	9586

On Peak: 129,330 Off Peak: 84,374 Total: 213,704

Summary of Results
with Storage for DOE and Justice Complex Only
(1982 ICES Community w/DEP)
Off Peak Elec. Generation
80% Max. kW Trip-Off

OIL (BARRELS)

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	6350	1024	1153	957	174	217	3882	634	797
2	5209	992	1027	759	151	201	3116	650	660
3	3824	772	896	531	130	189	2637	613	751
4	1536	127	202	196	39	41	1299	193	254
5	759	141	13	83	13	0	106	0	0
6	2246	406	304	290	47	37	220	38	6
7	3249	505	348	411	57	55	340	51	18
8	3105	724	587	363	98	69	302	74	43
9	1289	214	188	150	19	19	121	13	6
10	1544	202	111	243	47	26	1184	195	182
11	3253	850	724	492	138	145	1994	592	568
12	5978	991	1029	897	166	177	3354	634	661
TOT	38341	6949	6582	5373	1079	1177	18556	3685	3946

On Peak: 51,742 Off Peak: 33,946 Total: 85,488

OIL (BARRELS)

28-Feb-78

MO	8 AM - 8 PM			8 PM - 10 PM			10 PM - 8 AM		
	WKDY	SAT	SUN	WKDY	SAT	SUN	WKDY	SAT	SUN
1	63	4	7	6	0	1	78	18	17
2	39	7	7	6	0	0	53	8	11
3	101	42	27	25	5	3	130	32	13
4	314	56	55	56	5	10	273	44	50
5	394	63	57	44	11	7	87	25	12
6	240	31	60	38	9	8	102	20	27
7	187	35	34	33	10	3	110	22	24
8	152	35	31	40	4	9	102	24	24
9	334	48	40	45	8	8	87	18	17
10	348	52	46	44	4	5	142	22	24
11	112	38	38	14	6	6	165	40	26
12	49	6	7	3	0	1	91	8	11
TOT	2332	416	407	352	62	60	1419	281	256

On Peak: 3,162 Off Peak: 2,425 Total: 5,587

Summary of Results Adjusted for Failure
with Storage for DOE and Justice Complex Only
(1982 ICES Community w/DEP)
Off Peak Elec. Generation
80% Max. kW Trip-Off
85% Module Availability

	<u>Before Failure Analysis</u>	<u>After Failure Analysis</u>
Elec. (MWH) On Peak	19656	18476
Off Peak	12951	12553
Total	32607	31029
Steam (1000 lbs)		
On Peak	129330	129330
Off Peak	84374	84374
Total	213704	213704
Turbine Oil (Barrels)		
On Peak	51742	49846
Off Peak	33746	33106
Total	85488	82952
Boiler Oil (Barrels)		
On Peak	3162	4934
Off Peak	2425	3023
Total	5587	7957

The adjustment is made by applying the same probability figures reported in the Phase I report. Since the simulation program keeps tab of the number of modules running each hour an accurate record was available for making the adjustment.

Turbine Operating Hours

<u>No. of Turbines</u>	<u>On Peak</u>	<u>Off Peak</u>
0 Units	1126	1803
1 "	722	886
2 "	1028	1170
3 "	992	383
4 "	514	136

TRENTON ICES

LIST OF ASSUMPTIONS (intrinsically in the computer results)

- A. Assumptions with regard to data utilized:
1. Philadelphia = Trenton
 2. 1969 = typical year
 3. ASHRAE calculation procedures for heat load (1972 Handbook)
 4. Cloud cover modifier calculation per Bureau of Res. and Engineering of U.S.P.O. Department.
 5. The ICES "Demonstration Community" is as projected for the year 1982. (This includes the assumptions that scheduled buildings will be built and will be as preliminarily designed.)
 6. New buildings will conform to the criteria of ASHRAE 90-75.
 7. EEI Guidelines (and PSE&G experience) were utilized to develop electrical profiles.
 8. EEI "AXCESS" data utilized in determining domestic hot water profile factors. These factors multiplied by area of building (in sq. ft.) assumed to determine hot water requirements.

B. Assumptions with respect to general concept:

1. All buildings can be adequately modelled on nine(9) typical buildings.
2. A thermal profile for one square foot will give building load when multiplied by total floor area and an empirically derived factor to match energy consumption of existing buildings where energy consumption is known.
3. Heating season October 15 to May 1.
4. Cooling season May 1 to October 15.
5. No simultaneous heating and cooling.
6. PSE&G will own and operate central plant and distribution system.
7. 1024 Btu/# steam (1008 Btu/# used in later calculations).
8. 1 kW-hr = Btu/hr on PSE&G grid.
9. 1 ton of coal = 25,138,000 Btu (short ton).
10. 1 gallon of #2 oil = 138,095 Btu
1 gallon of #6 oil = 142,857 Btu
11. All thermal loads can be added together and treated as steam to a converter or chiller, including domestic hot water.
12. Steam distribution system losses = 2000 # steam/hr, all year round (including storage tanks of 630,000 gallon total capacity).
13. Power house and steam distribution system sized for 25% growth.
14. Additional growth can be accommodated by conservation and substitution of larger machinery.

C. Assumptions with regard to storage:

1. Six sub-groups with water storage for each sub-group is realistic for the "Demonstration Community".
2. Stored heat is 100% available.
3. Storage tanks can be insulated and buried (no vault).
4. Storage tanks will be at ambient pressure.
5. Maximum storage temperature = 199°F .
6. Hot water is used for all heating.
7. Temperature required of water for heating is 180°F at 0°F ambient and 100°F at 65°F ambient.
8. Minimum chilled water storage temperature = 40°F .
9. Maximum chilled water storage temperature = 46°F .
10. That converter will provide immediate heat response by bypassing empty storage tanks.

D. Assumptions with regard to heating:

1. One half of electric heat gain is available to reduce heat load.
2. Latent heat effects are neglected.
3. Shaded windows are one third shaded in winter.
4. All new buildings are shaded (this is repeated on SH. E).
5. Indoor winter day temperature = 68-72 (depending on service).
6. Indoor winter night temperature = 60-72 (depending on service).
7. State Building Complex has no night-time set-back (temperature in buildings = 72°F).

E. Assumptions with regard to air conditioning:

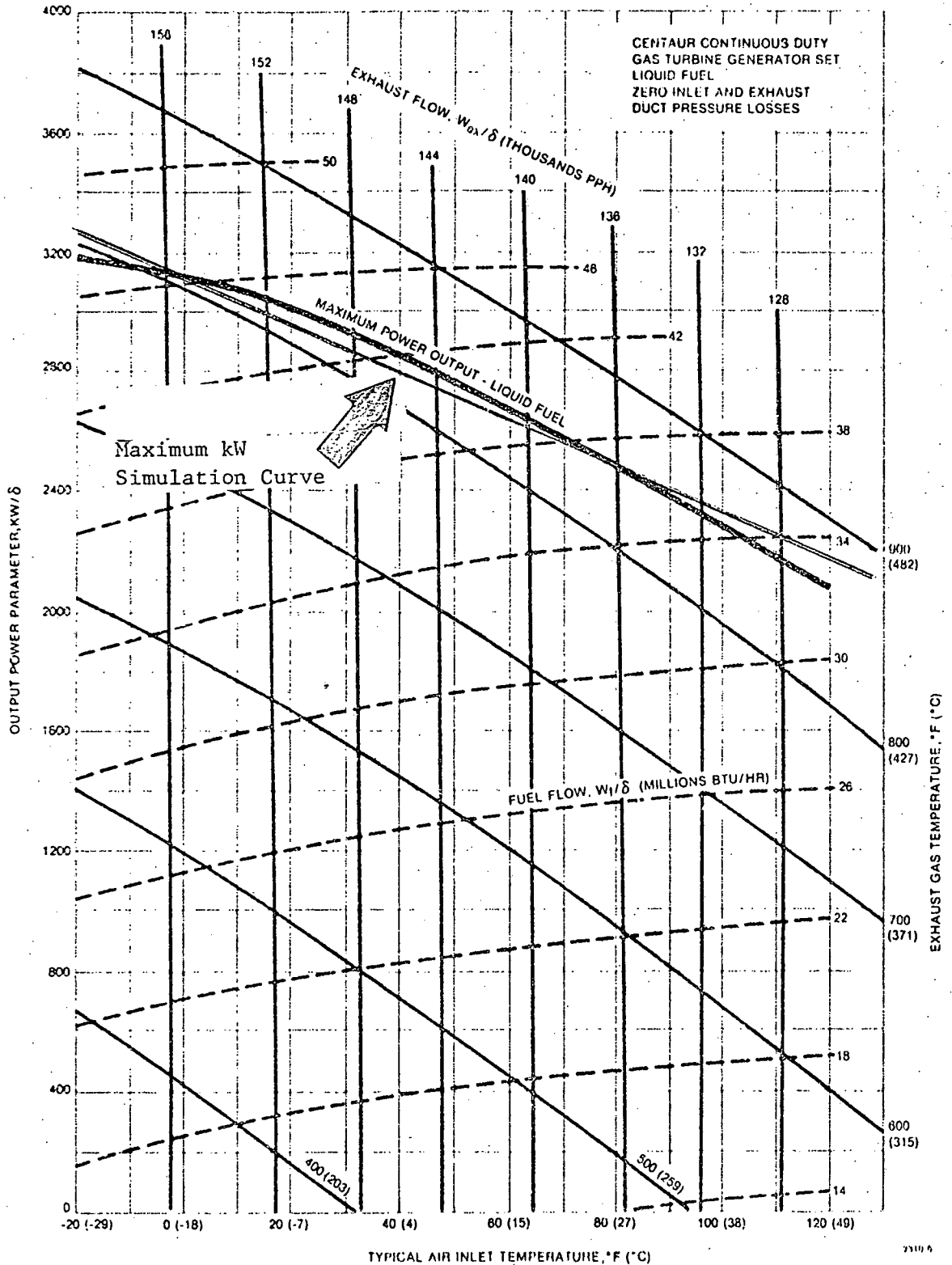
1. No night-time air conditioning.
2. All new buildings will be served by two stage chillers except buildings when less than 385 tons is required. Single stage chillers are assumed in the latter case.
3. All new buildings will have economizer systems.
4. Motor driven chillers require electric power at a rate of 0.9 kW/ton.
5. Electric heat gain added to cooling load as 100% gain.
6. Latent heat effects considered.
7. Two thirds of windows shaded.
8. All new buildings are shaded.
9. Steam chiller performance can be simulated accurately by two intersecting straight line equations (one set for each type of absorption machine).
10. Indoor summer dry bulb = 72-78.
11. Indoor summer wet bulb = 60-65.

F. Assumptions with respect to equipment:

1. Solar Centaur performance is typical of reliable available gas turbines.
2. Waste heat boiler performance will be uniform with varying flow.
3. Waste heat boiler output at full load will vary between 16,000 and 16,500 PPH at 80°F and 0°F respectively.
4. That performance of ICES plant can be reduced to linear relationships between kW output, steam load and ambient air temperature.
5. That one auxiliary boiler rated at 60,000 PPH is adequate.
6. That the auxiliary boiler will be 70% efficient.
7. That the availability of each gas turbine, waste heat boiler unit = 85%.

G. Assumptions with respect to controls for plant operations and storage systems:

1. A device which biases a kW output signal with ambient air temperature and transmits a signal to the automatic start-stop sequencing control system to optimize gas turbine performance can be developed quickly and inexpensively.



NOTE. AVAILABLE POWER OUTPUT AT LOW AMBIENT TEMPERATURES IS DEPENDENT ON THE GENERATOR SUPPLIED FOR EACH INDIVIDUAL APPLICATION.

Typical Output Power Available, Liquid Fuel

APPENDIX 4

Method for Introducing Gas Turbine and Waste Heat Boiler Performance into Computer Program

Using the gas turbine performance data - Solar Figure 13-4, for Centaur on liquid fuel - calculations were made for waste heat recovery at five different operating points and three different ambient temperatures using a constant (controlled) stack temperature and a constant performance or efficiency factor for heat transfer. Three curves were obtained (one for each ambient) on a plot of kilowatts versus steam generation in pounds per hour steam. These curves were found to be nearly linear and nearly parallel, so they were assumed to be parallel straight lines. An equation modeled on a straight line of constant slope ($y = mx + b$) was developed. It proved to be: $kW = 0.164 (\#/hr) + "a"$, where "a" is a variable depending on ambient temperature, but is constant for a given ambient (see Figure 1). A plot was made of "a" versus ambient (in degrees Fahrenheit). It was found that this plot was nearly linear and it, too, was written in the form of a straight line equation (" a " = $-6.475 (t^{\circ}F) + 394$ - See Figure 2).

So, given a steam load requirement and the ambient temperature on an hour by hour basis, the computer is programmed to determine the kilowatts generated. A sub-routine determines the quantity of gas turbines in operation and it is set up to minimize the number in simultaneous operation, thereby obtaining the best overall system performance.

The program also calculates turbine and boiler fuel requirement to meet the steam load. The fuel input in millions of British Thermal Units per hour, has been plotted against kilowatts (using Solar data) for the three different ambient temperatures (0° , 40° and $80^{\circ}F$) used previously. This plot, like the earlier one is nearly linear over the range of interest and the three curves tend to be nearly parallel. A straight line equation for this condition was developed which takes the form: $kW = 107.4X + "b"$, where x = fuel input (in millions of BTU). A plot was also made for "b" which proved to be nearly linear and a straight line equation for "b" was developed. This equation is: " b " = $4.5775 (t^{\circ}F) - 1840$ (See Figure 4). Consequently, given the temperature of the ambient on an hourly basis and the two expressions developed as described in this paragraph, the computer can calculate fuel flow versus time.

The calculated boiler performance was modified slightly during this process to give closer results at the full load and higher ambient condition.

FIGURE 1 - Waste Heat Boiler Steam Generation vs. kW

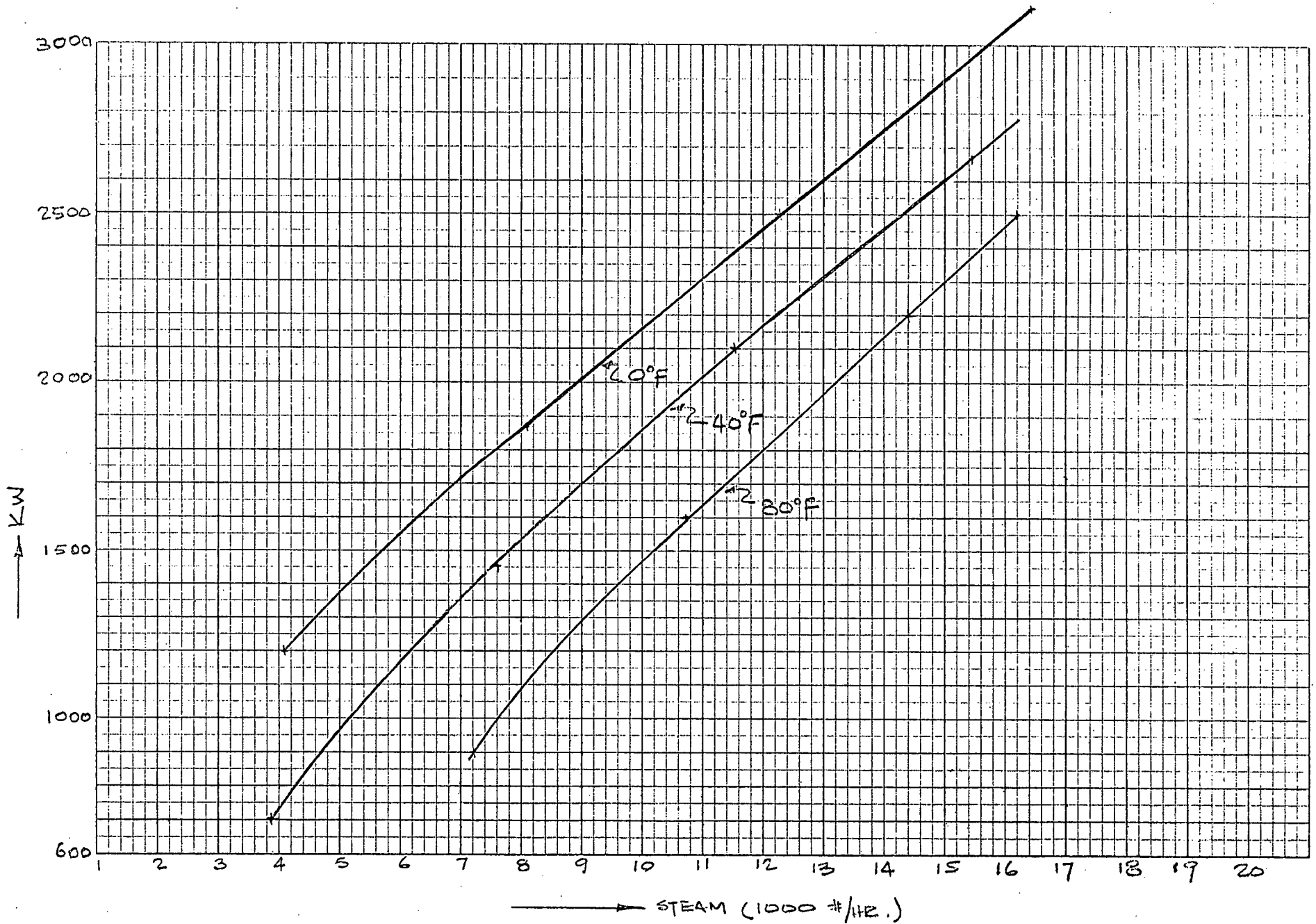


FIGURE 2 - Constant 'a' vs. Temperature

For use with equation $kW = 0.164 (\#/hr) + a$
 $(\#/hr) = \text{Steam Load.}$

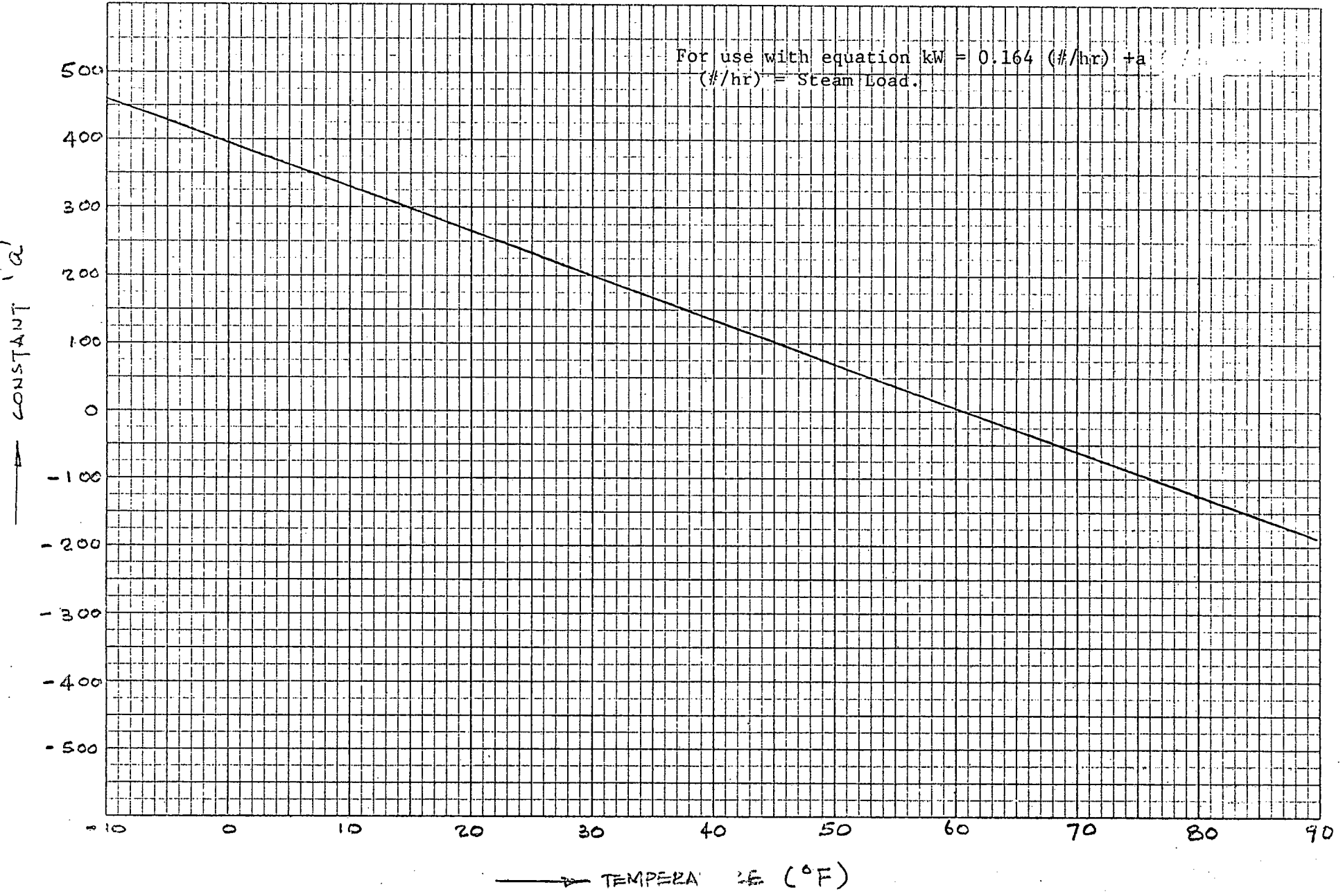


FIGURE 3 - Fuel Input vs. kW Output

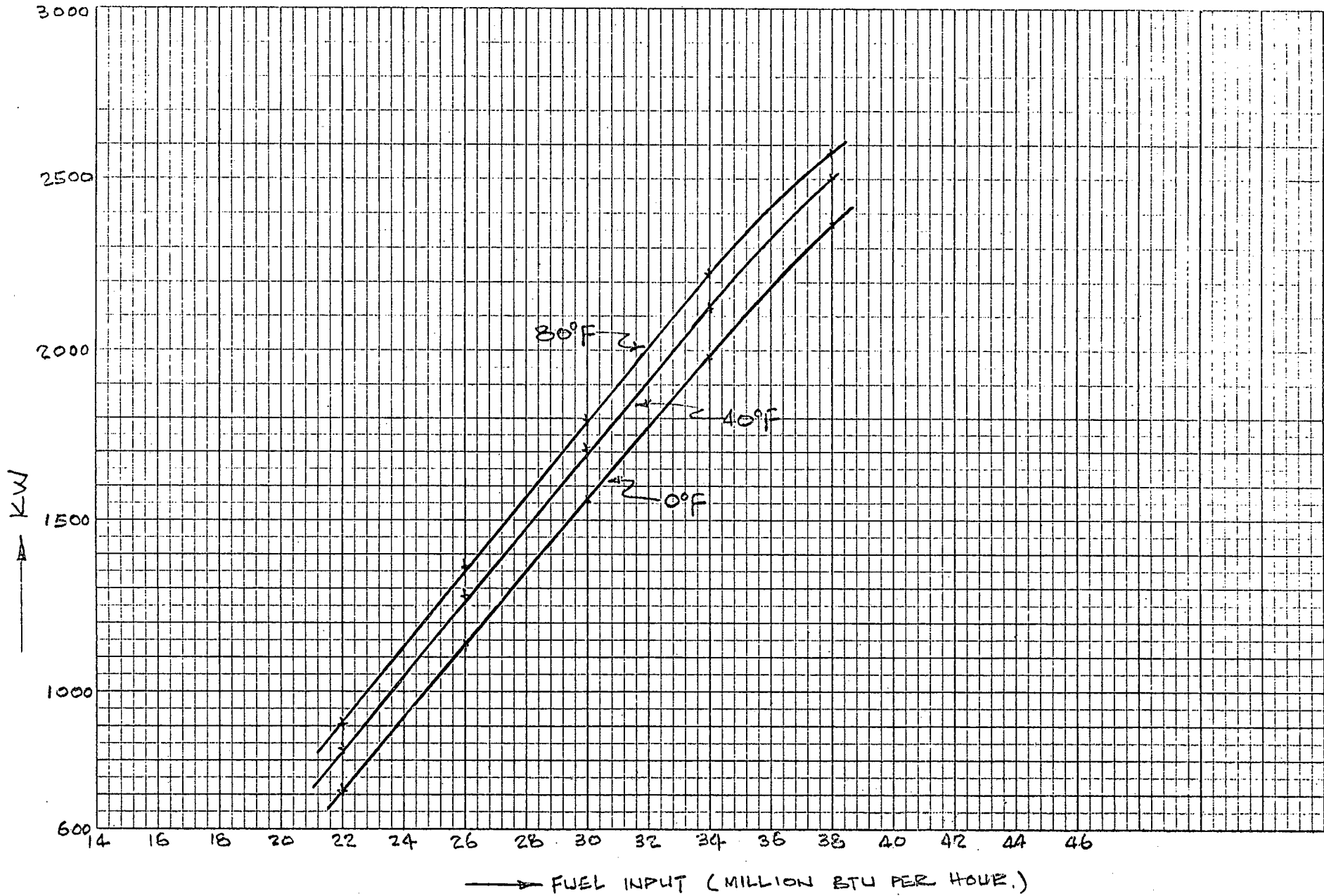
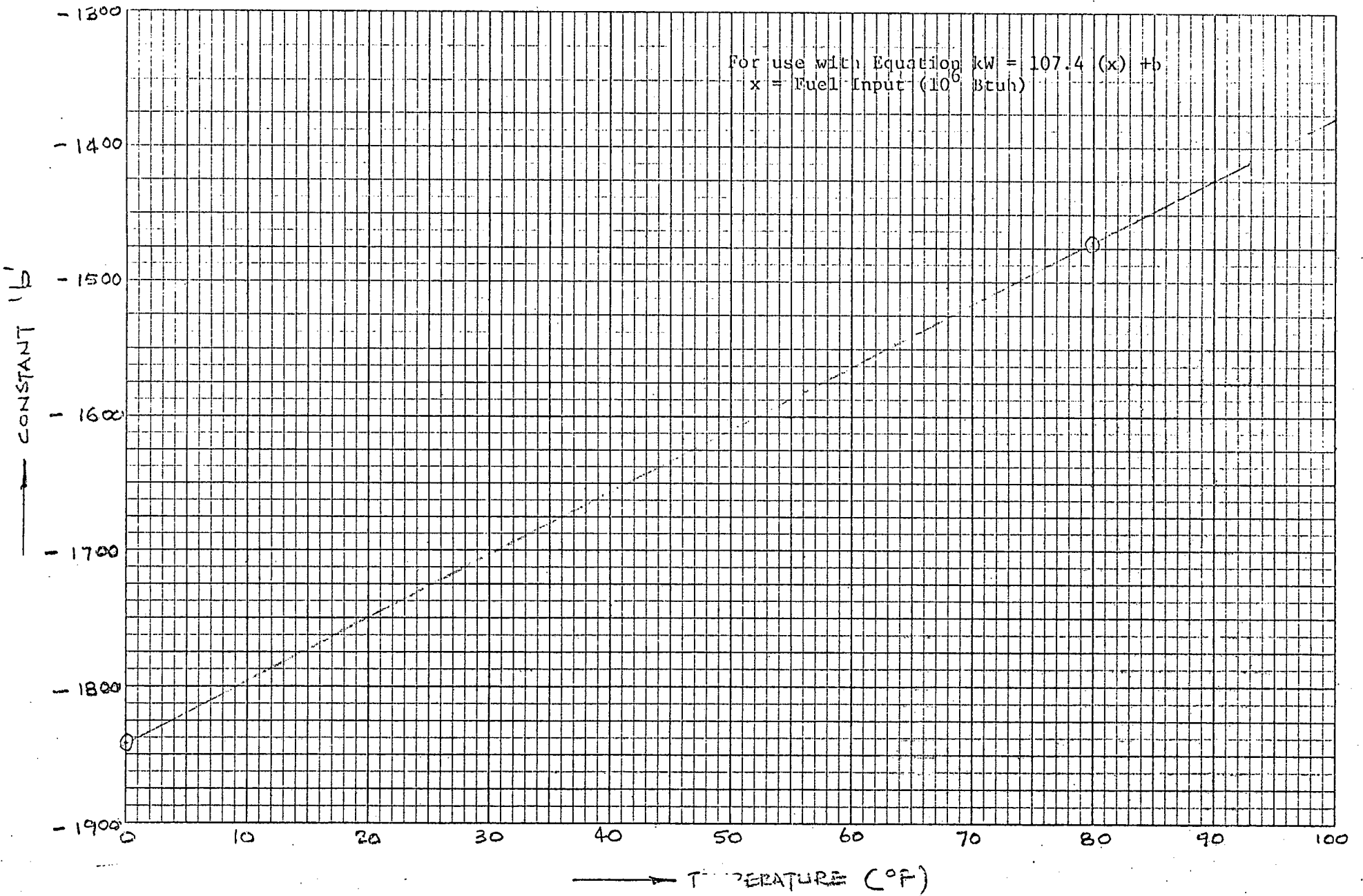


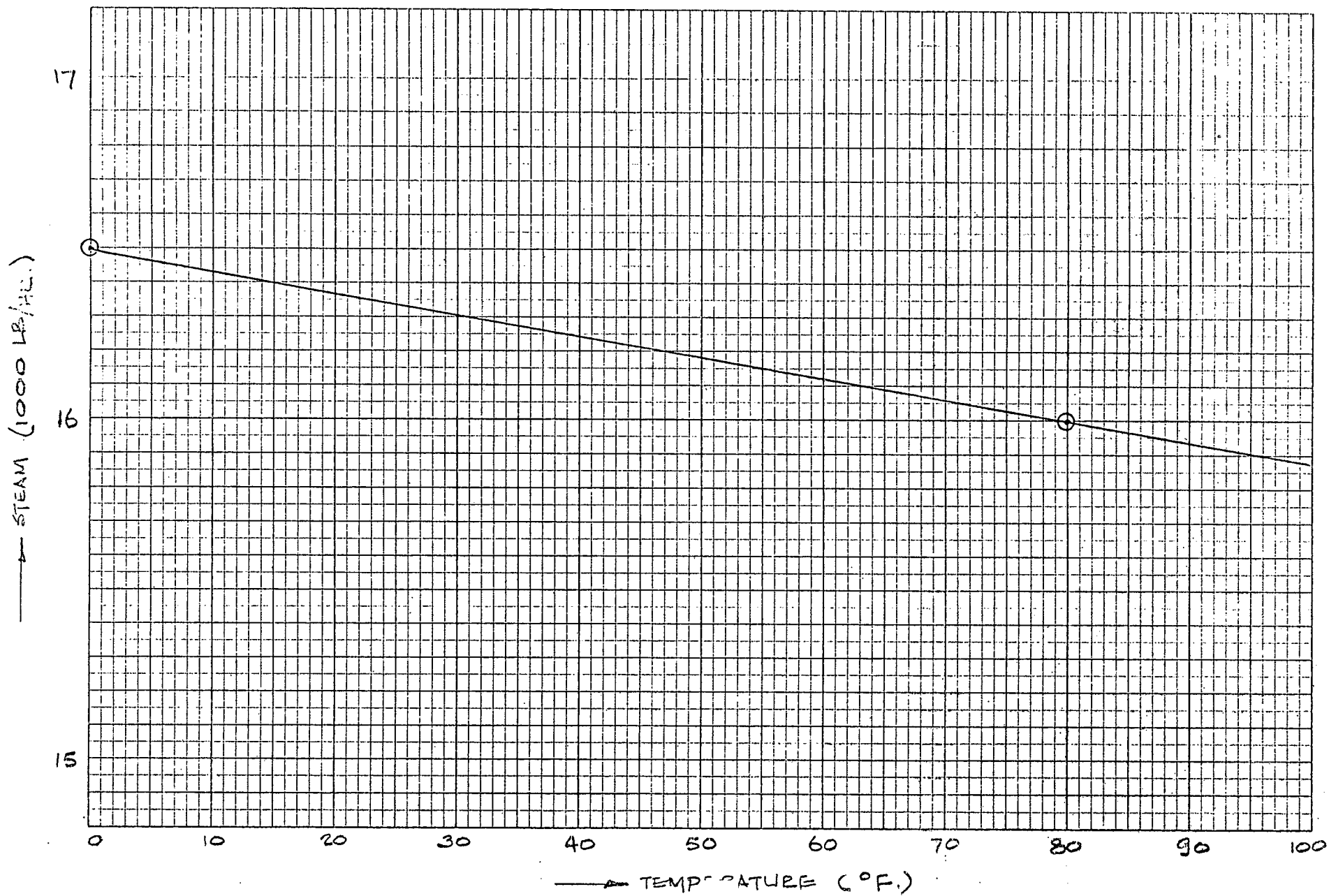
FIGURE 4 - Constant 'b' vs. Temperature



The heat recovery boiler performance at full load was hypothesized as a straight line varying from 16,000 pounds per hour at 80° F ambient to 16,500 pounds per hour at 0° F (see Figure 5). This information was reduced to an equation, namely, pounds of steam per hour = 16,500 - 6.25 (t), where "t" is ambient temperature in degrees Fahrenheit. This equation is the means in the computer program for determining how many waste heat boilers - and consequently how many gas turbines - are in operation, as load increases. This results in some inaccuracy which is greatest at low ambient and low load. This is an unusual operating condition and even at the worst condition the discrepancy is less than 10% and is expressed conservatively as lower electrical output than published curve (Fig. 6). However, excellent congruence is obtained at full load at all ambients and at high ambients between the expected plant performance and the computer simulation.

Also, the computer simulation is compatible with limited boiler performance data for a Deltak Model 3-187E at an ambient temperature of about 67°. Although our results tend to be less effected by changes in ambient than the Deltak data or theoretical calculations would lead one to expect we do obtain good correlation at the conditions and loading which is most typical of the expected plant operating conditions.

FIGURE 5 - Waste Heat Boiler Performance
(Gas Turbine at Full Load)



APPENDIX F

(3.5.2c)

PRELIMINARY DESIGN - DRAWINGS

TRENTON ICES

VOL IV, PHASE II DRAWINGS

CITY OF TRENTON
DEPARTMENT OF PLANNING AND DEVELOPMENT

RICHARD G. STEIN AND PARTNERS
 ARCHITECTS, NEW YORK, N.Y.

R. G. VANDERWEIL ENGINEERS INC.
 CONSULTING ENGINEERS, BOSTON, MASS.

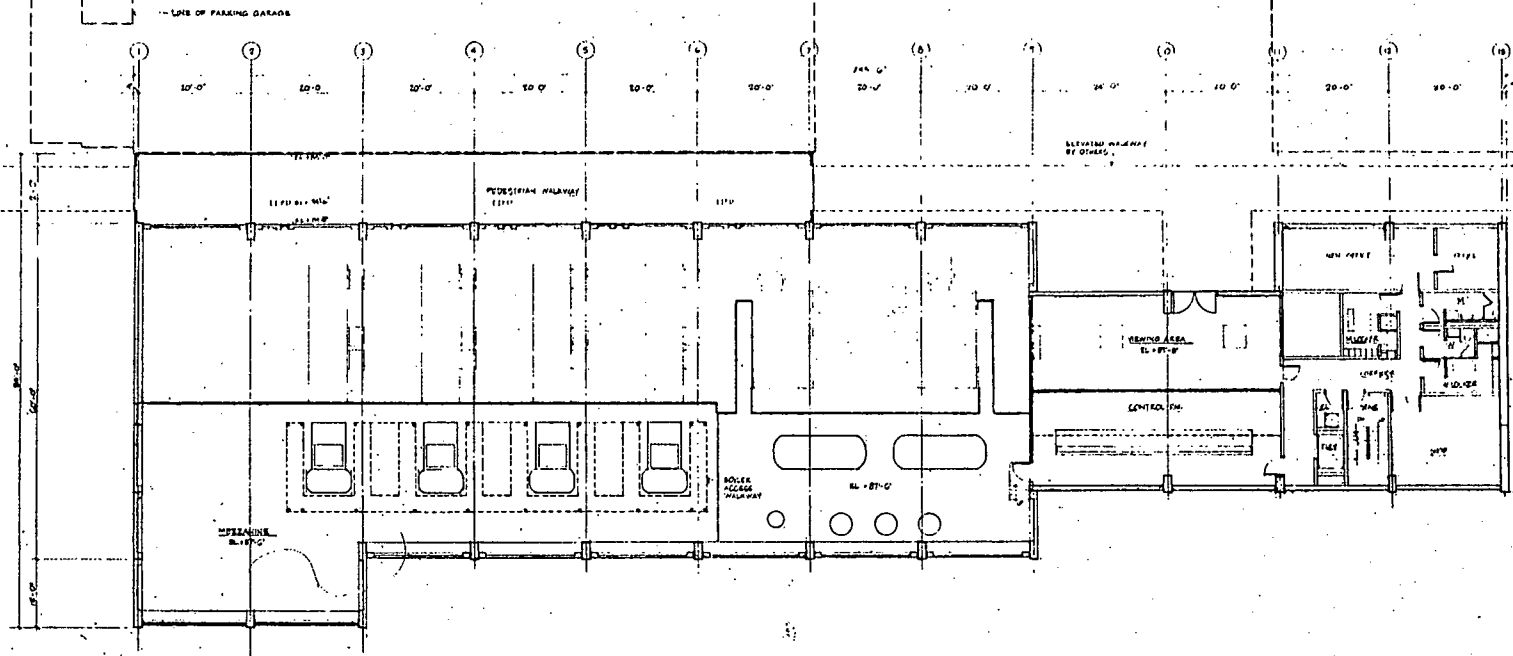
ROBERT SILMAN ASSOCIATES, P.C.
 STRUCTURAL ENGINEERS, NEW YORK, N.Y.

TURNER CONSTRUCTION COMPANY
 CONSTRUCTION MANAGER, PHILADELPHIA, PA.

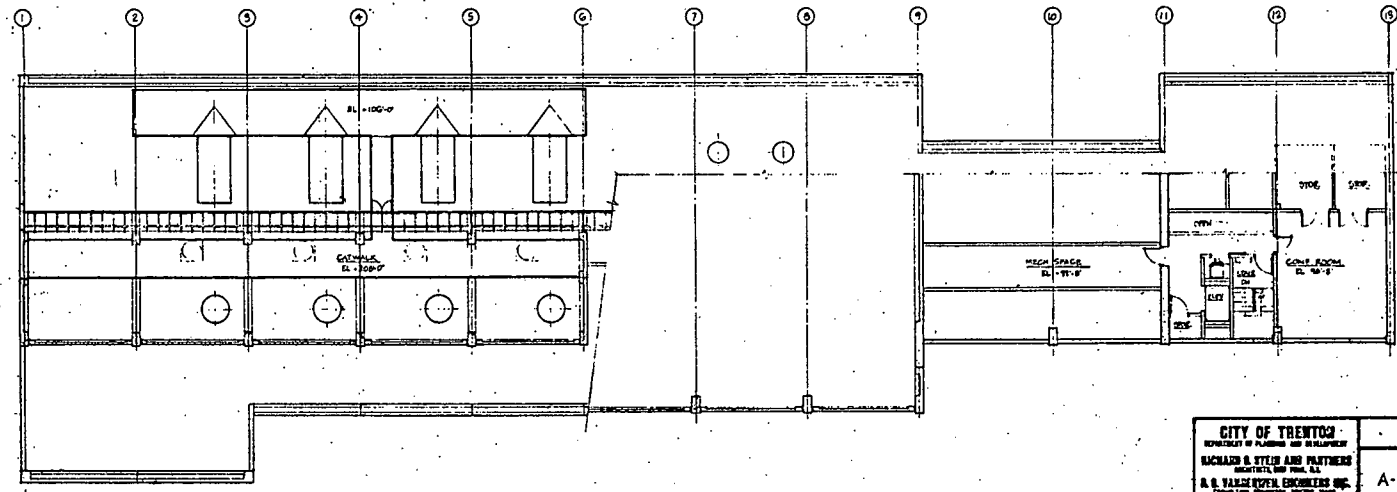
LIST OF DRAWINGS

11225 A 1110 A-1 SITE PLAN
 11226 A 1110 A-2 FIRST FLOOR PLAN
 11227 A 1110 A-3 SECOND AND THIRD FLOOR PLANS
 11228 A 1110 A-4 SHOP PLAN
 11229 A 1110 A-5 ASH ELEVATION
 11230 A 1110 A-6 EAST ELEVATION
 11231 A 1110 A-7 NORTH ELEVATION
 11232 A 1110 A-8 SECTION
 11233 A 1110 A-9 SECTION
 11234 A 1110 A-10 DETAILS
 11235 A 1110 A-11 DETAILS
 11236 A 1110 DISTRIBUTION OF EXHAUST, MECHANICAL SYSTEM
 11237 A 1110 EXHAUST DISTRIBUTION SCHEMATIC
 11238 A 1110 EXHAUST STORAGE AND FEED PLAN
 11239 A 1110 STEAM DISTRIBUTION MAIN NORTH-EAST SECTION
 11240 A 1110 STEAM DISTRIBUTION MAIN WEST-WEST SECTION
 11241 A 1110 SOUTH WARDEN STREET STEAM ROUTING DETAIL SHEET 1
 11242 A 1110 SOUTH WARDEN STREET STEAM ROUTING DETAIL SHEET 2
 11243 A 1110 SOUTH WARDEN STREET STEAM ROUTING DETAIL SHEET 3
 11244 A 1110 STANDARD HEATING AND COOLING FACILITIES - TYPICAL SCHEMATIC
 11245 A 1110 ALTERNATE THERMAL FACILITY - TYPICAL SCHEMATIC
 11246 A 1110 MECHANICAL ROOM PIPING CONNECTION

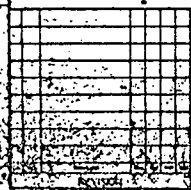
11247 A 1110 S-1 FOUNDATION PLAN
 11248 A 1110 S-2 FIRST LEVEL FRAMING PLAN
 11249 A 1110 S-3 SECOND LEVEL FRAMING PLAN
 11250 A 1110 S-4 FRAME SECTIONS
 11251 A 1110 S-5 FRAME SECTIONS
 11252 A 1110 S-6 WALL PANELS
 11253 A 1110 S-7 TYPICAL DETAILS AND GENERAL NOTES



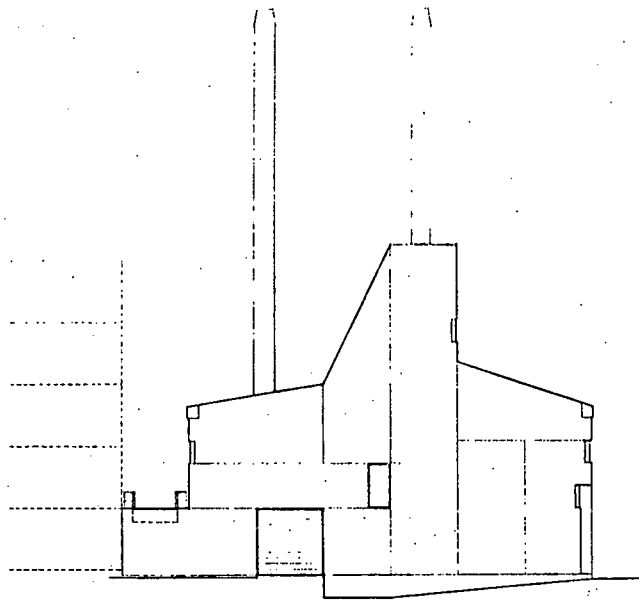
SECOND FLOOR PLAN



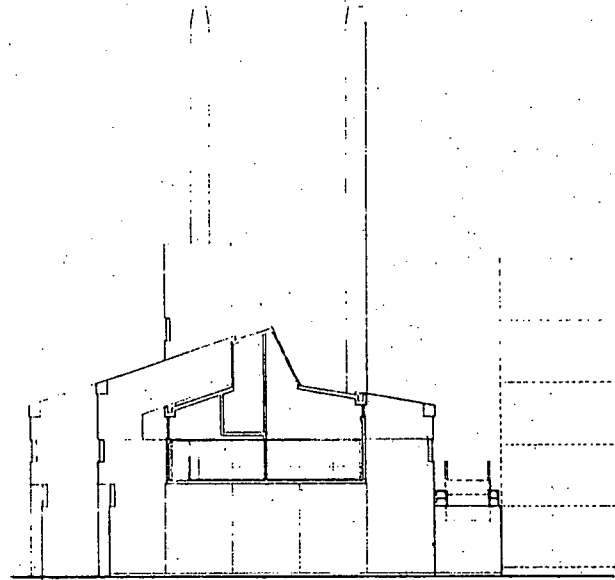
THIRD FLOOR PLAN



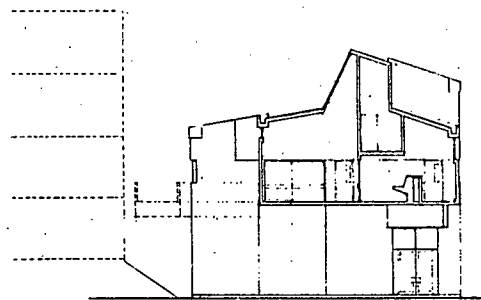
<p>CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT</p> <p>RICHARDS & STEIN AND PARTNERS ARCHITECTS, INC. P.A. 400 WALL STREET, SUITE 2000 NEW YORK, N.Y. 10048</p> <p>ROBERT KILGUS ASSOCIATES, P.C. CONSULTING ENGINEERS AND ARCHITECTS 1000 NORTH AVENUE, SUITE 200 TRENTON, NEW JERSEY 08611</p>	<p>TRENTON ICES <small>PLATE 11</small> <small>BRASSIERE</small></p>
	<p>A-3 SECOND & THIRD FLOOR PLANS</p>
<p>DATE: 01/15/08</p> <p>SCALE: AS SHOWN</p> <p>17727-A-110</p>	<p>DATE: 01/15/08</p> <p>SCALE: AS SHOWN</p> <p>17727-A-110</p>



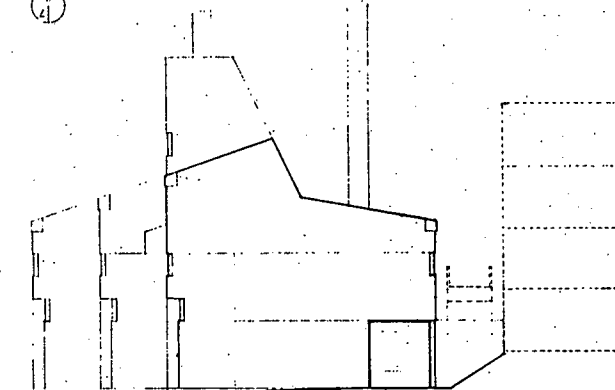
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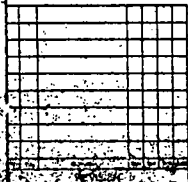
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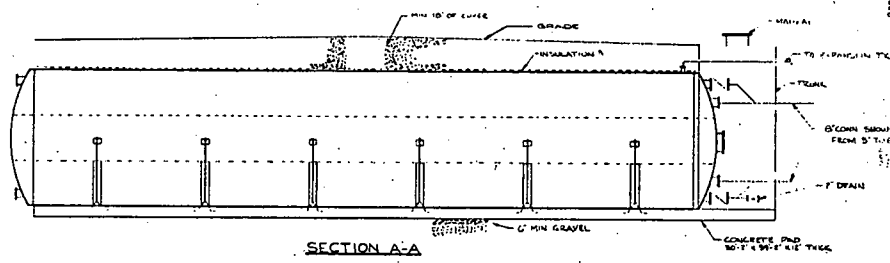
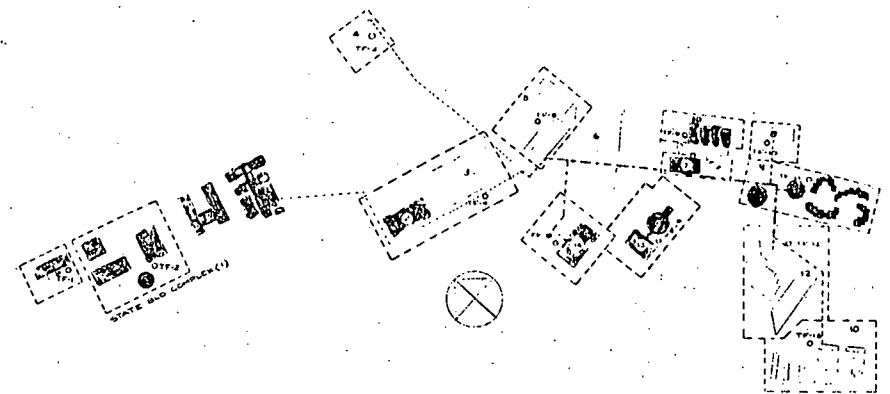
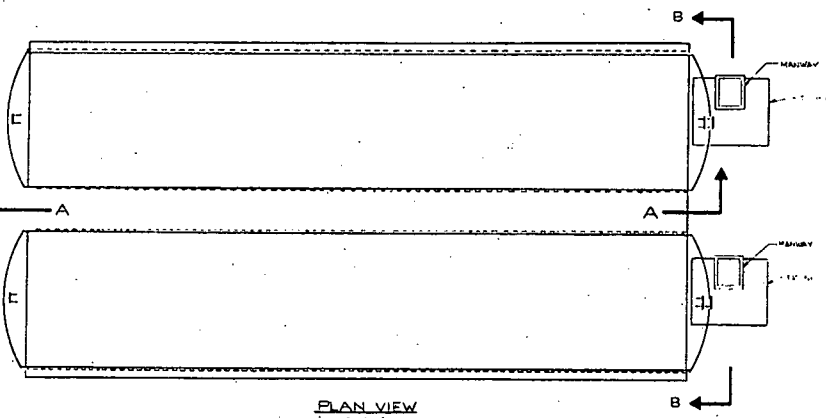
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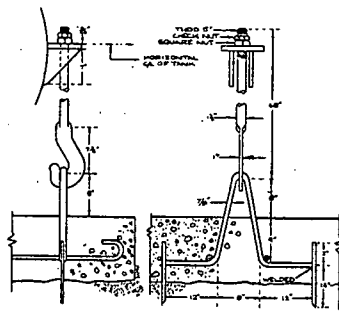
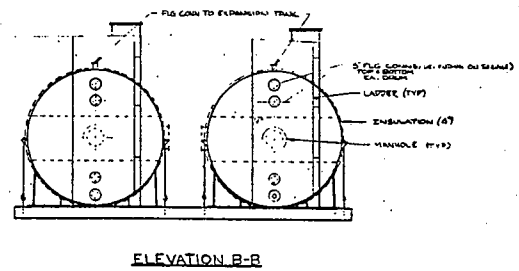


<p>CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT</p> <p>RICHARD B. STILES AND PARTNERS ARCHITECTS AND PLANNERS 100 NORTH 10TH STREET, SUITE 200 TRENTON, NEW JERSEY 08611</p> <p>R. B. LACROIX ENGINEERS INC. ENGINEERS 100 NORTH 10TH STREET, SUITE 200 TRENTON, NEW JERSEY 08611</p> <p>ROBERT G. KELLY ASSOCIATES, P.C. ENGINEERS 100 NORTH 10TH STREET, SUITE 200 TRENTON, NEW JERSEY 08611</p> <p>YONKER CONSTRUCTION COMPANY CONTRACTORS 100 NORTH 10TH STREET, SUITE 200 TRENTON, NEW JERSEY 08611</p>	<p>TRENTON ICES - PHASE II DRAWINGS</p>
	<p>A-7 NORTH & SOUTH ELEVATIONS</p>
<p>DATE: 11/7/31</p> <p>SCALE: AS SHOWN</p>	<p>11/7/31 A-11(C)</p>



TANK	TYPE	TAKE	TAKE	TAKE	TAKE	TOTAL	REQUIRED
1	12.00	12.00	12.00	12.00	12.00	12.00	12.00
2	12.00	12.00	12.00	12.00	12.00	12.00	12.00
3	12.00	12.00	12.00	12.00	12.00	12.00	12.00
4	12.00	12.00	12.00	12.00	12.00	12.00	12.00
5	12.00	12.00	12.00	12.00	12.00	12.00	12.00
6	12.00	12.00	12.00	12.00	12.00	12.00	12.00
7	12.00	12.00	12.00	12.00	12.00	12.00	12.00
8	12.00	12.00	12.00	12.00	12.00	12.00	12.00
9	12.00	12.00	12.00	12.00	12.00	12.00	12.00
10	12.00	12.00	12.00	12.00	12.00	12.00	12.00
11	12.00	12.00	12.00	12.00	12.00	12.00	12.00
12	12.00	12.00	12.00	12.00	12.00	12.00	12.00

- EXISTING BUILDINGS
- PROPOSED BUILDINGS
- EXISTING DRIVEWAYS
- PROPOSED DRIVEWAYS
- EXISTING SIDEWALKS
- PROPOSED SIDEWALKS
- EXISTING PARKING
- PROPOSED PARKING
- EXISTING TRAILS
- PROPOSED TRAILS
- EXISTING UTILITIES
- PROPOSED UTILITIES
- EXISTING FENCES
- PROPOSED FENCES
- EXISTING LIGHTS
- PROPOSED LIGHTS
- EXISTING SIGNAGE
- PROPOSED SIGNAGE

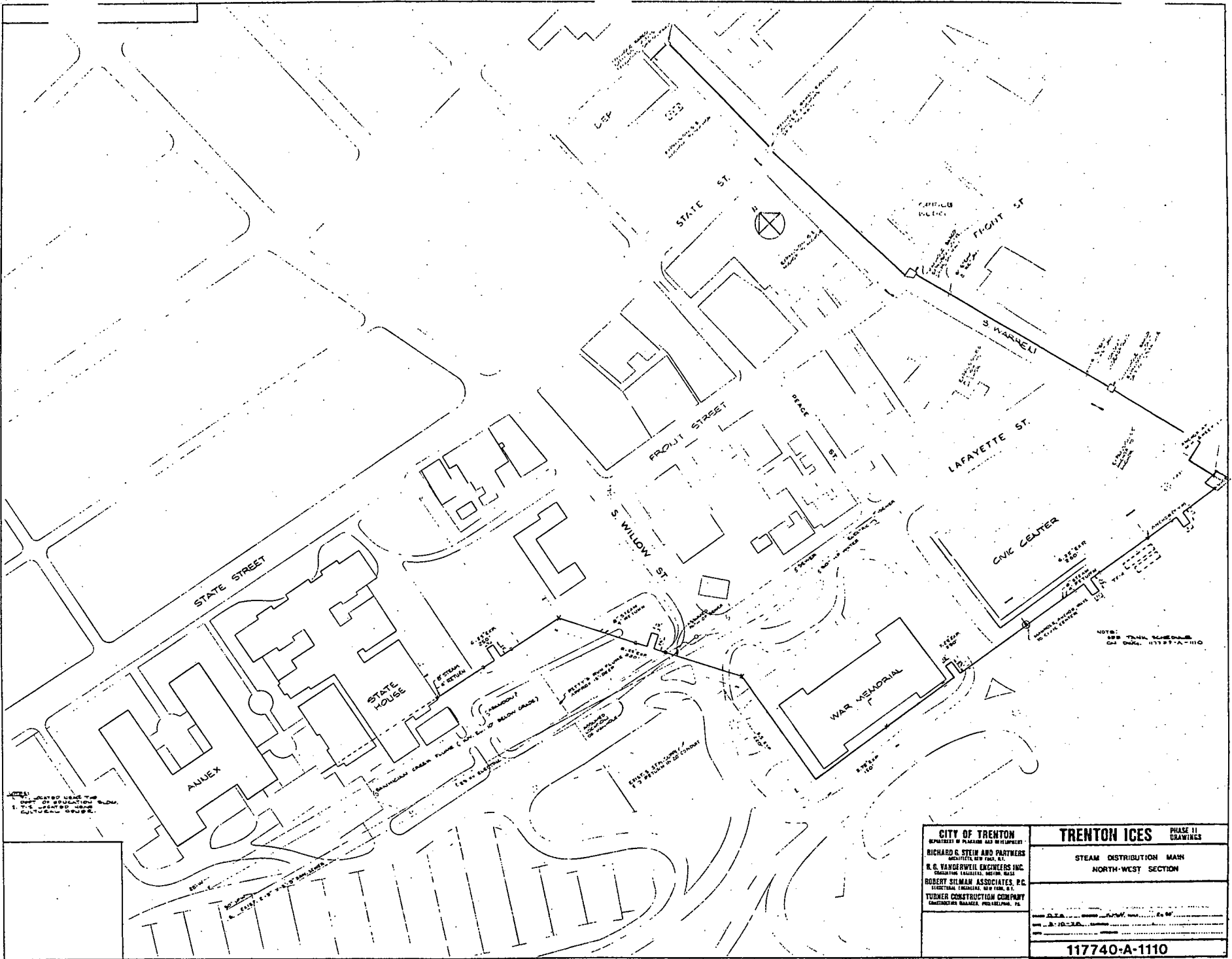


NO.	DATE	REVISION

CITY OF TRENTON
 RICHARD G. STEIN AND PARTNERS
 ARCHITECTS INC. OF N.J.
 R.G. VANDERWEIL ENGINEERS INC.
 CONSULTING ENGINEERS
 ROBERT SILMAN ASSOCIATES, P.C.
 STRUCTURAL ENGINEERS
 TURNER CONSTRUCTION COMPANY
 GENERAL CONTRACTORS

TRENTON ICES PHASE II DRAWINGS
 THERMAL STORAGE AND KEY PLAN

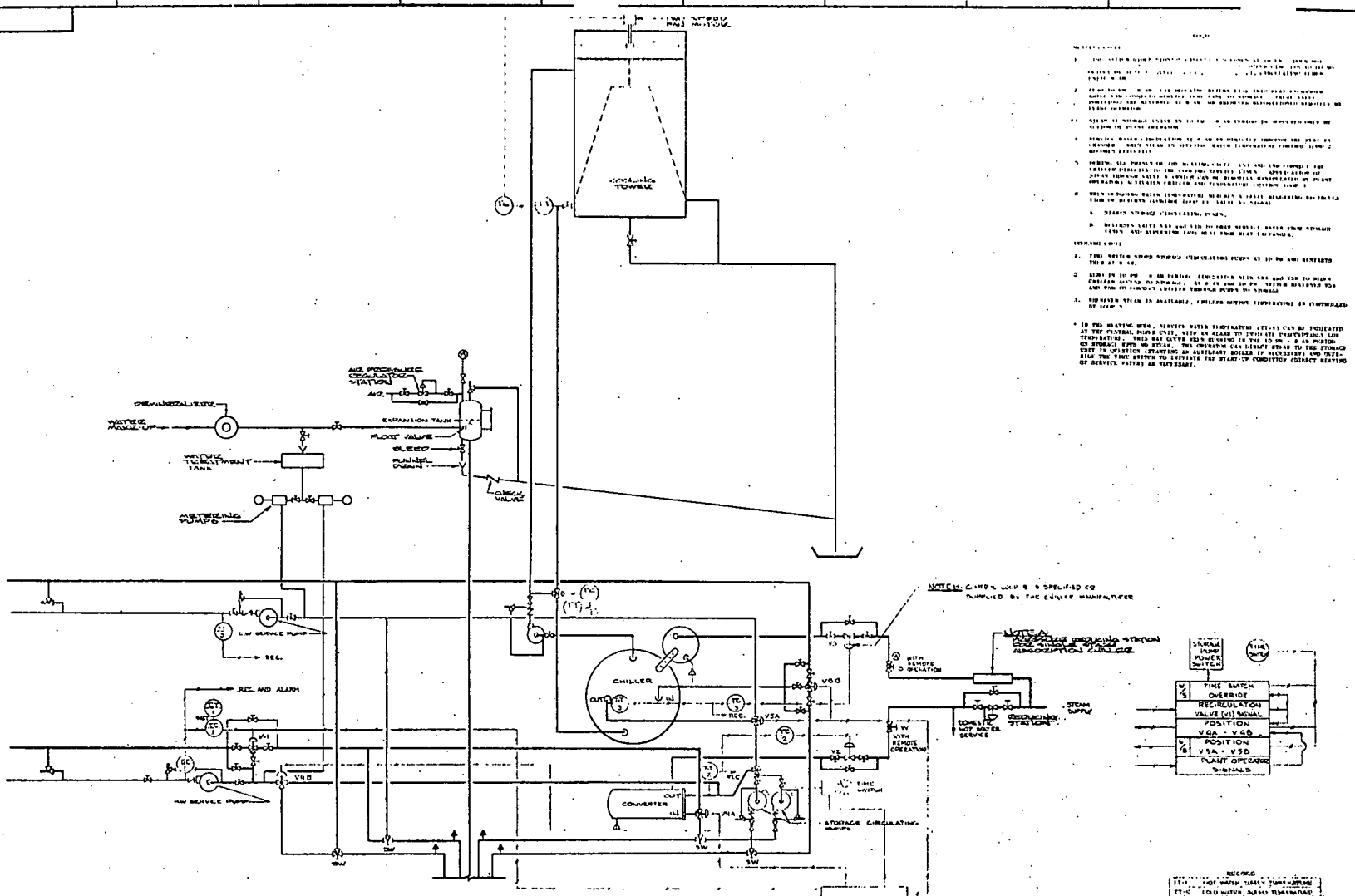
DATE: 11/11/73
 DRAWING NO.: 117738-A-1110



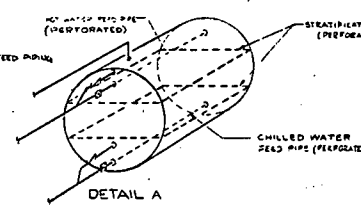
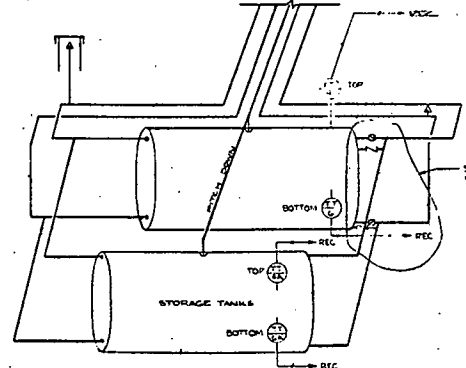
NOTES:
 1. ALL DIMENSIONS ARE TO FACE UNLESS NOTED OTHERWISE.
 2. THE SHOWN DIMENSIONS ARE TO FACE UNLESS NOTED OTHERWISE.

NOTES:
 1. SEE TANK SCHEDULE
 2. SEE DWG. 117740-A-1110

CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT RICHARD S. STEIN AND PARTNERS ARCHITECTS, P.C. R. E. VANDERWIL ENGINEERS INC. CONSULTING ENGINEERS, ARCHITECTS ROBERT SILMAN ASSOCIATES, P.C. ELECTRICAL ENGINEERS, MECHANICAL ENGINEERS TURNER CONSTRUCTION COMPANY CONSTRUCTION MANAGER, PHILADELPHIA, PA.	TRENTON ICES PHASE II DRAWINGS STEAM DISTRIBUTION MAIN NORTH-WEST SECTION
	117740-A-1110



- OPERATING INSTRUCTIONS:**
1. THE SYSTEM SHOULD BE OPERATED AS SHOWN ON THIS DRAWING UNLESS OTHERWISE SPECIFIED.
 2. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY VALVE OPEN AND THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
 3. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
 4. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
 5. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
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 9. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
 10. ALL SYSTEMS MUST BE OPERATED WITH THE MAIN WATER SUPPLY PRESSURE MAINTAINED AT THE DESIGN PRESSURE.
- STARTING INSTRUCTIONS:**
1. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.
 2. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.
 3. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.
- STOPPING INSTRUCTIONS:**
1. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STOPPING THE SYSTEM.
 2. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STOPPING THE SYSTEM.
 3. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STOPPING THE SYSTEM.
- NOTES:**
1. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.
 2. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.
 3. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.



RECOMMENDED OPERATIONAL PROCEDURES:

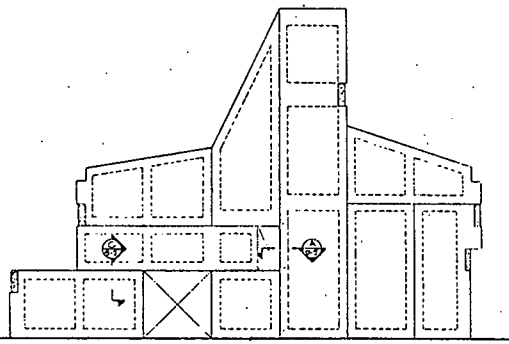
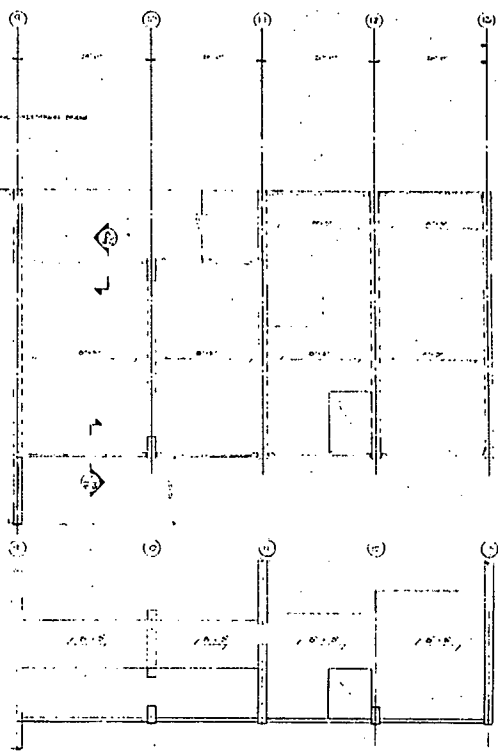
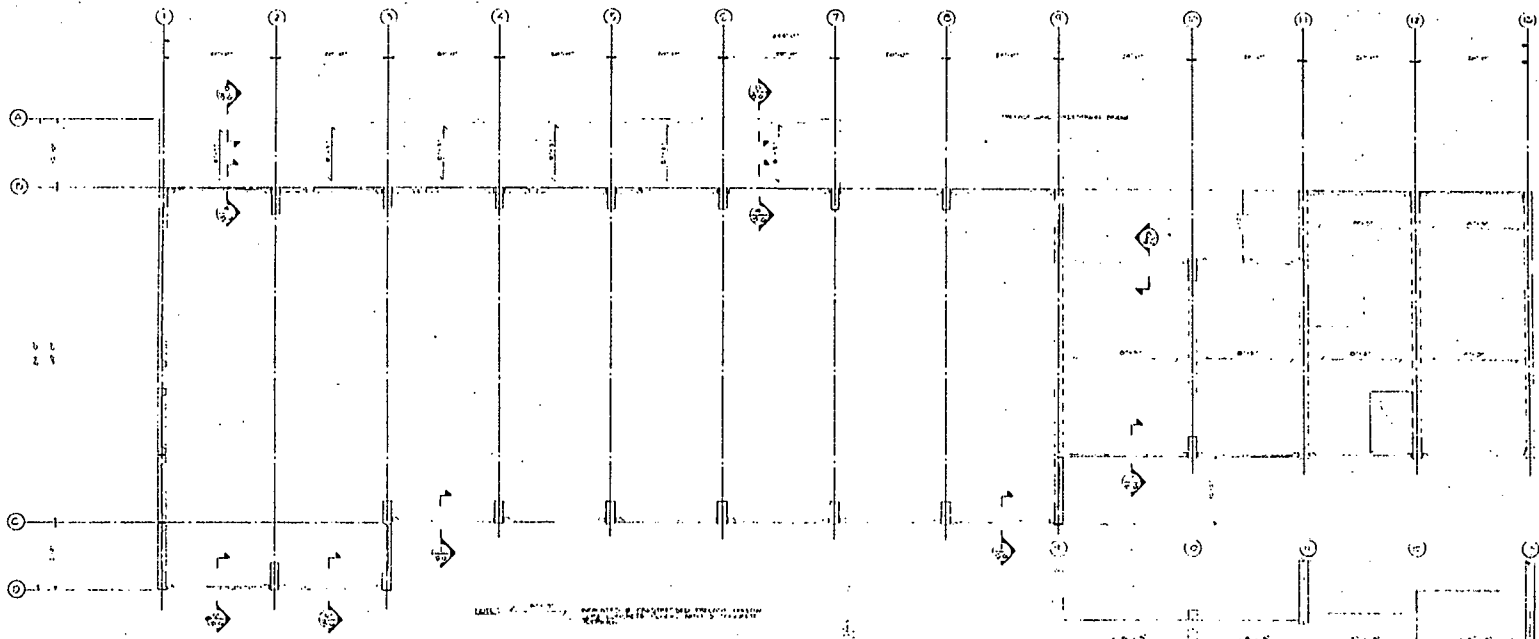
1. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.

2. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.

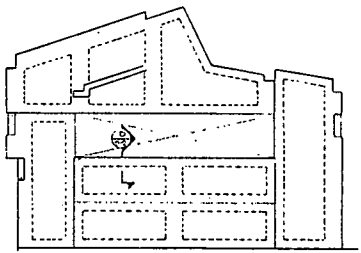
3. THE OPERATOR SHOULD CHECK THE SYSTEM PRESSURE AS SHOWN ON THIS DRAWING BEFORE STARTING THE SYSTEM.

NO.	REVISION

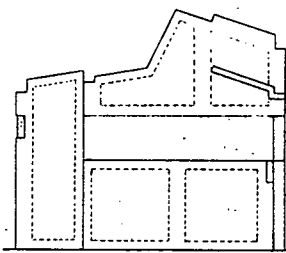
CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT RICHARD S. STEIN AND PARTNERS ARCHITECTS, INC. 200, 401 N. G. WARDENWELL ENGINEERS INC. MECHANICAL ENGINEERS, 100 N. 4th St. ROBERT SILVERMAN ASSOCIATES, P.C. ELECTRICAL ENGINEERS, 100 N. 4th St. TURNER CONSTRUCTION COMPANY CONSTRUCTION MANAGER, 100 N. 4th St.	TRENTON ICES PHASE II DRAWINGS STANDARD HEATING & COOLING FACILITY TYPICAL SCHEMATIC



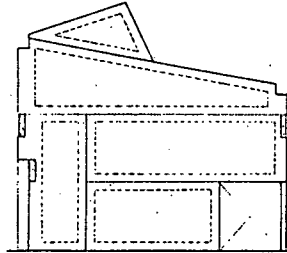
COL. LINE 1



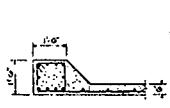
COL. LINE 9



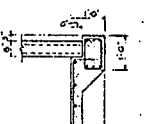
COL. LINE 11



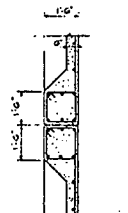
COL. LINE 12



SECTION 1



SECTION 2



SECTION 3

NO.	DATE	REVISION

<p>CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT</p> <p>RICHARD G. STEIN AND PARTNERS ARCHITECTS, NEW YORK, N.Y.</p> <p>R. G. VANDERWELT ENGINEERS INC. CONSULTING ENGINEERS, NEW YORK, N.Y.</p> <p>ROBERT SILMAN ASSOCIATES, P.C. STRUCTURAL ENGINEERS, NEW YORK, N.Y.</p> <p>TURNER CONSTRUCTION COMPANY CONSTRUCTION MANAGER, PHILADELPHIA, PA.</p>	<p>TRENTON ICES PHASE II DRAWINGS</p> <p>6-2 UPPER LEVEL FRAMING PLAN</p>
	<p>DATE: 2-14-78</p> <p>SCALE: 1/8" = 1'-0"</p> <p>11775G-A-1110</p>

**GENERAL NO. 57
GENERAL**

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF TRENTON AND THE STATE OF NEW JERSEY. ALL PERMITS AND APPROVALS SHALL BE OBTAINED PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF TRENTON AND THE STATE OF NEW JERSEY. ALL PERMITS AND APPROVALS SHALL BE OBTAINED PRIOR TO THE START OF CONSTRUCTION.

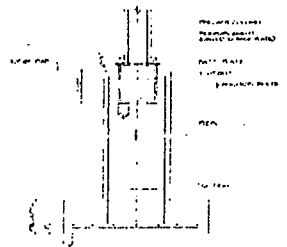
PRECAST CONCRETE

1. ALL PRECAST CONCRETE SHALL BE CAST AND CURED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONCRETE MANUAL OF THE AMERICAN CONCRETE INSTITUTE (ACI) AND THE SPECIFICATIONS FOR PRECAST CONCRETE STRUCTURES OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC. (AISC). THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF TRENTON AND THE STATE OF NEW JERSEY. ALL PERMITS AND APPROVALS SHALL BE OBTAINED PRIOR TO THE START OF CONSTRUCTION.

PRECAST CONCRETE

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V



TYPICAL PRECAST COLUMN BASE
SECTIONAL DETAIL

NO.	DATE	REVISION

CITY OF TRENTON DEPARTMENT OF PLANNING AND DEVELOPMENT RICHARD S. STEIN AND PARTNERS ARCHITECTS, NEW YORK, N.Y. H. G. VANDERWELL ENGINEERS INC. STRUCTURAL ENGINEERS, NEWARK, N.J. ROBERT SILMAN ASSOCIATES, P.C. ARCHITECTS (REGISTERED IN N.J.), NEW YORK, N.Y. TURKIN CONSTRUCTION COMPANY CONSTRUCTION MANAGER, PHILADELPHIA, PA.	TRENTON ICES PHASE II DRAWINGS 5-7 TYPICAL DETAILS & GENERAL NOTES
	117761 - A-1110

APPENDIX G

(3.5.2c)

PRELIMINARY DESIGN - SPECIFICATIONS

AUTOMATIC CONTROLS FOR
THERMAL STORAGE OPERATION

February 27, 1978

Re: 77.21
Trenton ICES

I. Control Sequence

a. Summer/Winter Operation:

Basically, both heating and cooling capability will be available throughout the year. However, hot water is stored in underground tanks during the heating season and chilled water - in the same tankage - during the summer season. The storage is switched over twice annually by local manual means.

Since not all buildings require simultaneous heating and cooling at all times, the steam valves feeding the heat exchanger (converter) and the chiller can be shut off either centrally or locally to avoid energy waste.

Summer and winter operation plans for office buildings assume heating cut back and no cooling at night. (In case of research or computer areas requiring 24 hour cooling, (self contained) local cooling equipment must be considered.

Operation plans for apartment buildings, auditoriums such as the proposed Civic Center, and other public buildings including the museum and the library may provide for cut-back by timed thermostat.

b. Day/Night Operation of Heating Cycle:

During normal day operation, the heat exchanger heats the storage water making use of the storage circulation pumps, and in turn, the water in the storage tank is circulated through the building by the hot water service pumps. The ambient temperature modulates the temperature of the building heating water through the by-pass valve V1.

Between 10 p.m. and 8 a.m. the time clock stops the circulating pumps at return valves V4A and V4B to supply the building with hot water entirely from storage. If during this period the storage becomes exhausted (as indicated by closed by-pass V1) V4A and V4B will connect the building directly to the heat exchanger, and alert the operator to open the steam stop valve.

If during this same period the storage did not become completely exhausted, the time clock will at 8 a.m. establish direct building heating via V4A and V4B as previously described. When the start-up needs are satisfied as shown by opening of the by-pass V1, conditions will return to the normal day cycle. This will be achieved by starting the storage circulating pumps and by restoring V4A and V4B to supply hot water storage, and to supply building heat from storage.

c. Maintaining Hot Water Temperature:

TIT-2 controls valve V2 to maintain a constant, preset, temperature of the water leaving the heat exchanger.

d. Operation of the Cooling Cycle:

Control TC-3 is furnished by the chiller manufacturer, and maintains constant chilled water temperatures as measured by TT-3. The time clock starts the chiller and storage pumps at 8 a.m., and as the cold water service pump is started it will draw from the bottom of storage and start the standard cooling cycle. In case storage has been depleted by extreme summer loads, as may be the case by early afternoon, or if storage is in the heating mode and cooling should be required, V5A and V5B will by signal TT-5 be positioned to directly cool the building and isolate the storage from the chiller. After a preset time of operation in peak load condition, the time clock will act on V5A or V5B to restore standard cooling operation in order to replenish storage.

II. Control Apparatus

Excluding the controllers, which may be separate analog units or included in a computer control program, the basic instrumentation for a storage unit will include:

Six, possibly eight temperature transmitters.

TIT-1 Hot water outgoing to load.
TIT-2 Heat exchanger water outlet.
TT-4 Storage tank top temperature.
TT-4A Top of second storage tank, if used. (All the above have a range of 90° - 220°F)
TIT-3 Chiller outlet temperature
TIT-5 Cold water outgoing to load.
TT-6 Tank bottom temperature.
TT-6A Bottom of second tank if used.
(The four instruments above have a range of 30° - 80°F)

A computer control system might include a complete weather monitoring unit. Without it, add:

TaT-1 Ambient (outdoor temperature.
(Range 0° - 120°F)

The necessary control valves include:

V1 Three-way throttling water valve.
V2 & V3* Equal percentage steam valves.
V4A, V4B, V5A, V5B. Two position three-way water valves.

* These units are supplied or specified by the chiller manufacturer, as is one controller.

If separate analog controllers are to be supplied, a total of three are required. These should have proportioning action as a minimum.

The foregoing items of control apparatus are shown diagrammatically on drawing M-21.

III. Variations in Thermal Storage Concepts

Smaller buildings may use single stage absorption chillers and existing buildings may or may not utilize hot water storage depending on whether the existing heating system is steam or hot water. The "Standard" control system has been adapted to these alternatives and they are diagrammed on M-21 or M-22.

TRENTON ICES PHASE II

OUTLINE SPECIFICATIONS FOR GENERAL CONSTRUCTION

DIVISION 1 - GENERAL REQUIREMENTS

1.1 Schedules and Reports

All work shall proceed in accordance with progress schedule prepared by the Construction Manager.

1.2 Temporary Facilities

The Contractor shall provide and maintain all temporary structures and facilities as may be required for the protection of the work, and the public, and to provide a safe place to work in accordance with regulations of city bureaus having jurisdiction.

Services shall be made available by the Contractor for the purposes of temporary heat, electric, water and sanitary accommodations.

The Contractor shall provide an office trailer at his own cost, and install all utilities.

DIVISION 2 - SITE WORK

2.1 Clearing of Site

Demolish all paving on site. Remove all material demolished from the site and dispose of properly.

Clear and remove all organic material.

2.2 Earthwork

Excavate to levels called for on drawings. Remove all material with organic matter, debris and material unsuitable for backfilling.

Backfill to elevations called for on drawings.

Compact and test per Building Code for controlled backfill.

Dewater as required.

2.3 Shoring and Bracing

Provide adequate bracing and protection at all excavation as required by OSHA and all applicable codes and regulations.

2.4 Roads and Walks

Paving - provide 4" cobble stone set in concrete as indicated on drawings.

DIVISION 3 - CONCRETE

3.1 Cast-in-Place Concrete

Scope: Provide cast-in-place concrete for footings, piers, grade beams, pits, trenches, slabs on grade, foundations walls, topping over precast plank and pads for equipment.

Materials:

- A. Cement: ASTM C150, Type I or II.
- B. Aggregate: ASTM C33.
- C. Admixtures: air entraining, ASTM C260
water reducing, ASTM C494
- D. Reinforcing: ASTM A615, Grade 60 and ASTM A185.
- E. Liquid membrane curing compound for slabs: Masterseal by Master Builders.
- F. Dustproofer - hardener for slabs: Lapidolith by Sonneborn Co.
- G. Grout under Base Plates: Five Star Grout by U.S. Grout Co.

Execution: All work shall comply with requirements of ACI 301, "Specifications for Structural Concrete for Buildings" as follows:

- A. Reference standards and recommendations cited in Chapter 1, ACI 301, are considered mandatory for this project.
- B. Materials: Part 2 above and Chapter 2, ACI 301.
- C. Proportioning: Chapter 3, ACI 301.
- D. Formwork: Chapter 4, ACI 301.
- E. Reinforcement: Chapter 5, ACI 301.
- F. Joints and Embedded Items: Chapter 6, ACI 301.
- G. Production of Concrete: Chapter 7, ACI 301.
- H. Placing: Chapter 8, ACI 301.
- I. Repair of Surface Defects: Chapter 9, ACI 301.
- J. Finishing Formed Surfaces: Chapter 10, ACI 301.
- K. Slabs: Chapter 11, ACI 301.
- L. Curing and Protection: Chapter 12, ACI 301.
- M. Testing: Chapter 16, ACI 301.
- N. Evaluation and acceptance: Chapters 17 and 18, ACI 301.

3.2 Precast, Prestressed Concrete Plank

Scope: Provide precast, prestressed concrete plank for roof slabs, floor at control room, secondary levels at control and transformer rooms, roof over low portion of plant serving as pedestrian walkway.

Materials:

- A. Cement: ASTM C150, Type I.
- B. Aggregate: ASTM C33.
- C. Seven wire uncoated stress relieved strand: ASTM A416.
- D. Reinforcing bars: ASTM A615, Grade 60.

Execution:

- A. Align, shim and level units as required.
- B. Place reinforcing bars and grout in keyways.
- C. Place no warped, cracked or broken slabs.
- D. Do not cut holes which will cut through reinforcing without prior approval.
- E. Show plank design camber on shop drawings. Planks varying from design camber by more than 25% or $\frac{1}{4}$ -inch shall be rejected.

3.3 Precast Concrete Frames and Panels

Scope: Frames and bents in plant, columns, girders, wall panels, end wall bearing panels, pedestrian bridge.

Material:

- A. Cement: ASTM C150, Type I.
- B. Aggregate: ASTM C33
- C. Reinforcing: ASTM A615, Grade 60.
- D. Admixtures: Air Entraining: ASTM C260.
Water reducing: ASTM C494.
- E. Reinforcing: ASTM A615, Grade 60.
- F. Forms: Steel or fiberglass lined form finish
- G. Structural Steel: ASTM A36 with ASTM A490 bolts and ASTM A233, class E70XX welding electrodes.

Execution:

- A. All work to comply with ACI 301, "Specifications for Structural Concrete for Buildings" and ACI 318, "Building Code Requirements for Reinforced Concrete."
- B. Quality control and manufacturing procedures shall comply with PCI MNC 117.
- C. Provide on-site sample panels of minimum size 5'-0" x 8'-0" x 4" thick for approval of color, texture, finish, joints, etc. Approved panel shall remain on job as standard for acceptance of production precast concrete until conclusion of project.
- D. Required finishes to be as follows:
 - Frames: Steel or fiberglass lined form finish.
 - Panels: Steel or fiberglass lined form finish.
- E. Erect within allowable tolerances. Use non-marring slings. Place no cracked or broken pieces. Provide temporary supports, shores, guys, braces, etc. as required until structural frame is complete.
- F. Provide final cleaning of precast concrete.

DIVISION 4 - MASONRY

4.1 Mortar

Mortar to be ASTM, C-150 type 1

4.2 Unit Masonry

Concrete Unit Masonry - structural characteristics per building code. Size - 8" x 16" hollow block. All masonry units requiring to be cut on job, to be done with masonry saw. No cut faces shall be exposed on finished surfaces.

DIVISION 5 - METALS

5.1 Structural Steel

Scope: Columns, beams, girders, grating, etc. for mezzanine.

Materials:

- A. Structural steel: ASTM A36
- B. High Strength Bolts: ASTM A325
- C. Welding Electrodes: ASTM A233, class E70XX
- D. Shop Paint: Tnemec No. 99 (Red).
- E. Grating: Steel, welded grating, galvanized.

Execution:

- A. Conform to AISC Specifications for Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Shop paint all steel (except within 2 inches of welds and under washers of High Strength Bolts) with minimum 2 mil thick application.
- C. All welding by qualified welders in accordance with AWS "Structural Welding Code."
- D. Provide temporary bracing and guying as required.
- E. Do not flame cut steel in field or burn holes for bolts.
- F. All column-ends to be milled and welded to base plates. Do not use leveling plates.
- G. All welding and high-strength bolting to be inspected.

5.2 Miscellaneous Metals

Metal Stairs - Provide and install metal stairs with pans for concrete-filled treads.

Exterior handrails to be galvanized steel 1½" pipe rail, Blum Weldless System or equal.

Interior handrails to be 1½" pipe rail. All connections to be mitered, welded, filled, and ground smooth.

5.3

Special Formed Metal

Stainless Steel Facing - Provide and install 12 ga. ridgidized stainless steel facing. Fasten with tamperproof steel screws.

Sandwich panels 12 ga. outside, 16 ga. inside. For steel channel subframe, see drawings.

Stainless steel framing for exterior wall system shall include fastenings and glazing stops.

Provide electrolytic protection for dissimilar metals.

DIVISION 6 - CARPENTRY

6.1 Rough Carpentry

Provide wood blocking and nailers as required for all trades.

DIVISION 7 - MOISTURE PROTECTION

7.1 Waterproofing

Waterproof outside of walls below grade with plastic sheet material cemented in place with asphalt cement.

7.2 Membrane Roofing

Roof slabs to receive with a trowelled-on elastomeric coating, such as Monotex Waterproof Deck Coating, or equal. Wearing surface as indicated on drawings.

7.3 Flashing

All flashing to be lead coated copper. Base and cap flashing to be 32 ounce.

7.4 Roof Accessories

Skylight to be Super Sky Products "Structural Series 450" Aluminum, clear anodized finish, or equal.

7.5 Caulking and Sealants

Caulking and sealants to be 2 part polysulfide. Provide expanded polyethylene closed cell backing rods for all caulking.

DIVISION 8 - DOORS, WINDOWS, AND GLASS

8.1 Metal Doors and Frames

All doors and frames to be hollow metal unless otherwise noted. Bucks and frames to be 16 gauge.

Exterior hinged doors to be faced with 12 gauge rigidized stainless steel.

8.2 Special Doors

Overhead roll-up doors to be Kinnear Model # FPO-20. Slats to be No. 9 (Goliath Slat) 10 gauge Aluminum, clear anodized finish, or equal.

8.3 Metal Windows

Aluminum windows to be Kawneer ^{Tru} "Tori-Fab 450", or equal, with clear anodized finish.

8.4 Glass and Glazing

Types of Glazing:

- a) Double strength "A" quality window glass
- b) Tempered Plate Glass
- c) Wire glass - clear, plate with welded wire mesh
1/4" thick
- d) Acoustic
- e) Polycarbonate

DIVISION 9 - FINISHES

9.1 Tile Work

6" x 6" quarry tile, thin set with epoxy adhesive and grout to be Summitville Ceramic Tile, Oxford Gray, or equal. 2' x 2" ceramic tiles in toilet and shower areas.

9.2 Special Flooring

Exposed concrete floors to have integral sealer and hardener applied to surface.

9.3 Painting

Exposed interior concrete walls block walls and underside of planks to have semi-gloss epoxy paint, Pittsburgh Paints - two component Epoxy or equal.

DIVISION 10 - SPECIALTIES

10.1 Compartments & Cubicles

Provide and install toilet partitions and shower cabinets.
General Partitions Manufacturing Corp. or equal.

10.2 Firefighting devices

Provide and install fire extinguishers and hose racks.

10.3 Lockers

Provide and install lockers.

10.4 Storage Shelving

Provide and install shelving.

10.5 Louvers and vents

Louvers - provide and install Construction Specialties, Inc.
Model No. 1251 Aluminum, clear anodized finish or equal.

DIVISION 11 - No Text

DIVISION 12 - No Text

DIVISION 13 - No Text

DIVISION 14 - CONVEYING SYSTEMS

14.1 Elevators

Elevator to be passenger type
oil hydraulic

Platform size 4'-5" x 6'-4"
Clear dim 4'-10" x 7'-8"

Capacity 2000# Montgomery Elevator Co. or equal.

DIVISION 15 - MECHANICAL

15.1 Central Station Heating and Ventilating Unit

- A. The generating plant on the first floor shall be heated and ventilated by a central station heating and ventilating unit.

Unit shall consist of casing, mixing box with dampers suitable for automatic operation, throw-away filters, face and by-pass dampers, hot water coils, fans, motor drive, and vibration damping isolators. Mixing boxes shall be designed to allow for any proportion of re-circulated or fresh air and may be combined with filters where feasible.

Unit shall be provided with a spare filter set to be installed immediately before occupancy of the building.

Unit casing shall be lined with $\frac{1}{2}$ in. fiberglass insulation secured in place with a suitable adhesive.

Unit shall have a capacity of 18,000 cfm @ 5/8" sp and shall be driven by a $7\frac{1}{2}$ hp motor.

Unit shall be as manufactured by the Herman-Nelson, Trane or McQuay.

15.2 Terminal Air Conditioning Units

- A. The control room, viewing area, conference room and offices shall be air conditioned by self-contained thru the wall terminal units as specified.

Unit shall be American Air Filter - Type SC Size 18 terminal air conditioning units as listed below or equal. Each unit shall have a total cooling capacity of 18,000 Btu/hr., based on ARI testing and rating conditions.

Each unit shall consist of a wall sleeve assembly, outside air louver, heating section with controls, cooling chassis and room cabinet.

Wall sleeve shall be factory fabricated of 16 gauge, zinc coated, phosphatized steel with entire sleeve coated with epoxy based finish, corrosion resistance.

Outside Air Louver shall consist of horizontal extruded aluminum sections, anodized in natural aluminum color and securely crimped into aluminum back-up channels. Louver assembly shall be capable of being installed from inside the building after wall sleeve is in place.

Motor and Fan Assembly shall be mounted on a one-piece, galvanized steel motorboard, easily removable for maintenance without breaking pipe connections or rewiring. Fans shall be aluminum double inlet, forward curved centrifugal type, direct connected to a two-speed motor with built-in automatic reset overload protection. Maximum motor speed to be 1150 RPM.

Control Box shall be completely factory prewired with plug-in connections for heating section and cooling chassis, and with adequately sized junction box for wiring of external power supply and temperature controls.

Hot Water Heating Coil shall be copper tube with aluminum fins. Coil shall be provided with low limit device to close outdoor air damper on heating cycle when air passing through coil approaches 35° F.

Cooling Chassis shall be a self-contained slide-in assembly complete with hermetically sealed refrigeration circuit, separate condenser fan and motor, condensate disposal system filter and casing. The entire cooling chassis shall slide in and out without the necessity of breaking piping or wiring except by plug connections.

The Evaporator Coil shall be copper tube with aluminum fins and mounted so that condensate pan is easily accessible for cleaning. Pan shall be galvanized steel, insulated and mastic coated.

The Refrigerant Circuit shall be precharged and tested. Compressor crank case shall be electrically heated when cycled off. Refrigerant metering shall be by automatic expansion valve and the refrigeration system must be capable of operating at outdoor ambients to 33F minimum. A fused type compressor motor capacitor shall be mounted in the evaporator air stream and shall be accessible for

service without removing the cooling chassis. A quick connect plug shall be provided for connection of the cooling chassis to the control panel and power supply.

An Outdoor Air Damper shall be mounted in the cooling chassis on the discharge air side of the condenser fan to insure a positive supply of ventilation air whenever called for by unit controls, regardless of whether the unit is operating on heating or cooling cycle. Outdoor air to be filtered at all times.

Cabinet shall be factory assembled and finished in baked enamel of a color selected by the Architect.

Each unit shall be provided with controls consisting of a wall-mounted thermostat - on-off switch, High-Low switch, ventilation switches, electric control valve and other controls which is standard for it. Valve shall open when the unit stops.

Provide with each unit a throw-away filter and a spare filter set.

B. The number of units and area served shall be as follows:

Viewing area	-	2nd floor:	2 units
Control Room	-	2nd floor:	2 units
Conference Room	-	3rd floor:	2 units
Offices	-	3rd floor:	1 unit

First Floor Plan

Boiler Plant: 2 boilers @ 900 hp each.

10 cfm/BHP = 2 x 900 x 10 = 18,000 cfm each.

Second Floor Plan

Viewing Area: 45 x 18 = 810 SF = 3 ton = (2)

Control Room: 45 x 18 = 810 SF = 3 ton = (2)

Third Floor Plan

Conference Room: 40 x 22 = 880 SF = 3 ton (2)

Offices: 40 x 22 = 440 SF = 1½ ton each - AAF - #18 - SC25

TRENTON ICES
OUTLINE SPECIFICATION & DESCRIPTION OF
STEAM DISTRIBUTION SYSTEM

1. GENERAL

The Trenton ICES Distribution System consists of supplying 150 psig steam which is compatible with the existing system requirements. As proposed at this stage, part of the distribution system will be buried underground and part of the system will be overhead installation, enclosed in the underside of the walkways.

The underground system will consist of separate conduit for the steam and condensate line, buried underground with cathodic protection as required.

2. CODES, STANDARDS AND AUTHORITIES

- A. All work shall be performed in strict accordance with all rules, regulations, standards, codes, ordinances, or laws of local, state, and Federal governments, or other authorities having jurisdiction, and be responsible for compliance therewith.
- B. All material and equipment shall be Underwriter's Laboratory (UL) and ASME approved, as applicable, for the service for which it is being used.
- C. All work shall be performed by workmen skilled in their respective trades and shall be executed in accordance with the best stand and practice of the trades.

3. PIPE AND FITTINGS

- A. Steel pipe, sizes 2" and larger (unless specified otherwise).
 - 1. Pipe shall be A53 ERW or seamless Grade B, plain carbon steel, allowable stress 22,500 psi at -20°F to $+650^{\circ}\text{F}$, with bevel ends for welding, Schedule 40 for steam service and Schedule 80 for condensate service. All fittings employed shall be Grade B seamless welding fittings, Schedules 40 and 80 to match piping. All elbows shall be long radius with center radius $1\frac{1}{2}$ times nominal pipe diameter. Tees, caps, reducers, etc., shall all conform to the above requirements. Welding neck flanges (150 psi) shall

be used on steam mains at all flanged valves and elsewhere as required, unless otherwise shown on the drawings. Similarly, 150 psi slip-on welding flanges shall be used where required on condensate piping.

2. Welded joints for all the above (except at Slip-On flanges) shall be made with backing rings, equal to Grinnell Standard, short nubs.
 3. Where branch lines are less than one-half the diameter of the main, Weld-O-Lets may be used in place of tees, provided they are installed prior to erecting the mains and that any slag is removed before erection.
- B. All welding processes shall be performed by welders having currently valid State Certificates suitable for the classification or work undertaken on this Project. All work shall be done in accordance with ASME, Unfired Pressure Vessel Code and the ASA Code for Pressure Piping. Before commencement of welding, a list of proposed welders and a copy of their certificates shall be submitted to the Engineer for approval.
- C. Steam and condensate piping in manholes, and buildings, sizes $1\frac{1}{2}$ " diameter and less for steam and $2\frac{1}{2}$ " diameter and less for condensate shall be Seamless A53 Grade B, plain carbon steel, Schedule 40 for steam, Schedule 80 for condensate, used with 150# malleable iron, screwed, banded fittings. All threads shall be full and clean cut and pipe ends reamed and assembled with threading compound.
- D. On screwed piping, unions shall be 150#, malleable iron, brass to iron seat, female threaded, black or galvanized to match piping.
- E. Flanged connections shall have 1/16" thick Cranite ring gaskets, coated with Crane Thread Lubricant immediately prior to installation. Flange bolts and nuts shall conform to ASA Standards for 150 pound saturated steam service. (Unless otherwise shown.)
- F. All piping shall pitch as indicated on the drawings. Reduction in steam pipe sizes shall be made from vertical to horizontal using long radius 90° reducing welding elbows. Reduction in horizontal steam pipe size in the direction of steam flow shall be made with eccentric reducing fittings, flat on bottom. Increase in horizontal

steam pipe size, in the direction of steam flow shall be made with concentric fittings. Condensate generally is pitched in the same direction as steam piping, rising in the direction of flow, with high point venting. Increases in horizontal condensate shall be made using concentric fittings.

4. PIPE HANGERS, SUPPORTS, ANCHORS AND GUIDES

- A. Furnish and install all pipe stands, supports, hangers, and other supporting appliances necessary to support firmly and substantially the several parts of the apparatus described in the plans and specifications.
- B. All vertical piping shall be supported from the building construction in a manner so as to prevent sagging or swinging.
- C. Piping shall be supported in the manner and at maximum centers as shown on the drawings. Additional hangers and supports are necessary at valves and other similar heavy loads.
- D. Anchors and guides shall be per drawings.
- E. All bare steel in all trenches and manholes shall be painted with one coat of "Rustoleum" primer and one coat of Rustoleum paint. Surfaces in contact with concrete shall be painted prior to installation. Galvanized steel surfaces do not require painting. Welded steel shall be primed and painted after welding.
- F. Insulation saddles throughout are to be factory finished with prime coat of corrosion resistant paint.

5. VALVES, STRAINERS, AND SPECIALTIES

- A. All valves shall be 150 psi saturated steam, unless otherwise noted. All valves shall have the name of the manufacturer and the guaranteed working pressure cast or stamped on the body of the valve. All valves of one type, viz., all gate or globe valves, etc., shall be of the same manufacture, Jenkins, Crane, or Walworth. The Figure number is based on Crane and is given for descriptive purposes only.
- B. All valves shall be gate type. Valves size 2½" and larger shall be iron body flanged ends, bronze mounted, outside screw and yoke, Crane No. 465. Where so indicated, valves shall be equipped with chain wheel, with guide and chain. Gate valves 2" and under shall be brass, wedge disc, non-rising stem, Crane No. 438.

- C. Check valves 2" size and smaller shall be all bronze horizontal steam rated, regrinding Y pattern, Crane No. 36.
- D. Check valves 2½" size and larger to be 125 saturated steam, iron body, swing check, flanged, with brass trim, full brass disc, body seat ring, hung pin and bushings, Crane No. 373.
- E. Strainers 2" and smaller shall be 250 psi, 406° F steam rated, semi-steel Y body, screwed with 20 mesh, 0.033", stainless steel screen, "Sarco" Type A.T. Each strainer shall be fitted with a gate blow valve, two nipples and a threaded cap, sized to match the N.P.T. of the sediment chamber.
- F. Traps shall be as shown or described on the drawings. Bucket traps shall be Armstrong, or equal; F & T traps shall be Trane, or equal.

6. INSULATION

- A. Provide insulation on the inlet air system as described on the drawings.
- B. Steam and condensate piping.
 - 1. Insulation shall be applied after all systems have been tested and proved to be tight. Before any insulation is applied, the surfaces to be covered shall be thoroughly cleaned of dirt, scale, oil, and rust, and shall be painted as hereinafter specified or as per drawings.
 - 2. All insulation shall be Pittsburgh Corning for Foamglas, Owens/Corning for fiberglas, or approved equal.
 - a. Foamglas shall be 8.5# density, 2-piece sectional, without jacket, $k = 0.38$ at 50° F mean and shall be suitable for temperature of 338° F.
 - b. Fiberglas shall be heavy density, 2-piece pipe insulation with all service jacket, 25 A.S.J./SSL $k = 0.24$ at 75° F mean and 0.355 @ 300° F mean.
 - 3. Fiberglas insulation shall be used on all steam and condensate piping in boiler plant, all buildings and the underside of walkways.

- a. Steam piping in sizes 2" and above shall be insulated with 2½" thickness. Insulation saddles shall be welded at each point of support.
 - b. Condensate piping in sizes 2" and larger shall be insulated with 1" thickness. Insulation saddles shall be welded at each point of support. Small condensate pipes up to and including 1½" diameter shall be insulated with 1" thick insulation, with standard surface shields cemented to the covering.
 - c. Insulation shall be butted tightly to inside surfaces of exterior walls when pipe penetrates tunnel or trenches.
 - d. The self-sealing lap feature of fiberglass shall be utilized per the manufacturer's recommendations.
4. Fittings, valves and flanges (located in fiberglass insulated piping) shall be insulated with "Speedline" Fabricated fiberglass fittings and fiberglass mitered segments wired in place. Thickness of insulation shall match that of the specified thickness for adjacent pipe. Mitered segments only shall be covered with ¼" coat of hard setting finishing cement. Finish shall consist of Insul-Coustic #1-C-501 applied with Insul-Coustic #1-C-215 lap adhesive all applied per manufacturer's recommendations.
5. Foamglas insulation shall be used on all steam and condensate in conduits and manholes.
- a. All steam and condensate in sizes 2" and larger shall be insulated 2½" nominal thickness. Condensate up to and including 1½" diameter to insulated 1" thickness, also insulation on pipes penetrating existing exterior building walls from trenches and manholes shall be reduced to 1" thickness to minimize the diameter of core drilling of existing concrete.
 - b. At each point of support special surface insulation shields shall be provided and cemented to insulation per the schedule of sizes and details on drawings.
 - c. Foamglas for all pipe insulation shall be furnished in two, half segments and in lengths of 18" and 24" depending on pipe diameter. Joints of insulation segments shall occur at locations

equivalent to 12 o'clock and 6 o'clock; thus should moisture ever enter the insulation, the drying process will be facilitated due to the location of the longitudinal joints. All joints shall be tightly butted and secured with bands. Bands shall be on 9" centers with 18" lengths of insulation and on 12" centers for 24" lengths. Bands shall be $\frac{1}{2}$ " wide by .015", stainless steel as recommended and supplied by the manufacturer. They shall be installed in accordance with the manufacturer's recommendations.

- d. Steam expansion loops insulated with Foamglas require special consideration. They shall be accommodated by using oversized insulation sections to form voids for free pipe movement and shall meet manufacturer's current recommended practices.
- e. Fittings shall be shaped Foamglas as manufactured by Pittsburgh Corning nominal thickness to match thickness of pipes. Insulation shaped fittings and application procedure shall conform to manufacturer's recommendations.

7. UNDERGROUND PIPING

- A. Underground piping systems shall consist of prefabricated, insulated and protected pipe units with integral supports, field-assembled with fittings, anchors, etc., as indicated on the drawings and specified herein. Units shall have metallic conduits as manufactured by Ric-Will, Midwesco, Epcoc.
- B. Conduit shall be 10-gauge smoothwall hot dipped galvanized steel having all outside surfaces of the conduit machine-coated with high melting point asphalt to a minimum thickness of 3/16 in., with an interposed layer of fiberglass screen plus one final outer wrap of asphalt impregnated, fiberglass reinforced, asbestos pipe line felt applied spirally under tension. Conduit closures shall be furnished with the conduit at a ratio of one closure for each fabricated item or length. Closures shall consist of 10 gauge steel suitably rust-proofed and in cylindrical form with a single horizontal split and shall be held welded over adjacent units. After test, all exposed closures shall be covered in the field with Coating and Blanket. All materials and insulation required for complete field closure shall be furnished with the conduit.

- C. Piping support guides and anchors shall be furnished and installed where shown and as a minimum, shall conform to manufacturer's recommendations.
- D. Expansion Loops, Ells and Tees: Prefabricated ells, loops and tees shall be furnished and installed where shown on plans and shall consist of pipe, insulation, and conduit conforming to the same specification as hereinbefore specified for straight runs. Expansion loops shall be of proper design in accordance with stress limits indicated by A.S.M.E. Code for pressure piping District Heating Section. Loop piping shall be installed in conduit suitably sized to handle indicated pipe movement.
- E. Conduit Air Test: All field welds at conduit closures shall be tested for leaks before applying Coating. During test, all field welds shall be checked with soap suds, and rewelded if necessary until air tight at 15 lbs. pressure.
- F. Pipes and fittings shall be as specified for type of service.
- G. Insulation shall be as specified for underground system.
- H. All piping shall be joined by welding and shall be made with welding fittings of same weight and material as the piping. Each system shall be tested under the hydrostatic pressure of twice the working pressure before insulation is applied and conduit sealed. Conduits shall be joined couplings with insulation protection and closure material same as for prefabricated unit.
- I. Furnish and pay for the services of conduit manufacturer or an authorized representative to supervise the installation and to test the underground distribution system. Before backfilling trench, submit manufacturer certified statement, that installation is in accordance with his recommendation and that tests show it to be satisfactory.

APPENDIX H

(3.5.1 c1)

NEW JERSEY ASSEMBLY
BILL NO. 519

MAR 17 1978

[OFFICIAL COPY REPRINT]
ASSEMBLY, No. 519

STATE OF NEW JERSEY

PRE-FILED FOR INTRODUCTION IN THE 1978 SESSION

By Assemblymen SHUCK and SHAPIRO

AN ACT to amend and supplement the "Department of Energy Act," approved July 11, 1977 (P. L. 1977, c. 146).

1 BE IT ENACTED by the Senate and General Assembly of the State
2 of New Jersey:

1 1. Section 3 of P. L. 1977, c. 146 (C. 52:27F-3) is amended to
2 read as follows:

3 a. As used in this act:

4 a. "Commissioner" means the Commissioner of the Department
5 of Energy;

6 b. "Department" means the Department of Energy established
7 by this act;

8 c. "Distributor" means and includes each person, wherever
9 resident or located, who imports into this State fuels for use,
10 distribution, storage, or sale in this State after the same shall reach
11 this State; and also each person who produces, refines, manu-
12 factures, blends, or compounds fuels and sells, use, stores, or
13 distributes the same within this State. In no case, however, shall a
14 retail dealer be construed to be a distributor;

15 d. "Energy" means all power derived from, or generated by,
16 any natural or man-made agent, including, but not limited to,
17 petroleum products, gases, solar radiation, atomic fission or fusion,
18 mineral formations, thermal gradients, wind, or water.

19 e. "Energy facility" means any plant or operation which pro-
20 duces, converts, distributes or stores energy or converts one form
21 of energy to another; in no case, however, shall an operation con-
22 ducted by a person acting only as a retail dealer be construed as an
23 energy facility;

24 f. "Energy information" means any statistic, datum, fact, or
25 item of knowledge and all combinations thereof relating to energy;

26 g. "Energy information system" means the composite of energy
27 information collected by the office;

EXPLANATION—Matter enclosed in bold-faced brackets [thus] in the above bill
is not enacted and is intended to be omitted in the law.

28 h. "Energy industry" means any person, company, corporation,
29 business, institution, establishment or other organization of any
30 nature engaged in the exploration, extraction, transportation,
31 transmission, refining, processing, generation, distribution, sale or
32 storage of energy;

33 i. "Fuel" means coal, petroleum products, gases and nuclear
34 fuel, including enriched uranium, U235 and U238, and plutonium,
35 U239;

36 j. "Gases" means natural gas, methane, liquefied natural gas,
37 synthetic natural gas, coal gas and other manufactured gases;

38 k. "Person" means natural persons, partnerships, firms, asso-
39 ciations, joint stock companies, syndicates and corporations, and
40 any receiver, trustee, conservator or other officer appointed pur-
41 suant to law or by any court, State or Federal; "person": also
42 means the State of New Jersey, counties, municipalities, authori-
43 ties, other political subdivisions, and all departments and agencies
44 within the aforementioned governmental entities;

45 l. "Petroleum products" means and includes motor gasoline,
46 middle distillate oils, residual fuel oils, aviation fuel, propane,
47 butane, natural gasoline, naphtha, gas oils, lubricating oils and any
48 other similar or dissimilar liquid hydrocarbons;

49 m. "Public building" means any building, structure, facility
50 or complex used by the general public, including, but not limited
51 to, theaters, concert halls, auditoriums, museums, schools, libraries,
52 recreation facilities, public transportation terminals and stations,
53 factories, office buildings, business establishments, passenger
54 vehicle service stations, shopping centers, hotels or motels and
55 public eating places, owned by any State, county or municipal
56 government agency or instrumentality or any private individual,
57 partnership, association or corporation;

58 n. "Purchase" means and includes, in addition to its ordinary
59 meaning, any acquisition of ownership or possession, including, but
60 not limited to, condemnation by eminent domain proceedings;

61 o. "Retail dealer" means any person who engages in the busi-
62 ness of selling fuels from a fixed location such as a service station,
63 filling station, store, or garage directly to the ultimate users of
64 said fuel;

65 p. "Sale" means and includes, in addition to its ordinary mean-
66 ing, any exchange, gift, theft, or other disposition. In such case
67 where fuels are exchanged, given, stolen, or otherwise disposed of,
68 they shall be deemed to have been sold;

69 q. "Supplier of fuel" means any refiner, importer, marketer,
70 jobber, distributor, terminal operator, firm, corporation, whole-
71 saler, broker, cooperative or other person who supplies, sells,
72 consigns, transfers, or otherwise furnishes fuel. In no case, how-
73 ever, shall a retail dealer be construed to be a supplier of fuel;

74 r. "Trade secret" means the whole or any portion or phase of
75 any scientific, technical or otherwise proprietary information,
76 design, process, procedure, formula or improvement which is used
77 in one's business and is secret and of value; and a trade secret
78 shall be presumed to be secret when the owner takes measures to
78a prevent it from becoming available to persons other than those
78a selected by the owner to have access thereto for limited purposes;

79 s. "Wholesale dealer" means any person who engages in the
80 business of selling fuels to other persons who resell the said fuel.
81 In no case shall a retail dealer be considered as a wholesale dealer.

82 t. "*Cogeneration*" means the simultaneous production in one
83 facility of electric power and other useful forms of energy such as
84 heating or process steam.

1 2. Section 9 of P. L. 1977, c. 146 (C. 52:27F-11) is amended to
2 read as follows:

3 9. The commissioner shall, on behalf of the department through
4 the Division of Energy Planning and Conservation:

5 a. Manage the department as the central repository within the
6 State Government for the collection of energy information;

7 b. Collect and analyze data relating to present and future
8 demands and resources for all forms of energy;

9 c. Have authority to require all persons, firms, corporations or
10 other entities engaged in the production, processing, distribution,
11 transmission or storage of energy in any form or in the use of steam
12 in quantities greater than 50,000 pounds per hour to submit re-
13 ports setting forth such information as shall be required to carry
14 out the provisions of this act;

15 d. Have authority to require any person to submit information
16 necessary for determining the impact of any construction or devel-
17 opment project on the energy and fuel resources of this State;

18 e. Charge other State Government departments and agencies
19 involved in energy-related activities, including the Board of Public
20 Utilities, with specific information gathering goals and require that
21 said goals be fulfilled;

22 f. Establish an energy information system which will provide
23 all data necessary to insure a fair and equitable distribution of
24 available energy, to permit a more efficient and effective use of

25 available energy, and to provide the basis for long-term planning
26 related to energy needs;

27 g. Design, implement, and enforce a program for the conserva-
28 tion of energy in commercial, industrial, and residential facilities,
29 which program shall provide for the evaluation of energy systems
30 as they relate to lighting, heating, refrigeration, air-conditioning,
31 building design and operation, *elective cogeneration and process*
32 *steam production associated with cogeneration facilities*, and
33 appliance manufacturing and operation; and may include, but shall
34 not be limited to, the requiring of an annual inspection and adjust-
35 ment, if necessary, of oil-fired heating systems in residential, com-
36 mercial and industrial buildings so as to bring such systems into
37 conformity with efficiency standards therefor prescribed by the de-
38 partment; the setting of lighting efficiency standards for public
39 buildings; the establishment of mandatory thermostat settings and
40 the use of seven-day, day-night thermostats in public buildings; the
41 development of standards for efficient boiler operation; **[en-*
42 *courage]** *consider* the establishment of cogeneration facilities
43 to simultaneously produce electricity and steam to conserve fuel;
44 and, the preparation of a plan to insure the phased retrofitting
45 of existing gas furnaces with electric ignition systems and to
46 require that new gas ranges and dryers be equipped with electric
47 ignition systems, and new gas furnaces with electric ignition
48 systems and automatic vent-dampers;

49 h. Conduct and supervise a State-wide program of education
50 including the preparation and distribution of information relating
51 to energy conservation;

52 i. Monitor prices charged for energy within the State, evaluate
53 policies governing the establishment of rates and prices for energy,
54 and make recommendations for necessary changes in such policies
55 to other concerned Federal and State agencies, including the Board
56 of Public Utilities, and to the Legislature;

57 j. Have authority to conduct and supervise research projects
58 and programs for the purpose of increasing the efficiency of energy
59 use, developing new sources of energy, evaluating energy conserva-
60 tion measures, and meeting other goals consistent with the intent
61 of this act;

62 k. Have authority to distribute and expend funds made available
63 for the purpose of research projects and programs;

64 l. Have authority to enter into interstate compacts in order to
65 carry out energy research and planning with other states or the
66 Federal Government where appropriate;

67 m. Have authority to apply for, accept, and expand grants-in-aid
68 and assistance from private and public sources for energy pro-
69 grams; notwithstanding any other law to the contrary, the com-
70 missioner is designated as the State official to apply for, receive,
71 and expend Federal and other funding made available to the State
72 for the purposes of this act;

73 n. Require the annual submission of energy utilization reports
74 and conservation plans by State Government departments and
75 agencies, including the Board of Public Utilities, evaluate said
76 plans and the progress of the departments and agencies in meeting
77 these plans, and order changes in the plans or improvement in
78 meeting the goals of the plans;

79 o. Carry out all duties given him under other sections of this act
80 or any other acts;

81 p. Have authority to conduct hearings and investigations in
82 order to carry out the purposes of this act and to issue subpoenas in
83 furtherance of such power. Said power to conduct investigations
84 shall include, but not be limited to, the authority to enter without
85 delay and at reasonable times the premises of any energy industry
86 in order to obtain or verify any information necessary for carrying
87 out the purposes of this act;

88 q. Have authority to adopt, amend or repeal, pursuant to the
89 "Administrative Procedure Act" (C. 52:14B-1 et seq.) such rules
90 and regulations necessary and proper to carry out the purposes of
91 this act;

92 r. Administer such Federal energy regulations as are applicable
93 to the states, including, but not limited to, the mandatory petroleum
94 allocation regulations and State energy conservation plans.

95 s. Have authority to sue and be sued;

96 t. Have authority to acquire by purchase, grant, contract or
97 eminent domain title to real property for the purpose of demon-
98 strating facilities which improve the efficiency of energy use, con-
99 serve energy or generate energy in new and efficient ways;

100 u. Have authority to construct and operate, on an experimental
101 or demonstration basis, facilities which improve the efficiency of
102 energy use, conserve energy or generate power in new and efficient
103 ways;

104 v. Have authority to contract with any other public agency or
105 corporation incorporated under the laws of this or any other state
106 for the performance of any function under this act;

107 w. Determine the effect of energy and fuel shortages upon con-
108 sumers, and formulate proposals designed to encourage the lowest

109 possible cost of energy and fuels consumed in the State consistent
110 with the conservation and efficient use of energy;

111 x. Keep complete and accurate minutes of all hearings held
112 before the commissioner or any member of the Division of Energy
113 Planning and Conservation pursuant to the provisions of this act.
114 All such minutes shall be retained in a permanent record and shall
115 be available for public inspection at all times during the office hours
116 of the department.

1 3. (New section) The commissioner shall, through the Division of
2 Energy Planning and Conservation, within 180 days of the effective
3 date of this amendatory and supplementary act prepare or cause to
4 be prepared a study evaluating a. alternative ownership patterns
5 for cogeneration facilities including but not limited to industrial
6 ownership, utility ownership, governmental ownership, joint
7 ownership, and third party ownership; and b. financial incentive
8 which would encourage such ownership patterns.

1 *4. (New section) The Division of Energy and Planning and
2 Conservation shall prepare or cause to be prepared a study evaluat-
3 ing the site-specific potential for the cogeneration of electricity and
4 process steam at the 200 largest steam-using sites in this State.*

1 *5.* *4.* This act shall take effect immediately.