

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section number _____ Page _____


SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 90001096 Date Listed: 08/02/90

Cos Cob Power Station Fairfield CT
Property Name County State

N/A
Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.


Signature of the Keeper

8/2/90
Date of Action

Amended Items in Nomination:

8. Statement of Significance: Area(s)

Architecture and Engineering were intended as applicable areas of significance to correspond with the property's significance under Criterion C.

This information has been confirmed with John Herzan, National Register Coordinator, CTSHPD, by telephone.

DISTRIBUTION:

- National Register property file
- Nominating Authority (without attachment)

United States Department of the Interior
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NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

=====

1. Name of Property COS COB POWER STATION

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historic name: Cos Cob Power Station

other name/site number: N/A

=====

2. Location

=====

street & number: Sound Shore Drive

not for publication: N/A

city/town: Greenwich

vicinity: N/A

state: CT county: Fairfield

code: 001

zip code: 06807

=====

3. Classification

=====

Ownership of Property: Public-local, Public-state

Category of Property: District

Number of Resources within Property: 9

Contributing	Noncontributing	
<u>2</u>	<u>2</u>	buildings
<u>4</u>	<u>1</u>	sites
<u>6</u>	<u>3</u>	structures
		objects
	<u>3</u>	Total

Number of contributing resources previously listed in the National Register: 0

Name of related multiple property listing: N/A

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7. Description
=====

Architectural Classification:

Spanish Colonial Revival

No style

Other Description: _____

Materials: foundation concrete roof other: built-up
walls concrete block other roof: terra cotta

Describe present and historic physical appearance. X See continuation sheet.

=====
8. Statement of Significance
=====

Certifying official has considered the significance of this property in relation to other properties: National.

Applicable National Register Criteria: A,C,D

Criteria Considerations (Exceptions) : N/A

Areas of Significance: Transportation
Industry

Period(s) of Significance: 1905-1907, 1912

Significant Dates : 1907 (built) 1912 (expanded)

Significant Person(s): N/A

Cultural Affiliation: N/A

Architect/Builder: Westinghouse, Church, Kerr and Co. (builder)

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above. X See continuation sheet.

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9. Major Bibliographical References
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X See continuation sheet.

Previous documentation on file (NPS):

- _ preliminary determination of individual listing (36 CFR 67) has been requested.
_ previously listed in the National Register
_ previously determined eligible by the National Register
_ designated a National Historic Landmark
_ recorded by Historic American Buildings Survey # _____
_ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data:

- x State historic preservation office, 59 South Prospect Street, Hartford
_ Other state agency
_ Federal agency
_ Local government
_ University
_ Other -- Specify Repository: _____

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10. Geographical Data
=====

Acreage of Property: approx. 6

UTM References: Zone Easting Northing Zone Easting Northing

A _ _ _ B _ _ _
C _ _ _ D _ _ _

X See continuation sheet.

Verbal Boundary Description: X See continuation sheet.

Boundary Justification: X See continuation sheet.

=====
11. Form Prepared By
=====

Name/Title: Matthew Roth and Bruce Clouette, Reviewed by John Herzan, National Register Coordinator
Organization: HRC Date: November 27, 1989
Street & Number: 55 Van Dyke Avenue 203 547-0268
City or Town: Hartford State: CT ZIP: 06106

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Section number 7

Cos Cob Power Station Page 7-1

Description (continued):

Cos Cob Power Station, which was placed in service in 1907 and closed in 1986, supplied the electricity for the New York, New Haven and Hartford Railroad's electrified mainline between New York and New Haven (Shoreline Route). It stands on the west bank of the Mianus River, near its entry into Long Island Sound; the nominated property covers six acres (Figure 1). The central contributing building is the 3-story concrete Power House, which held the boilers, steam turbines, and alternators, as well as extensive supplementary equipment such as pumps and governors. Also included are one contributing outbuilding (a coal crusher house), two noncontributing outbuildings (a concrete shed and a steel warehouse), four contributing structures (a dock, two concrete water tanks, and a coal conveyor) and one noncontributing structure (an oil tank). A detailed inventory of all the buildings and structures is below.

Immediately to the north of the Power Station runs the four-track mainline of the Shoreline Route, presently operated by MetroNorth. Southwest of the station is a modern electrical-transmission substation, and to the south some nine acres of open waterfront land; to the west stand recent commercial structures. The character of the district is overwhelmingly utilitarian. The auxiliary structures and buildings are strictly functional in appearance, and were located on the property according to operational rather than aesthetic considerations.

As first built, the Power House had several prominent Spanish Mission-style features, notably the false parapets at the end walls and the tile roof, but additions and alterations have obscured or caused the removal of many decorative flourishes. All of the Power House's original operating equipment was replaced by 1937. The coal crusher house and the water tanks stand substantially unaltered; the dock and coal conveyor were modified to accommodate changing operations, such as upgraded coal-handling procedures and the partial shift to oil-firing the boilers. The only missing components of the Power Station are two concrete coal bunkers, which stood outside the north end of the Power House, and the 1919 machine stop building, which stood near the southwest corner of the Power House and was removed to make way for the substation that presently occupies that ground.

The Power Station has apparently not been subject to regular

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Description (continued):

maintenance since it was decommissioned in 1986. The Power House, in particular, shows signs of deterioration. The roof is no longer water-tight. Moisture has entered the building, where it stands in pools on the floor. Water has apparently entered the walls, causing cracks in the joints between concrete blocks and, in some instances, in the blocks themselves. The overhang of the roof has eroded completely away in several locations. The moisture in the building has also caused rust to form on all of the extant equipment.

Following is the inventory of buildings and structures in the district.

Contributing Buildings

1. POWER HOUSE (Figure 2, Photographs 1-8). As originally constructed in 1905-1907, the Power House was 248' long and 112' wide (longer axis running north-south) with a hip roof featuring a narrow monitor along its ridge. Though high enough to accommodate three stories, the interior is undivided vertically, providing a single high story. The walls consist of concrete blocks. Steel trusses support the concrete roof slabs; the roof was originally covered with terra-cotta tiles, most of which have been replaced with built-up roofing. The ends of the building had five round-arched bays: a central freight door flanked by pairs of high windows fitted with steel sash featuring radial-glazed transoms. Side elevations feature rectangular openings fitted with fixed small-pane steel sash. The end elevations feature Spanish Mission-style parapets (Photograph 1). The interior was divided into two rooms, each extending the full width of the building. The northern room took about two-thirds of the total length and contained the boilers, condensers, superheaters, and associated pumps and piping. The turbine-alternator sets and associated equipment (e.g., governors and exciters) occupied most of the southern room, which also had a raised, partitioned gallery for the control panels.

In 1912 the Power House was doubled in size by an addition to the west. The expansion plans maintained the original functional layout by adding another long boiler room west of the earlier boiler room, and extending the turbine room and control-panel gallery to the west; motors that powered the electrical switching mechanisms for the Shoreline Route were installed in a fenced-off area below the western end of the gallery (Photograph 8). The addition utilized identical structural

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Cos Cob Power Station Page 7-3

Description (continued):

details and similar decorative motifs; the north elevation of the building then took on its present appearance, marked by two adjacent Spanish Mission-style parapets. The lengthened turbine room was given its own hip roof with monitor, running perpendicular to the parallel roofs of the boiler rooms (Photograph 4).

In 1920 a 2-story transformer room (Photograph 2) was built onto the east end of the turbine room, obscuring and altering the south end of the 1905-1907 portion of the Power House. The transformer room has a double Spanish Mission-style parapet and a pair of high round-arched windows. The equipment in this addition augmented the transformers housed in the open-air gallery (Photograph 5) running along the south side of the Power House. Subsequent additions include two small rooms along the east wall, to house pumps and other equipment; the chief alterations to the building are the removal of the original chimneys, the addition of a steel-framed, sheet-metal clad enclosure atop the roof of the east boiler room to accommodate new equipment installed in the 1930s, and the installation of rectangular freight doors in the formerly round-arched end bays (Photographs 1,3).

Extant major equipment (Figure 3) includes the two boilers installed in the 1930s in the east boiler room, along with associated feed-water heaters (Photograph 7); three c.1926 Westinghouse turbine-alternator sets (Photograph 6) and three converter that were moved to Cos Cob in 1983; and three c.1924 motors that powered the signalling system, located in the fenced-off area below the switching gallery in the turbine room (Photograph 8). The west boiler room is empty except for the coal hoppers suspended from the roof framing.

2. COAL CRUSHER HOUSE (Photograph 9). Built c.1910, this gable-roofed frame structure with clapboard walls held the machinery that crushed and graded lump coal to the finer grades needed to fire the boilers. The building sits atop a timber trestle, which once held tracks for hopper cars that brought coal into the building. The crushed coal was fed down a covered trough onto a bucket conveyor that connected with another conveyor (not extant) for the short trip to the coal bunkers.

Contributing Structures

1. 1906 WATER TANK (Photograph 10, left). This reinforced-concrete

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Description (continued):

tank, 80 feet in diameter and 15 feet high, has a capacity of 600,000 gallons. Open at the top, it features a circumferential gallery of shallow round-arched panels. It served as a reservoir for boiler-feed water, and was filled by water pumped out of the nearby Mianus River.

2. 1924 WATER TANK (Photograph 10, right). This later tank is similar in every detail to the 1906 tank, except that it lacks the round-arched panels.

3. DOCK (Photograph 11). The plank decking rests on a substructure of timber piles that have been extended and repaired with steel sheet-piling. There are two pumphouses that housed equipment for offloading oil, which the power plant burned occasionally instead of coal. Both are frame structures with vertical-board siding. The older pumphouse, c.1920, contains remnants of a geared pump; equipment has been removed from the c.1960 pumphouse.

4. COAL CONVEYOR (Photograph 12). The earliest parts of the present structure were built in 1919, when outdoor storage for an additional 10,000 tons of coal was added to the system of bunkers and hoppers that previously accommodated the coal supply. (The plant burned 350 tons a day, and before the outdoor storage was added, the site could store only three days' supply.) The 1919 system featured a radial bridge-conveyor (not extant) that could be rotated into several positions for unloading coal barges and taking coal to and from the crusher house. It also had the inclined conveyor, of which a major portion remains today, that carried coal to the roof of the power house, where horizontal conveyors (not extant) took it to the various hoppers. The inclined conveyor consists of steel lattice-girder bents supporting shallow Warren deck trusses. Atop the trusses ran tracks for cable-drawn larry cars. The present configuration of the system dates from 1948, when the radial bridge was scrapped.

Noncontributing Buildings

1. CONCRETE SHED. This flat-roofed, 1-story building, erected c.1980, stands adjacent to the north end of the 1912 Power House addition. (Photograph 1, left)

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Cos Cob Power Station Page 7-5

Description (continued):

2. STORAGE BUILDING (Photograph 13). A steel-framed building, clad in corrugated steel, it was erected c.1960.

Noncontributing Structures

1. OIL TANK (Photograph 14). Erected c.1960, it is made of welded steel plates.

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Section number 8

Cos Cob Power Station Page 8-1

Significance (continued):

Summary

Cos Cob Power Station is significant for its pioneering role in railroad electrification (Criterion A). Cos Cob was a successful experiment -- the largest single component in the first electrified railroad mainline in the United States. It was an experiment on a grand scale, with enormous consequences for failure, because the mainline between New York and New Haven was the nation's busiest rail corridor in the first decade of the 20th century. The innovative attributes of Cos Cob include its enormous scale for an early 20th-century generating facility, its electrical format of single-phase alternating current at 11,000 volts and 25 cycles, the layout and functional integration of the Power House and support facilities, the structural details of the Power House itself, and the highly specialized design of every operating component. The plant is thus also significant because it embodies the distinctive characteristics of railroad electric-generating plants of the early 20th century (Criterion C): Cos Cob itself set the standard for those characteristics for decades after its completion in 1907. The Cos Cob Power Station is also of critical importance as an industrial archaeological property (Criterion D); professional archaeological investigation would yield critical industrial and engineering data that would complement and supplement surviving company records concerning the construction, day-to-day operations and demise of this first-of-its-kind electrification site.

History

The New Haven Railroad's electrification project began in response to a statute enacted in 1903 by the State of New York, which aimed for cleaner air in New York City by forbidding steam locomotives within the city limits. From the start of their efforts to comply, the two major railroads affected by the law, the New York Central and the New Haven, continually extended the scope of electrification. First the railroad engineers realized that changing from steam to electric locomotives at the city limits would only aggravate the enormous problem of coordinating the extensive rail traffic in and around the city; their first plan carried electrification along a route shared by the two companies as far as Woodlawn Station, in Westchester County. Though power was generated as high-voltage alternating current (AC) in the city, the locomotives utilized the same direct current that powered the New York Central's street railways: 666-volt direct current (DC) picked up by locomotives from a "third rail" mounted alongside the tracks.

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Section number 8

Cos Cob Power Station Page 8-2

Significance (continued):

Because of enormous losses in transmitting DC, the New York Central minimized transmission of DC by building substations every five miles along the track to convert the AC to DC.

At peak times during the week, the New Haven ran as many as twice the trains in and out of the city as did the New York Central; Woodlawn was not far enough out. The New Haven first planned to stretch the electrified line east to Stamford. Then, when its load projections indicated that within a few years switching at Stamford would cause huge complications and delays, the railroad realized that it should electrify all the way to New Haven, 66 miles from Woodlawn. Though it made sense in terms of traffic, this plan could not be completed economically with DC; the high operating costs due to line losses and the capital expense of building a dozen or more substations, as well as a power plant, would have crippled the railroad financially. Single-phase AC offered considerable economies in generation and transmission, would not require substations, and could be extended to electrify further trackage with relative ease. But AC had never been applied over long distances for heavy traction. In a decision of vast technological hubris, the New Haven Railroad put its trust in its engineers and the staff of its principal vendor, Westinghouse Electric, and decided to invent and then to build a long-distance AC system for the busiest rail corridor in the United States. (The New Haven carried ten percent of the rail passengers in the United States.)

Westinghouse, Church, Kerr and Co. (Westinghouse Electric's construction subsidiary) built the Power House between 1905 and 1907, and in July 1907 electrification was complete between Stamford and Woodlawn. It was such a success that the railroad soon began the planning to extend the system to New Haven. After doubling the size and generating capacity of the Power House, the railroad put the entire route under electrification in 1912. Cos Cob continued to be a site of innovation, as many new improvements first went into operation there. All the turbines and alternators were replaced by 1924, when the plant produced 100 million kilowatt-hours. The original boilers were entirely replaced in the 1930s, when the present 3-story Bigelow units were installed in the east boiler room. Until that time, Cos Cob Power Station had been an exception to the New Haven Railroad's post-World War I policy of taking money out of the company rather than reinvesting it for improved operations. But after 1937 Cos Cob no longer benefited from frequent renewal and adequate maintenance, in part because the railroad had gained the capability of converting commercial-utility power for its own needs. The 25-cycle system that had worked so well for railroads did not match the electrical industry's 60-cycle standard, and Cos Cob increasingly became a technological dinosaur -- not completely suited to modern needs, and

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Section number 8

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Significance (continued):

not worth upgrading to compete with readily available power from utility firms. It limped along through corporate mergers and bankruptcy, the disapprobation of its neighbors, and growing obsolescence until MetroNorth, the publicly owned successor to the New Haven Railroad, pulled the plug in 1986.

Technological and Structural Significance

Every detail of the electrified mainline was designed specifically for this pathbreaking project, from Cos Cob Power Station, which was the largest component, to the hardware used to hang the overhead wires. The power characteristics, particularly the 25-cycle output, were chosen specifically for application to heavy traction, and the generating equipment designed accordingly. Cos Cob Power Station (as built and modified) also had many innovative and influential features besides its contents, including the ability to store, move, and process massive amounts of coal that arrived either on rail or barge; the original Power House structural design that anticipated substantial enlargement without interruption of service; the rooftop entries for coal; and the open-air transformer gallery that both protected the equipment from rain and snow and maximized air circulation for cooling. While the basic interior layout of the Power House -- high undivided space, separate boiler room, raised gallery for switchgear -- utilized characteristics that had been established in earlier hydroelectric and coal-fired generating plants, Cos Cob applied these features on a huge scale that was unprecedented in Connecticut. It was the largest power plant in the state, and commercial utility construction in Connecticut did not approach the scale of Cos Cob until the 1920s.

In 1982 the American Society of Mechanical Engineers and the Institute of Electrical and Electronic Engineers named Cos Cob Power Station a National Historic Engineering Landmark.

Potential for Industrial Archaeology

As the country's pioneering railroad electrification facility, the Cos Cob Power Station is of unique importance as an industrial archaeological artifact. Taken together, the surviving structures, equipment, internal layout, overall site plan, and company records have enormous potential to explain the New Haven Railroad's innovative electrification experiment. The Cos Cob Power Plant is of pivotal importance for any comparative investigation of American railroad electrification systems; all subsequent operations across the country were constructed based on the innovations pioneered by the New Haven

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Cos Cob Power Station Page 8-4

Significance (continued):

Railroad. Furthermore, on-site study would document idiosyncratic, site-specific modifications required to maintain day-to-day operations and to adapt technological improvements in power generation and transmission. The oral tradition surrounding Cos Cob is, like all folklore, a rich blend of fact and tall tales. Professional archaeological examination can yield a definitive evaluation of the engineering design and functional operations of this industrial landmark.

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Section number 9

Cos Cob Power Station Page 9-1

Bibliography:

- Connecticut Board of Railroad Commissioners, Annual Report. Hartford, 1907.
- Coster, E.H., "The Cos Cob Power Plant of the New York, New Haven and Hartford Railroad," Electric Journal vol. 5 (January 1908): 5-17.
- Haelig, Arthur W., untitled compilation of data on the Cos Cob Power Station, files of National Museum of American History, Division of Mechanical and Civil Engineering, courtesy of NMAH and Robert M. Vogel.
- "Heavy Electric Traction on the New York, New Haven and Hartford Railroad," American Engineer and Railroad Journal (November 1907): 438-442.
- Rogers, W.O., "Extension of the Cos Cob Power Plant," Power, vol. 41 (March 16, 1915): 358-364.
- Roth, Matthew, Connecticut: An Inventory of Historic Engineering and Industrial Sites. Washington: Society for Industrial Archeology, 1981.
- Sanborn Map Co., Insurance Maps of Greenwich, CT, 1906, 1912, 1920, and 1939 with 1946 update.
- Vogel, Robert M., "A Brief Historical Evaluation of the Cos Cob Power Plant," 1977, typescript in files of National Museum of American History, Division of Mechanical and Civil Engineering, courtesy of NMAH and the author.
- Wadhams, Ed, "Cos Cob," New Haven Railroad Historical and Technical Association Newsletter (November 1986): 6-7.
- Westinghouse Electric and Manufacturing Co., New York, New Haven and Hartford Railroad Electrification, Special Publication Number 1698. East Pittsburgh, PA., 1924.

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Section number 10

Cos Cob Power Station Page 10-1

Geographical Data (continued):

UTM coordinates:

A: 18.618060.4542880
B: 18.618050.4542720
C: 18.617900.4542680
D: 18.617800.4542720
E: 18.617800.4542820

Verbal Boundary Description (see Figure 1):

The northern boundary of the nominated property follows the southern line of the MetroNorth Railroad right-of-way, and the nominated property's eastern limit is the Mianus River shoreline. To the south and west, the boundary follows fence lines that separate the structures and buildings of the Power Station from the electrical substation and various state and public-utility rights-of-way and property associated with a high-tension power line. The nominated property includes land held by the Town of Greenwich and the State of Connecticut Department of Transportation (see Figure 1); the legal property description is located in the Greenwich Land Records, volume 1959, page 80ff.

Boundary Justification:

The boundary was drawn to include all the historic operating components of the Cos Cob Power Station and to exclude buildings, structures and property associated solely with present-day railroad and public-utility operations. Open land to the south of the Power Station was also excluded.

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Photographs

Cos Cob Power Station, Page Photographs-1

All photographs:

1. COS COB POWER STATION
2. Greenwich, CT
3. Photo credit: HRC, Hartford, CT
4. October 1989
5. Negative filed with Connecticut Historical Commission
Hartford, CT

Captions:

North end of Power House, with c.1980 concrete shed to left, camera
facing SE
Photograph 1 of 14

South end of Power House, transformer-room addition at right, camera
facing N
Photograph 2 of 14

East side of Power House, camera facing NW
Photograph 3 of 14

West side of Power House (west end of boiler room), camera facing E
Photograph 4 of 14

Open-air transformer gallery at south end of Power House, camera
facing E
Photograph 5 of 14

Turbine alternator sets, camera facing NW
Photograph 6 of 14

East boiler room interior, with multi-story boiler in background and
feedwater heater in foreground, camera facing NE
Photograph 7 of 14

Fence enclosing signal-power motors, camera facing S
Photograph 8 of 14

Coal Crusher House, camera facing NE
Photograph 9 of 14

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Photographs

Cos Cob Power Station, Page Photographs-2

Photographs (continued):

1906 Water Tank (left) and part of 1924 Water Tank (right), camera
facing SE

Photograph 10 of 14

Dock, camera facing E

Photograph 11 of 14

Coal Conveyor viewed from roof of Power House, camera facing E

Photograph 12 of 14


Storage Building, camera facing NE

Photograph 13 of 14

Oil Tank, camera facing N

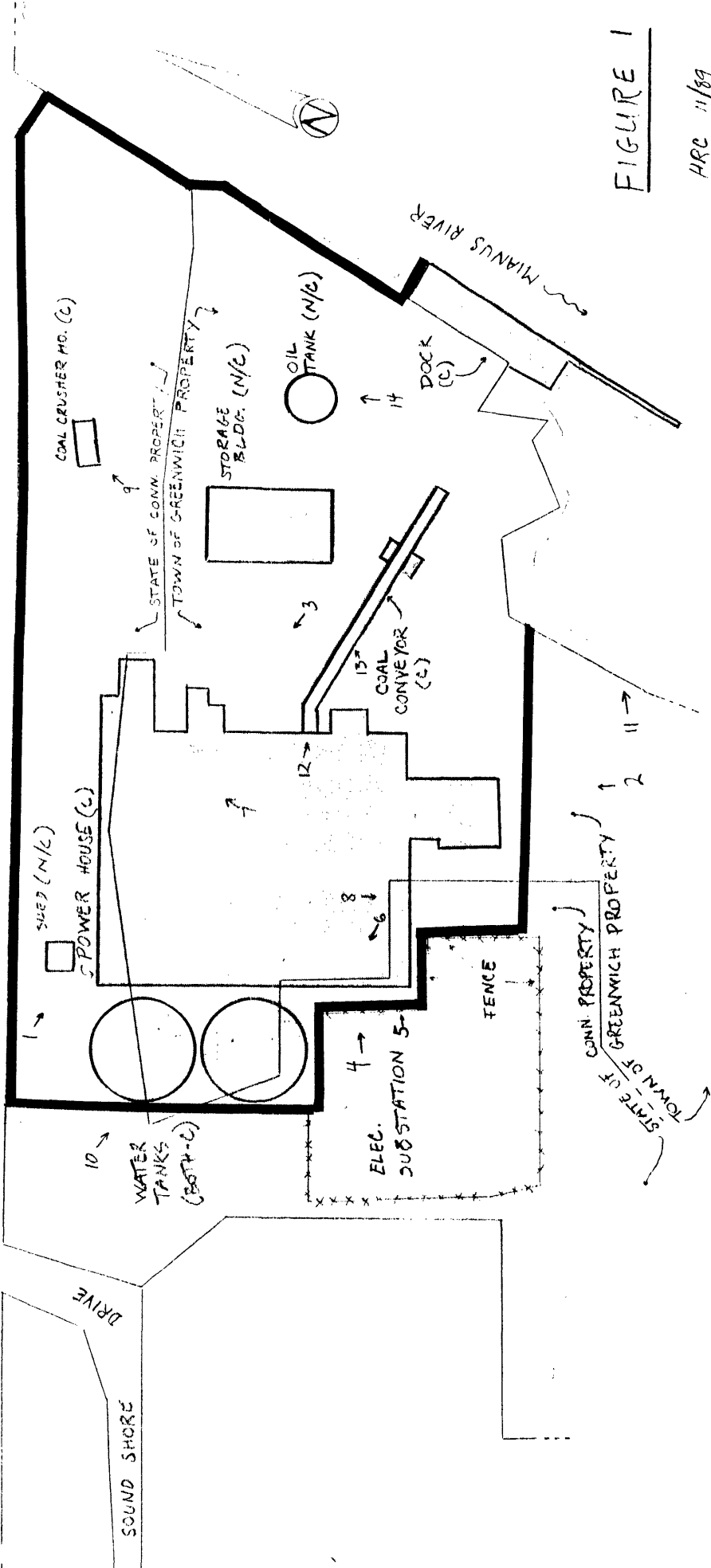
Photograph 14 of 14

COS COB POWER STATION
Greenwich, Connecticut

Buildings and structures: 
Contributing: C
Noncontributing: N/C
Photo position: 7 →



METRO NORTH R.R. R.O.W.



STATE OF CONN. PROPERTY
TOWN OF GREENWICH PROPERTY

MIANUS RIVER

DRIVE

SOUND SHORE

COS COB POWER STATION
Greenwich, Connecticut

Power House Construction Sequence

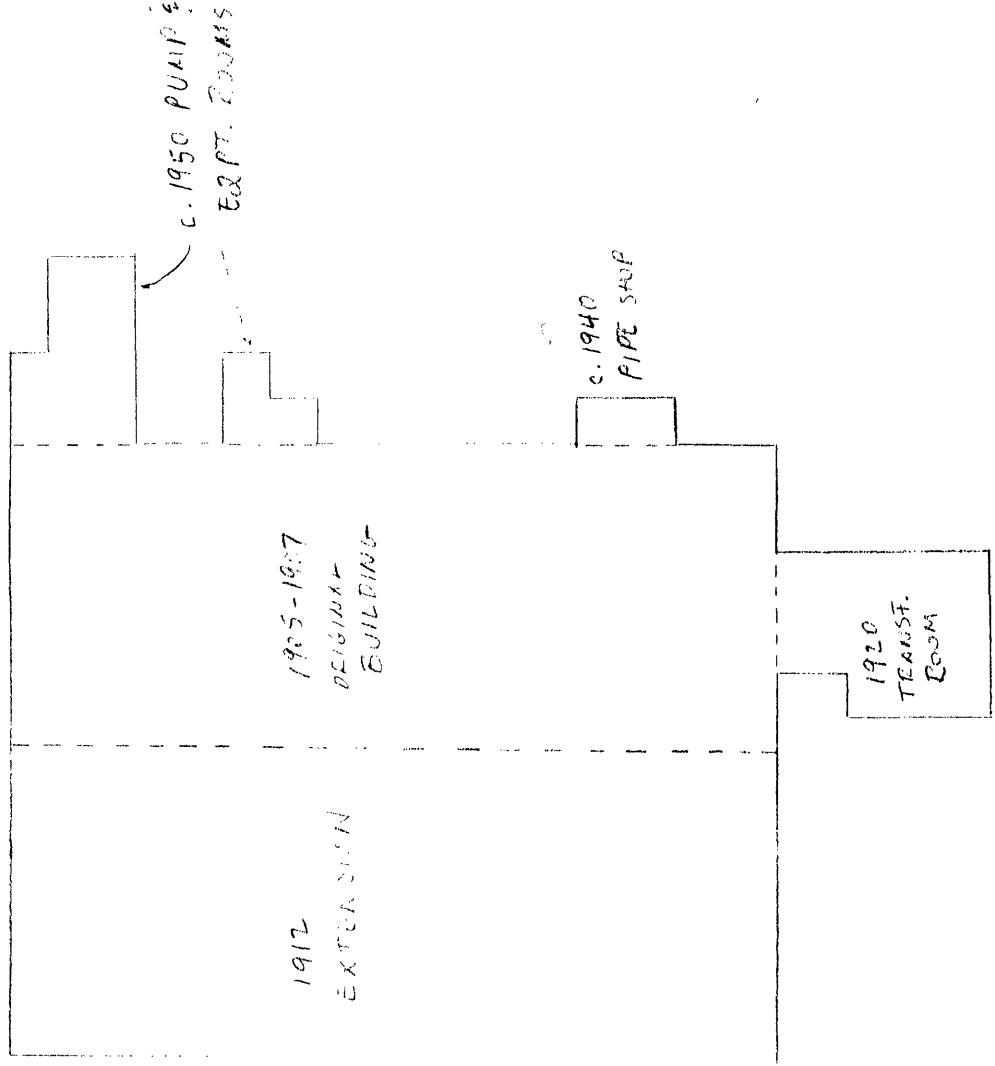
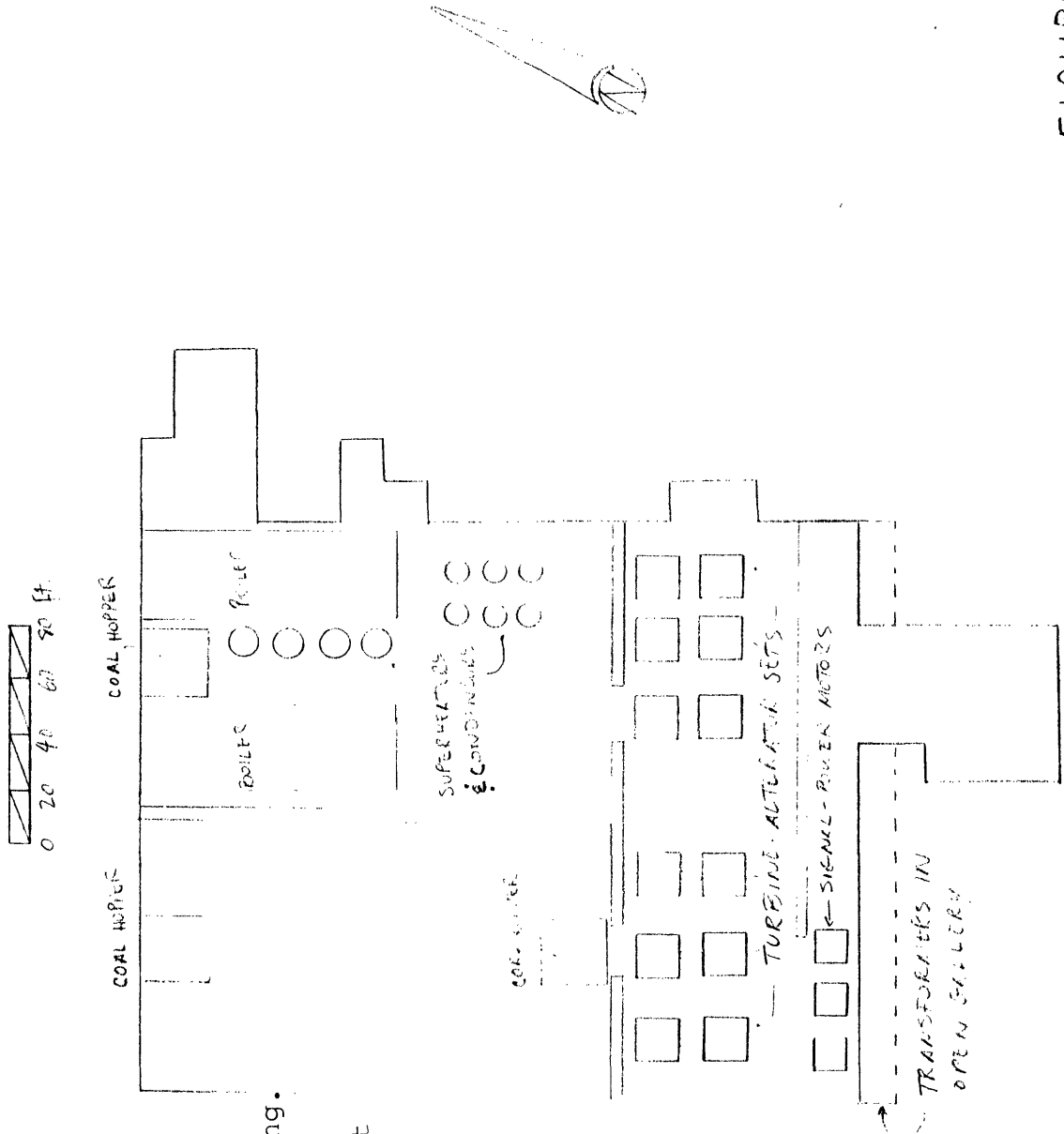


FIGURE 2

COS COB POWER STATION
Greenwich, Connecticut

Distribution of Major Equipment (1989 remnants)



Notes:

1. All coal hoppers are suspended from roof framing.
2. Boilers extend full height of building.

FIGURE 3

COS COB POWER STATION 2'30"
 Greenwich CT
 UTM References
 A: 18/618060/4542880
 B: 18/618050/4542720
 C: 18/617900/4542680
 D: 18/617820/4542720
 E: 18/617800/4542820

