CONSTRUCTION OF THE MIDDLETOWN STATION OF THE HARTFORD ELECTRIC LIGHT CO. FOR THE STEAM GENERATION OF ELECTRIC POWER*

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Introduction

KILOWATT hour sales of electrical energy constitute one of the most reliable economic barometers of our national economy. Electric energy is the life blood of industry and progress, the circulation varying with the demand. This is not unlike the flow of blood in the human body which increases or decreases to provide the amount of energy required. Similarly in an expanding economy, in our highly mechanized and well-populated New England, increased use of electric power has been substantial. The price of fuel in New England is about the highest in the country, and yet through economical operations, the cost per kilowatt hour on our lines is below the national average. One of the reasons for this economy, for example, is The Connecticut Valley Power Exchange, formed by several of the New England utility companies to make use of the generation, transmission, and sale of the most cheaply produced power in the system. This pooling arrangement allows the member companies to operate with a minimum power reserve of 10%, thus keeping capitalization costs for each exchange member at a minimum, and at the same time insuring more dependable service. Each utility has the reserve of the Exchange to draw upon, or in cases of emergency, the Exchange through transmission line interconnections, may obtain power from other utilities of the northeast. There are further economies to be gained from pooled generation and transmission in a thickly populated, closely integrated industrial area such as New England where the electrical utilities are comparatively small.

Power Generation

In 1920, when construction of the South Meadow Station of The Hartford Electric Light Company was started, the total name plate rating at the company's Dutch Point Station was 36,000 KW. Twenty-nine years later, in 1949 when the sixth and final turbo-generator was installed at

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South Meadow Station, the total name plate rating of this plant was 230,000 KW, more than a six fold increase in 29 years. Modernizing these statistics somewhat shows:

Average Residential Customer in 1940 used 1352 KWH annually
Average Residential Customer in 1954 used 2714 KWH annually

This is an increase of 100% in 14 years.

During this same period, the total Hartford Electric Light Company-Connecticut Power Co. interconnected peak load showed:

In 1940 a peak load of 134,000 KWH
In 1954 a peak load of 283,400 KWH

or a peak load increase of 111% in the same 14 years.

This peak load, usually occurring on a dark December afternoon around Christmas time, is the criteria for which electrical capacity must be available.

Future Trends

This continued growth in the manufacture of electrical energy is based on several important factors:

1. Population Growth
2. Prosperity
3. Business Expansion
4. Technological Advances

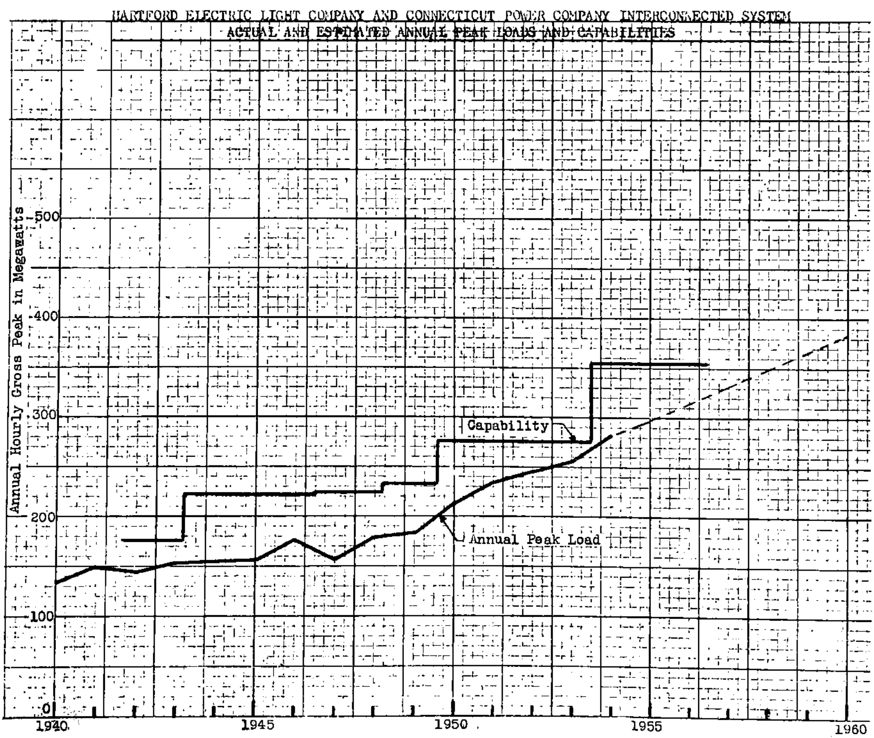
For example, the population of the United States increased 100% in the 51 years from 1900 to 1951. The population of our franchise area being a happier, sturdier and more prosperous people were not idle during this time—our population increased 100% in the 25-year period from 1900 to 1925 and by 1952, 27 years later, the increase totaled 200%, or practically twice the national average.

The national income of approximately $300 billion in 1954 is four times the 1940 income, which even with fifty cent dollar, indicates prosperity. A prosperous people spend money to better their standard of living, by buying homes, automobiles, and electrical appliances for entertainment, comfort, convenience and for saving time and work. Prosperity with confidence in the economy induces buying which of course promotes competition and business expansion. Technicological advances for example, the development and manufacture of atomic materials, or the manufacture and use of television sets, were only dreams a few years ago.

The effects of these four factors as they develop and unfold is is to increase the need for additional electrical energy. In plotting the peak load of previous years, the projected trend for the nation shows a 200% increase in electrical energy consumption by 1975. Our crystal ball possibly is not as clear as the one used by these forecasters, since we can see only 15 years in the future to 1970 when the interconnected peak loads of The Hartford Electric Light Company and the Connecticut Power Company indicate a 115% increase. Even now, we have reason to believe that this estimate may be conservative.

When to Build

This trend line of annual peak loads which we have been discussing when plotted is a sloping line continually increasing at the right of the chart with a few zig-zags resulting from the varying conditions from year to year. This trend line plus the crystal ball is used to project the future trend for the next five years which is our immediate concern. The installed capability is also plotted on the same chart to the same scale. At the point where the projected trend approaches the capability by 10% (the reserve capacity) is the date the new turbo-generator should be completed and ready to go on the line. It's as simple as that, providing you ordered your turbo-generator unit three years previously, and have the power station site where the new unit is to be installed.



Capability-Peak Load Curve

New Power Plant Site

With the rebuilding of the mercury unit in 1948, and the completion of Unit No. 6 in 1949, our South Meadow Station generation totaled 230,000 KW. Economic and engineering considerations indicated that future expansion should be at a new generating station. So in 1950, we started searching for the ideal power plant site that would fulfill all the following requirements:

1. Adequate Size or Area
2. Sufficient Cooling Water
3. Railroad Facilities
4. River Barge Deliveries
5. Flood Protection
6. Neighborhood—zoning
7. Nearness to load center
8. Transmission Line Get-aways
9. Foundation Conditions

These are not necessarily listed in their order of importance for local conditions may have a very persuasive way of making a normally unimportant requisite a very important one.

Explorations

In January 1951, preliminary soil tests were made at two possible generating station sites: one at Laurel in the Maromas section of Middletown; the other in the Cromwell Meadows. These were "Gow" borings taken by the Raymond Concrete Pile Co. The soil samples, drilling record, and location maps were sent for analysis to the Stone & Webster Engineering Corporation, who had been retained as engineers and constructors. After due consideration of each location relative to the previously summarized requirements, the site at Laurel, about four miles below Middletown on the south bank of the Connecticut River immediately below "The Narrows" at a point opposite "Paper Rock Light" was selected. The south bank of the Connecticut River mentioned above is not in error for this stretch of the river does flow due east for approximately four miles.

Preliminary Work

Site studies moved forward rapidly. In March, additional borings were completed to rock, and by the end of May, a topographical map of the station site, a hydrographic survey of the Connecticut River adjacent to the development area, and a preliminary highway relocation plan were furnished the engineers. From the preliminary mapping, exhibits were prepared for a successful zoning change and the stage was set for the purchase of the station site and adjacent lands.

The original land area purchased contained 885 acres, 8 houses, and a barn. The northerly portion has over a mile of river frontage, with the Valley Branch of the New Haven Railroad running downriver through the center. This area containing 210 acres was approved as an industrial zone by the City of Middletown. Forty-six acres between the railroad and the river comprise the station site. To enlarge this area, the old Laurel Railroad Station site and a 30-foot strip of railroad right-of-way north of the track (an area of 3.1 acres) was purchased. A strip of land containing 22.6 acres parallel and adjacent to the south of railroad was deeded to the City for the relocation of River Road, in exchange for 6.2 acres contained in the old River Road which ran through the center of the station site, north of the track. This relocation resulted in the elimination of one underpass and one grade crossing.

River Road-Construction

The River Road relocation was originally designed by the State Highway Department as a Town Aid Project for the City before the Company became interested in the area. Upon completion of the survey, this was expected to become another "on the shelf" job as no Town Aid Funds were then currently available for construction. However, by agreement between the Town and the Hartford Electric Light Company, the State Highway Department was requested by the Town to immediately process the preliminary plans, let contracts to construct the proposed road under the supervision and direction of the State Highway Department. A major portion of the processing involved radical changes in the proposed drainage pattern to direct highway runoff from the station project area.

The financing was accomplished by the sale of River Road Improvement Bonds by the City to The Hartford Electric Light Company, to be retired on specified due dates. The cost of the access road from the new River Road to the station site, and the additional drainage facilities were built as a portion of the project but for our account.

Several meetings and discussions were held with the State Highway Department, Western Union, The Southern New England Telephone Co., and Mr. Arrigoni, low bidder for the construction of the highway, in connection with the various problems. The Western Union lines were raised at the permanent and construction access roads and temporary lines installed for the construction of a 72″ culvert under the railroad. The telephone company removed its lines from old River Road to clear the site for our construction and installed services on a new 13,800V power line in joint use with the Connecticut Power Company's newly installed construction power line. The telephone lines were finally relocated to the south side of River Road.

Access to the job site for construction material necessitated the construction of a temporary entrance road at the west end of the station plot over the Valley Branch tracks to bypass the underpass with its low headroom.

Licenses were obtained from the New Haven Railroad for drainage rights permitting the construction of ditches and culverts to carry the drainage around the station site. Three culverts were installed under the railroad, thus eliminating two bridges and a third bridge was backfilled due to drainage changes.

Construction of the highway was started about June 1, 1952, and completed November 6, 1952. The finished road is a 20-foot wide tarred, gravel base road with tarred gravel shoulders.

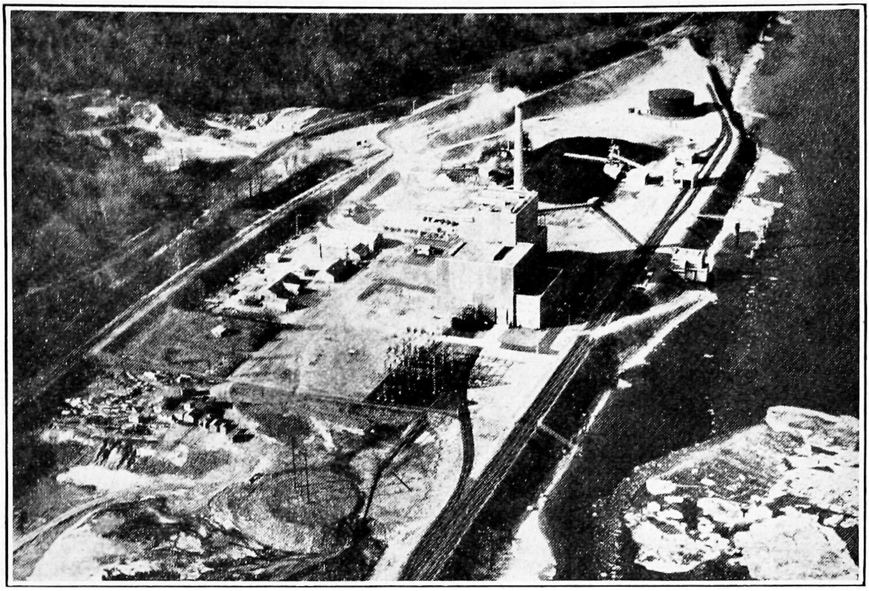
Survey and Land Title

Transfer of actual title to the land was long delayed, though it had little effect on construction preliminaries, for title irregularities had to be cleared through court action. These legal defects were found during title search by Gilman and Marks, Attorneys at Law, who were engaged for the title search. This firm worked in close cooperation with Peterson and Hoffman, Engineers, in determining metes and bounds of the area under option to the Company. For the engineers, this survey, requiring seven months to complete, involved much research and calculation as well as extensive field work in difficult terrain. If may be of interest to note that the "closures" obtained were excellent and that, with one exception, it was possible to re-establish all property lines in the field without recourse to boundary line agreements.

Station Layout

In May, 1951, the Stone & Webster Engineering Corporation submitted several plans showing proposed layouts and orientations of the proposed station. After much study and discussion, and a few changes, the accepted plan placed the power station approximately in the center of the station plot, facing north to the river. The Administration building, designed for the ultimate station of six generating units, is at the north end nearest the river and was built with the first unit. Each of the five successive units of the approximately 550,000 KW final capability can be added in a southerly direction toward the railroad, and away from the river. The turbine room is east or downriver and the boiler room is west or upriver. The outdoor electrical substation and transmission line facilities are outside the turbine room to the east. Still further east, there is an excavated ash pond area for the storage of fly ash. West of the boiler room, we have a parking area, the coal handling equipment, and coal storage area and the fuel oil storage tank farm.

Circulating water is taken in at the screen house just upriver of the west station wall, and pumped through circulating water lines under the boiler room to the condenser and discharged downriver at a maximum rate of 62,000,000 gallons per day for one unit at full load.



AIR PHOTOGRAPH

RAILROAD EMBANKMENT & DIKE

The railroad siding containing 6600 lineal feet of track, turns off the Valley Branch main line track at the east end of the station plot, and runs westerly along the river bank to the west end of the station plot on an embankment at or above elevation 28 feet U.S.C. & G.S. This is two feet above the highest recorded flood in the Connecticut River at this location. This completely encloses and protects the station site from extreme flood waters. The hillsides and new River Road drainage is designed to drain either around or through a 72″ pressure pipe across this area. The ground floor of the station is at elevation 25 feet while the general yard area is at elevation 24.5 feet, except in the oil tank farm area at the west which is at elevation 20.0 feet, and the ash pond area at the east end which is at elevation 4.0 feet.

POWER STATION

The foundations for the first unit and administration building consist of 85 concrete spread footings resting on undisturbed earth with a designed soil bearing capacity of 4 tons per square foot. The turbine room is 100 feet wide and 89 feet high; the boiler room, 116 feet wide, 131 feet high; and, the fan room, 54 feet wide, 58 feet high. The initial depth back from the river including the administration building is 158 feet. Each future addition will require 68 feet in depth. The steel stack is 207 feet above the fan room or 265 feet above the ground. The ground area of the power station is 43,000 sq. ft. with a volume of 3,200,000 cubic feet.

Administration Building

The Administration building contains the stockroom, first aid room, entrance lobby, and shop facilities on the ground floor. The second floor houses the instrument room, lockers, toilets, showers, and lunchroom. The top floor which is at plant operating floor level contains the administrative offices, conference room, laboratory, record storage room, telephone equipment room, toilets, and the ventilating equipment for the administration building.

Preliminary Construction

Preliminary construction was started on November 6, 1951, by the Whaling City Dredge and Dock Co., consisted of clearing and grubbing the station site, stripping top soil, and building up the track embankment to retain the sand pumped in from the dredging of the river channel for our barge unloading facilities.

Construction Schedule

Stone & Webster Engineering Corporation's Superintendent of Construction arrived on February 11, 1952. By this time, all major equipment and materials were on order and the construction schedule made up for completion by December, 1953. However, before construction got off to a good start, the two-month steel strike in the summer of 1952 and a subsequent strike in the fabricating shops of The Ingalls Iron Co. delayed structural steel delivery about four months to January, 1953.

Water Wells

Well drilling to locate a satisfactory supply of water for boiler make-up and domestic use was completed by the S. B. Church Co. in February. Six wells were explored for a total of 379 lineal feet of drilling. Four of these wells were abandoned and two were delevoped and tested. These wells are about 75 feet in depth and each produced 412 gallons per minute of good quality water over a 24-hour pumping period with only a 12-foot drawdown. Chemical and bacteriological tests were made and the approval of the State Department of Health was obtained on the construction of the two well pump houses and the water for drinking purposes.

Temporary Construction

The construction of the job office, carpenter shop, rigging loft, time office, and a steel frame warehouse were completed in June, 1952. The job toilet, the combined electrical and mechanical shops and change houses, as well as the water supply, septic tanks, fire protection and heating systems were completed by October, 1952.

Additional Borings

The original test borings taken over the general station plot were augmented with 22 additional "Gow" borings driven in the station area for an aggregate depth of 1150 lineal feet and samples obtained for each class of material. Unsuitable material was found in the hollow along the west wall of the station area that will house future Units No. 5 and No. 6. This 3,700 cubic yards of material was removed and replaced with gravel before filling the hollow with 20 feet of sand fill dredged from the river.

Site Preparation and General Grading

By the middle of June 1952, the Whaling City Dredge & Dock Company completed its contract, accomplishing the following:

Clearing Site of Trees & Shrubs	38 acres
Removing & Stockpiling Top Soil	13,000 cubic yds.
Improving Old River Road	4,000 cubic yds.
Fill for Temporary Power Lines	4,000 cubic yds.
Fill for Construction Access Road	8,000 cubic yds.
Fill for Railroad Siding and Dike	154,000 cubic yds.
Fill for Station Site	27,100 cubic yds.
Fill for Electrical Switchyard	2,000 cubic yds.
Fill for Parking Area Over Dredged Sand	2,300 cubic yds.
Fill for Bulldozer House	2,000 cubic yds.
Dike Rip-Rap—Field Stone	1,100 tons

The total estimated amount of material handled by this contractor was 230,000 cubic yards. Subsequently, an additional 50,000 cubic yards was handled by local contractors.

Dike slopes and excavated embankment, as they were completed, were fine graded, topped with loam, fertilized, and seeded to prevent excessive erosion.

Demolition permits were issued by the City of Middletown for the removal of seven of the eight houses on the station plot. These were sold to various people at a nominal sum for removal from the site.

Approximately 550 lineal feet of the track embankment at the west end on the river slope was covered with 2,165 tons of traprock rip-rap to furnish protection against flood waters.

Dredged Fill

The New England Dredge and Dock Company, the dredging contractor, started dredging in the barge channel in the vicinity of the unloading dock.

This dredged sand was deposited in the low spots on the station site, 47,500 cubic yards in the parking area west of the station, 23,000 cubic yards in the coal handling area, and 24,500 cubic yards in the tank farm area for an estimated 95,000 cubic yards of dredged sand. The channel was dredged to elevation -17.0 feet.

Railroad Siding

The New Haven Railroad started installation of the siding turnout from the Valley Branch track at the east end of the station site. In May, 1952, the Pearson Company, the track contractor, started laying, spiking, ballasting and tamping of the siding track. About 50% of the trackage was installed as far as the station site; the remainder was finished in 1953.

Power Station Foundations

The 85 concrete spread footings for the building foundations, started in the spring of 1952, were completed in August. All building, structure and machinery foundations were excavated to rest on undisturbed earth. A concrete fill to undisturbed earth was poured for the turbine foundation before the mat and 30-foot high superstructure containing 750 cubic yards of concrete were placed. Foundations for boiler feed pumps, pulverizers, and forced draft fans were completed by the end of 1952 while waiting for the arrival of the structural steel which finally started arriving in January 1953, four months late.

Screen Well House

While the building foundations were being installed, the steel sheet piling for the screen well cofferdam was started at the river's edge. After excavating 2000 cubic yards of material to elevation -10.0 feet, serious sand boils developed, necessitating the installation of a well point system to control the flow of water. After three days of pumping, the excavation proceeded to elevation -11.5 feet. Additional header piping and an increase in the number of well points from 68 to 117 was required before excavation to elevation -13.5 feet could be completed. The base mat was poured and the pumping continued while the concrete walls and floor level above the cofferdam were completed. The 700 cubic yards of concrete required to raise the structure above cofferdam height was also sufficient to prevent uplift, so pumping through the well points was discontinued.

Yard Piping

The 54″ circulating water line between the screen house and the west wall of the station is reinforced concrete pipe. Under the station, the pipe is steel, concrete encased. The pipe from the station to the outfall is steel pipe, bituminous wrapped outside with a field applied cement lining inside.

Additional yard piping consists of a 24″ tile roof drain; a 24″ tile floor drain; a 10″ fire line; a 12″ yard drainage line; a 20″ warm water line; and miscellaneous, water, sewer, and steam lines. An 8″ oil, 3″ steam, 2″ condensate and 1″ air line were installed in "Thermo-Tile" duct from the station to the tank farm, with a lateral to the unloading dock.

Station Model

The scale model of Middletown Station, costing $25,000, was built by Atkins and Merrill on a scale of ⅜″ = 1 foot in the Stone & Webster Engineering Corporation offices. The model was built as the designs were completed and was of considerable value in planning design, showing equipment and piping interferences, and cutting down on engineering time. By February 1953, when major layout design was completed, the model was brought to Middletown for the use of construction personnel as an aid for planning sequence of erection, clearances, and erection procedure.

Coal Handling

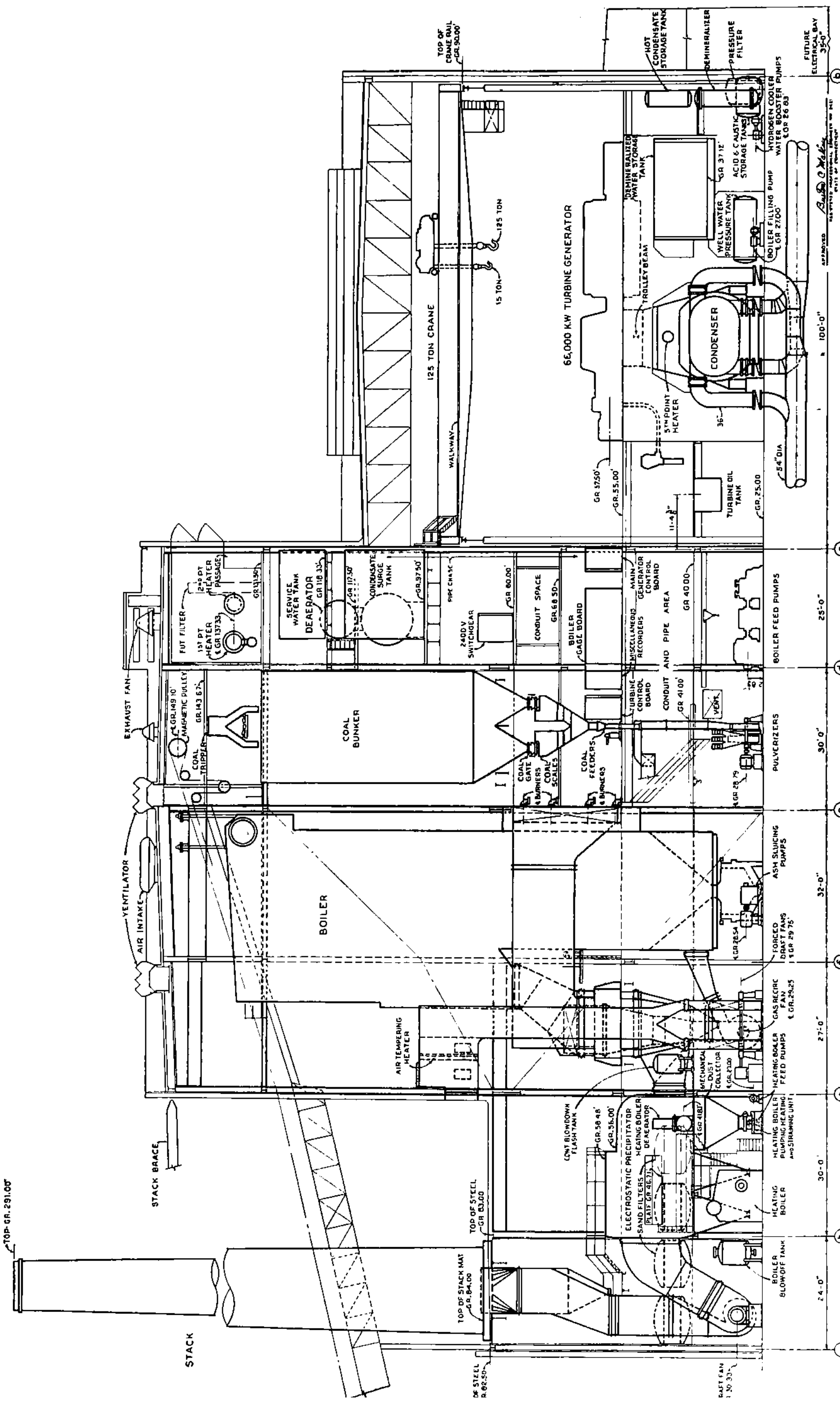
The coal handling system is designed to handle bottom dump rail coal cars with provisions for a future car dump, and coal barge unloading facilities when coal volume and economics warrant the installation. The coal handling system is designed for an ultimate 500 tons of coal per hour, but is being used at 250 tons initially.

Rail coal is dumped into a 90-ton hopper in the track hopper house where conveyors transport it thru the junction house, the crossing house to the crusher house where it is crushed and conveyed directly to the station coal bunkers holding 800 tons. Or, the crushed coal may be returned through the junction tower and transferred to a second belt leading to the 80-foot boom conveyor atop the crusher house. This boom conveyor rotates on a 180° horizontal axis, and an 18° vertical axis to deposit coal in a kidney-shaped pile. A bulldozer spreads the coal to enlarge and compact the pile. The coal reclaiming pit is at the base of the crusher house near the center of the semi-circular coal pile. The bulldozer pushes coal to the pit and conveyors carry it directly to the station bunkers or, if necessary, through transfer belts to the crusher and then to the bunkers.

The coal storage area accommodates approximately 40,000 tons of coal, about a 90-day supply for the present unit. The coal storage area can contain approximately 200,000 tons, when the ultimate station is completed.

Oil Storage Tank

A 55,000 barrel bunker "C" fuel oil storage tank, 100 feet diameter by 40′ high, was erected on a crowned sand cushion raised about four feet above the general oil tank farm elevation of 20 feet. Approximately 6 inches



CROSS SECTION (FM-1) LOOKING NORTH TOWARD RIVER of 2″ crushed stone fill was placed on the five-foot foundation berm and slopes after the tank was completed to prevent excessive erosion of the foundation. The tank is located on a dredged sand fill area pumped into an old pond area, partially mucked out, with about 18′ of sand under the west side and 10 feet under the east side. Settlement readings during a water test of the tank indicated uneven settlement with little recovery after emptying. A second prolonged water test indicated continued settlement but at a decreasing rate. Total settlement on the 18-foot sand fill side was 14½ inches, while on the 10-foot sand fill side it was 3¾ inches for a differential settlement of 10¾ inches.

The water was emptied, and the tank filled with three barge loads of oil. Additional settlement resulted in a total differential of 11″ at a slowing rate. The overturning effect, although numerically greater, has remained proportional to the vertical settlement. The compaction of the different depths of dredged sand fill under each side of the tank would account for some of the unequal settlement, while the remainder must be attributed to muck displacement on the low side. The tank shows no visible signs of distress from this unequal settlement.

Station Erection

Steel erection which started in January 1953, was delayed due to heavy rains and winds, causing considerable lost time with the resulting shortage of ironworkers who quit for more remunerative work. However, by the end of June, the 2,000 tons of main structural steel and the 40,000 rivets were completed and installation of concrete floors, slabs, and builders iron was started. Wall grade beams were poured and brickwork started in the Administration building.

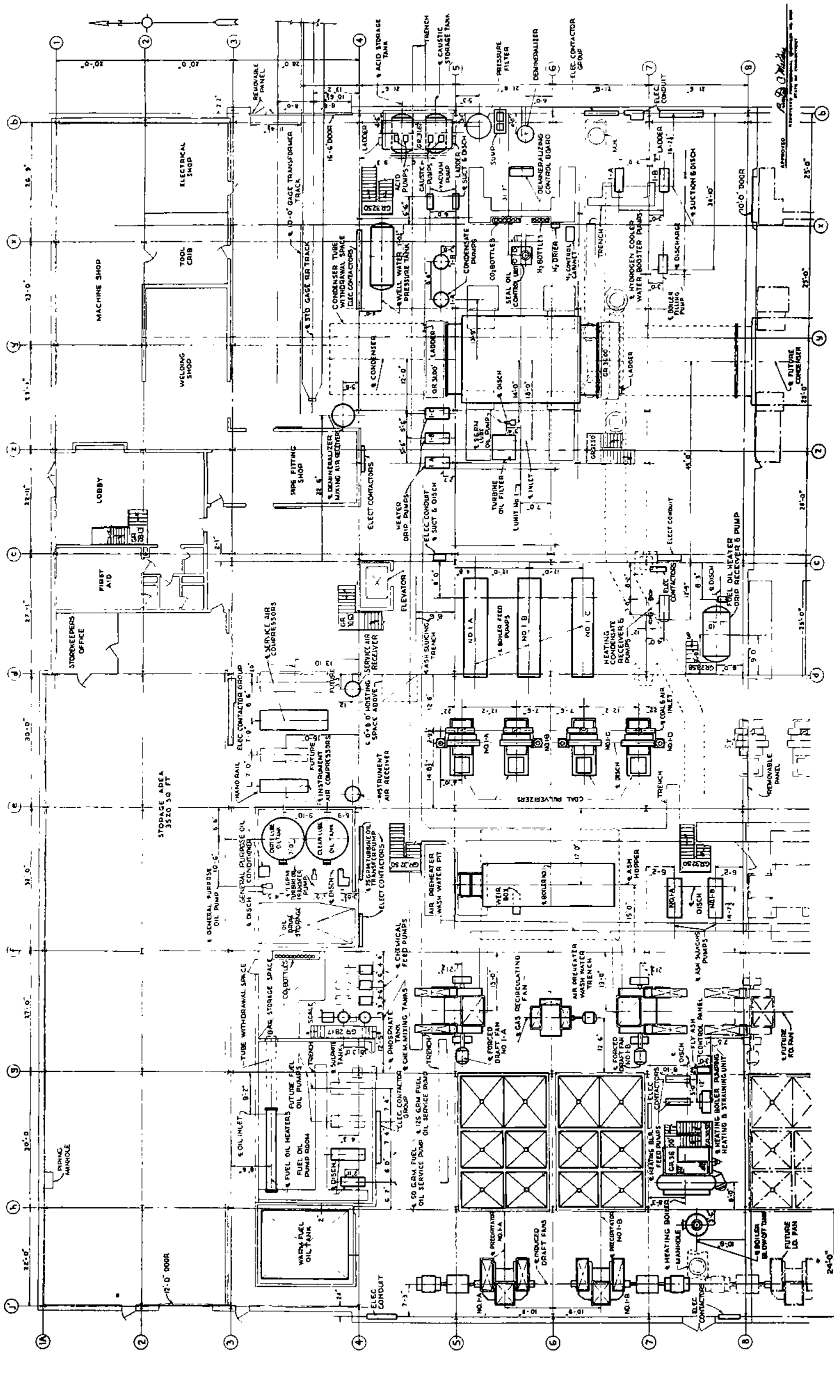
The precast concrete roof slabs were started by the contractor, The Lastik Corporation. The Connery Construction Company started erection of the steel stack and ductwork. The 125-ton turbine room crane was erected and put into operation.

The fluted aluminum insulated wall panels covering three walls of the power station were furnished and erected by the R. C. Mahon Co., while the corrugated asbestos siding for the fourth and temporary south end was furnished and erected by Asbestos Erectors. Aluminum sash throughout the building is by Bayley, Inc. The Southern New England Roofing Company installed the 20-year bonded roof and flashing.

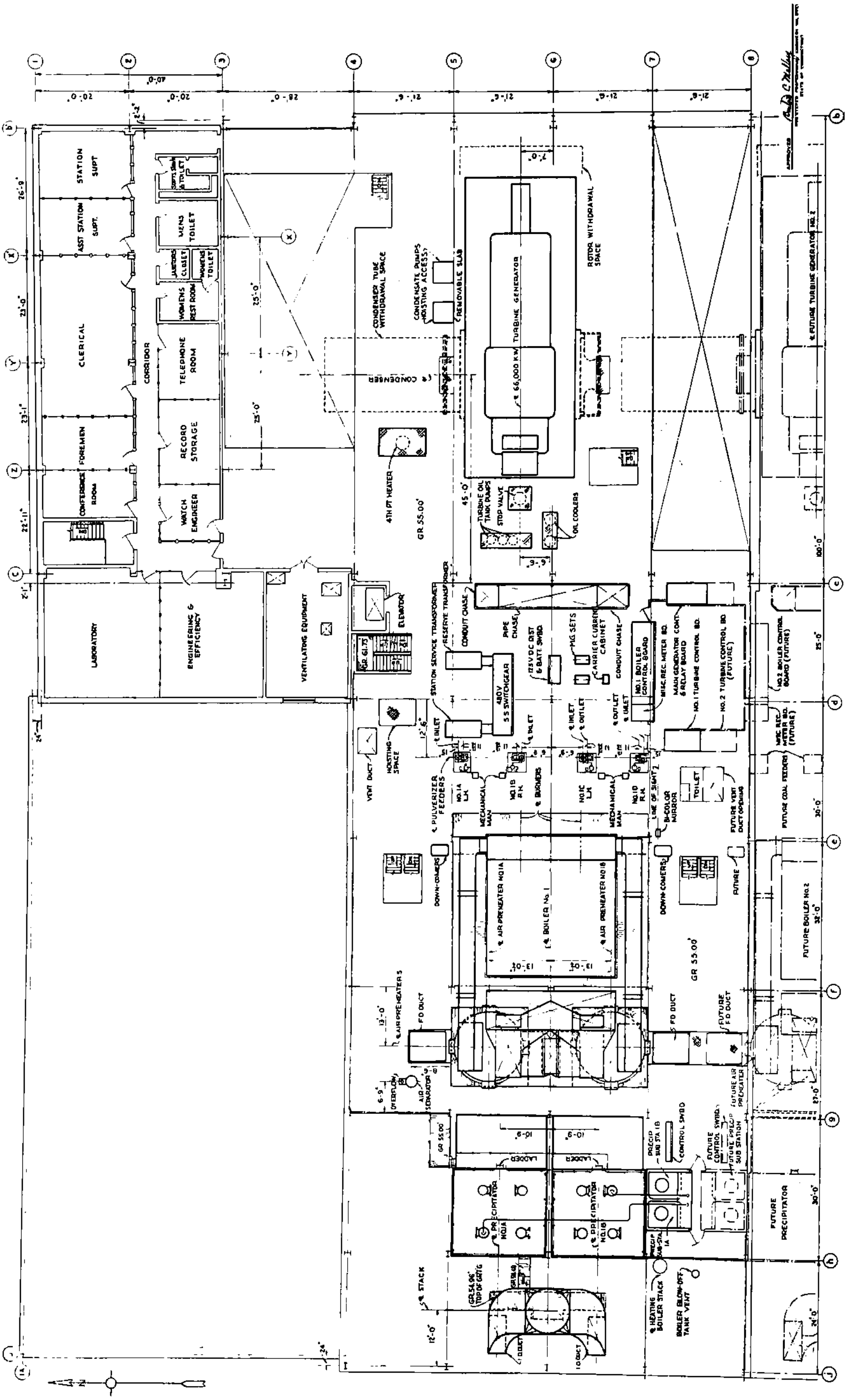
By the end of 1953, the building was closed in and the house heating boiler placed in operation.

Boiler

The raising of the 63-ton boiler drum into position in June 1953 started the major equipment erection. The Babcock & Wilcox steam generator is



LOCATION PLAN GRADE 25 (FM-5)



Location Plan Grade 55 (FM-3)

rated at 600,000# of steam per hour at 1300# gage pressure at 950° F temperature. The 12 combination burners, six on each of two operating levels, are designed to burn pulverized coal or oil as a secondary fuel. Nine burners supplied by three of the four coal pulverizers, when burning 27 tons of coal per hour, will produce the rated capacity. The boiler is a water-cooled wall radiant boiler with two superheater sections, an economizer section, and two Ljungstrom air preheaters. Automatic superheat control is obtained by gas recirculation and water spray attemperation.

Turbo-Generator

The preparatory work for turbo-generator erection was also started in June 1953. This General Electric unit has guaranteed generating capability of 66,000 KW with the boiler operating at 1250#, 925° F steam conditions and hydrogen cooling of the generator at ½# pressure. Terminal voltage of the generator is 13,800 Volts.

Power Transformer

The main power transformer, weighing 152 tons, is a General Electric air-cooled 66/88,000 KVA transformer located outside the station, adjacent to the east wall, and connected to the 13,800 Volt generator leads on the low side.

The 115,000 Volt high side is connected to the transmission line after passing through the electrical substation breakers and disconnects.

Equipment Erection

It was approximately one year from the time erection of the boiler was started to June 24, 1954, until the unit produced the first electrical energy. During this year, the mechanical and electrical equipment was installed along with the 25 miles of interconnecting piping, and the equivalent of 70 miles of single conductor electric wire was pulled and connected.

Construction Period

Including the four months required for clearing and grubbing the station site, the construction time required to place the new unit into operation was 2 years and 7 months. It required an additional five months with a greatly diminished construction force to complete all the necessary work for proper automatic plant operation.

New Innovations

This first unit at Middletown Station was designed as a base load unit, requiring maximum dependability and availability. As a result, we avoided generally new unproven developments that might cause difficulties in operation or maintenance and thus affect the availability.

The following is a summary of a few of the items installed which are new with us:

a. A mono-bed demineralizing system for processing well water for boiler feed water makeup.
b. Vertical condensate pumps installed in a pump well for pumping condensate from the condenser to the third point heater.
c. A gas recirculating fan on the boiler for partial superheat control at light loads with water spray attemperation for control at higher loads.
d. Sequentially operated retractable soot blowers for cleaning the fire side of boiler tubes.
e. A combination of mechanical and electrostatic fly ash collectors in series to extract 97% of the ash contained in the exhaust gases of the boilers.
f. A central control or operating room, the gage boards of one unit forming one-half the room closure. With the addition of the second unit, the room would be enclosed by the gage boards of the second unit.
g. A telephone paging system with loudspeakers and telephones throughout the station and yard.
h. Clear glazed tile on inside walls in the Administration building and basement floor to reduce maintenance costs.
i. Fluted aluminum insulated wall panels for the permanent walls of the power plant.
j. A vacuum cleaning system with outlets servicing all areas of sufficient capacity to serve the ultimate expansion.
k. Divided water box in surface condenser.

Engineering and Design

The Stone & Webster Engineering Corporation were the designers and constructors of the station. A procedure was established whereby all specifications issued for equipment were submitted to the Company for approval after preliminary discussions established the general design. The accepted specifications were then sent out to a list of approved bidders by the engineers and, when the proposals were in, a comparison of bids prepared and submitted to us with a recommendation for our approval. Purchase orders were then placed by Stone & Webster for the various approved items. The larger field purchase orders were handled similarly.

Conferences were held as required between the engineers of Stone & Webster and the Company to expedite design specifications, purchasing, and construction. As design progressed and the engineers drawings were issued, a careful study of each familiarized us with details and brought out differences of opinion which were correlated before construction started.

Some idea of the amount of work involved during the engineering and design may be derived from the following approximate tabulation:

Conferences Held	85
Specifications Issued	125
Engineers Purchase Orders (Boston)	220
Engineers Contracts (Boston)	22
Field Purchase Orders	2400
Field Contracts	13
Engineers Drawings	700
Manufacturers Drawings	2500

Conclusion

The last four years spent almost exclusively on this project have been very interesting and, in spite of the long hours and hard work, there is a sense of well being and satisfaction to see a dream in which one played a small part come to fruition. This satisfaction would not be nearly as pleasurable, were it not for the splendid work, cooperation and understanding of Mr. C. L. Derrick, Vice President in charge of Engineering for The Hartford Electric Light Company, and Mr. D. Douglass, Vice President of the Connecticut Power Co. and Power Consultant for The Hartford Electric Light Company.

In preparing this paper for presentation to the Connecticut Society of Civil Engineers, every effort was made to concentrate on the civil engineering aspect of the construction. The many phases of the construction overlap to such an extent that it is rather difficult to give a coherent chronological sequence of the construction. The brief references to the mechanical and electrical aspects of the construction was introduced to give some rough idea of the component parts of a steam-electric generating station.

It gives me a great deal of pleasure to inform you that, if your program committee so desires, arrangement can be made whereby the Connecticut Society of Civil Engineers will be given the opportunity to visit and inspect the Middletown Station. Should this field inspection trip become a reality, and some of those present today make the trip, I am certain they will be much more impressed in seeing, rather than hearing about the station.