

CONSTRUCTION OF SUBSTRUCTURE
MAYFAIR PUMPING STATION, CHICAGO.

BY

J. T. LUCAS

ARMOUR INSTITUTE OF TECHNOLOGY

1917

628.1

L 96

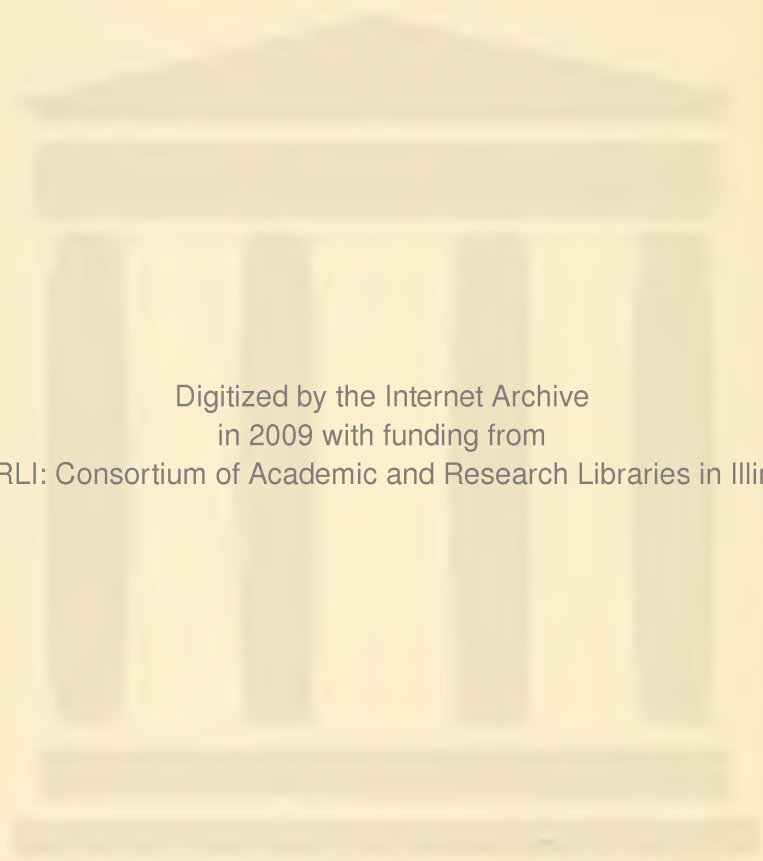


British Institute
of Technology
UNIVERSITY LIBRARIES

AT 459

Lucas, J. T.

Construction of substructure
of Mayfair pumping station,



Digitized by the Internet Archive
in 2009 with funding from
CARLI: Consortium of Academic and Research Libraries in Illinois

CONSTRUCTION OF SUBSTRUCTURE
OF MAYFAIR PUMPING STATION
CITY OF CHICAGO

A THESIS

PRESENTED BY

JOHN THOMAS LUCAS

TO THE

PRESIDENT AND FACULTY

OF

ARMOUR INSTITUTE OF TECHNOLOGY

FOR THE DEGREE OF

CIVIL ENGINEER

MAY 31, 1917

APPROVED:


Professor of Civil Engineering


Dean of Engineering Studies

ILLINOIS INSTITUTE OF TECHNOLOGY
PAUL V. GALVIN LIBRARY
35 WEST 33RD STREET
CHICAGO, IL 60616

Dean of Cultural Studies

INDEX.

GENERAL DESCRIPTION.	Page 1.
CONSTRUCTION.	
(A). EXCAVATION.	
(1). General Excavation.	Page 5.
(2). Trench "	Page 9.
(3). Caisson "	Page 13.
(4). Core "	Page 15.
(B). CONCRETE.	
(1). Coal Receiving Room.	Page 17.
(2). Mixing Plant.	Page 19.
(3). Boiler Room.	Page 21.
(4). Pump Room.	Page 23.
(5). Chimney Foundation.	Page 25.
(C). PLANT EQUIPMENT.	Page 26.
ORGANIZATION AND COSTS.	Page 29.

INDEX

• 100	• 100
• 101	• 101
• 102	• 102
• 103	• 103
• 104	• 104
• 105	• 105
• 106	• 106
• 107	• 107
• 108	• 108
• 109	• 109
• 110	• 110
• 111	• 111
• 112	• 112
• 113	• 113
• 114	• 114
• 115	• 115
• 116	• 116
• 117	• 117
• 118	• 118
• 119	• 119
• 120	• 120
• 121	• 121
• 122	• 122
• 123	• 123
• 124	• 124
• 125	• 125
• 126	• 126
• 127	• 127
• 128	• 128
• 129	• 129
• 130	• 130
• 131	• 131
• 132	• 132
• 133	• 133
• 134	• 134
• 135	• 135
• 136	• 136
• 137	• 137
• 138	• 138
• 139	• 139
• 140	• 140
• 141	• 141
• 142	• 142
• 143	• 143
• 144	• 144
• 145	• 145
• 146	• 146
• 147	• 147
• 148	• 148
• 149	• 149
• 150	• 150
• 151	• 151
• 152	• 152
• 153	• 153
• 154	• 154
• 155	• 155
• 156	• 156
• 157	• 157
• 158	• 158
• 159	• 159
• 160	• 160
• 161	• 161
• 162	• 162
• 163	• 163
• 164	• 164
• 165	• 165
• 166	• 166
• 167	• 167
• 168	• 168
• 169	• 169
• 170	• 170
• 171	• 171
• 172	• 172
• 173	• 173
• 174	• 174
• 175	• 175
• 176	• 176
• 177	• 177
• 178	• 178
• 179	• 179
• 180	• 180
• 181	• 181
• 182	• 182
• 183	• 183
• 184	• 184
• 185	• 185
• 186	• 186
• 187	• 187
• 188	• 188
• 189	• 189
• 190	• 190
• 191	• 191
• 192	• 192
• 193	• 193
• 194	• 194
• 195	• 195
• 196	• 196
• 197	• 197
• 198	• 198
• 199	• 199
• 200	• 200

The Wilson Avenue Tunnel system, the construction of which was commenced in August, 1913, extends from the intake crib in Lake Michigan about 16,250' east of the shore shaft, located at Wilson and Clarendon Avenues, to the new Mayfair Pumping Station at Wilson and N. Lamont Avenues. This station, when completed, will supply the extreme northwest part of the city of Chicago and its adjacent suburbs with water under standard pressure, and under high pressure for high level territory.

GENERAL DESCRIPTION.

The building fronts south on Wilson Avenue with a pump room 236' x 60', the floor being at elev. - 7.15' or 38.65' below street grade. At the entrance to station, in the center of south front, there is an office section one story in height, 50' x 31'. The boiler room, 239' x 54'- 3", lies north of the pump room; its basement level is at elev. + 13.92' or 17.58' below grade, and the main floor at elev. + 28.84'. A coal receiving room, 72'- 9" x 70'-

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1901. The names are given in alphabetical order of their surnames. The names of the persons who have been elected to the office of Justice of the Peace for the year 1901 are: [illegible names]

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1901. The names are given in alphabetical order of their surnames. The names of the persons who have been elected to the office of Justice of the Peace for the year 1901 are: [illegible names]

9" is located north of the boiler room with an 18' driveway between these two sections of the station.

A side track, turning south from the C.M.& St.P.Ry., carries coal cars into the receiving room over three receiving hoppers. The coal can be unloaded directly into the hoppers through bottom dump cars, or by means of a grab bucket from an overhead traveling crane; or the coal can be stored in bins on both sides of the track hoppers. Plate No. 1. shows a general layout of the station.

The coal after passing through a crusher under the hoppers is carried south on an apron conveyor to the main bucket conveyor, running east and west in the boiler room four feet north of the boiler fronts. This conveyor supplies a set of enclosed bunkers 175'-6" long, which have a capacity of 1,000 tons. Spouts feed the coal from the bottom of the bunkers, 22' above boiler room floor, to each stoker.

The boilers, fronting north, supply

steam at 175 lbs. pressure through a double header system to the seven pumping engines. They consist of a battery of 6 - 4 pass Edgemoor water tube boilers equipped with Taylor stokers, and have a rating of 500 H.P. each.

The smoke breeching is suspended from the main floor, and enters the central stack from the east and west. The stack is 184'-2" high above boiler room floor, the inside diameter being 8'0" at top and 14'-5" at base, and is supported by four 5'-0" caissons extending to solid rock at elev. - 50.00'.

The water will be pumped by seven pumping engines of a total capacity of 152.5 million gallons in 24 hours. The pumps are of the triple expansion, crank and fly wheel type with mechanically operated suction and discharge valves of Riedler design. The steam ends of both high and standard pressure pumps are alike, but the water ends of the three west pumps are smaller. The three west pumps will each deliver 17.5 million gallons per day against a 200' head,

The first thing I noticed when I stepped
 out of the car was the smell of
 fresh air and the sound of birds
 chirping. It felt like I had been
 transported to a different world.
 The landscape was beautiful, with
 rolling hills and a clear blue sky.
 I took a deep breath and smiled,
 feeling a sense of peace and
 freedom. This was exactly what I
 needed. I had been so stressed
 at work, but here, in this quiet
 spot, everything felt right. I
 walked slowly, enjoying every
 moment. The sun was shining
 brightly, and the grass felt soft
 under my feet. I had found my
 escape.

and the four east pumps will each deliver 25 million gallons per day against a 140' head.

Each pump has two suction nozzles extending south and then down into a common suction tunnel, the flowline of which is 20'- 10" beneath pump room floor. All the water entering the pumps passes around the tubes of a surface condenser, and is discharged through four pipes from each pump into the station mains.

There are two discharge mains for the 140' head, one north and one south of the pumps at elev. + 4.00', extending the full length of the station and leaving at the west. They are supported by a series of piers adjacent to the north and south walls of pump room. The two high pressure lines start at about the center of the building, and are supported by saddles on the pipe, leaving also at the west.

Immediately west of the station are two pipe vaults in which the pipes rise to street grade, and change direction to conform with general layout of the water pipe system in street.

...the first of these ...
...the second of these ...
...the third of these ...
...the fourth of these ...
...the fifth of these ...
...the sixth of these ...
...the seventh of these ...
...the eighth of these ...
...the ninth of these ...
...the tenth of these ...
...the eleventh of these ...
...the twelfth of these ...
...the thirteenth of these ...
...the fourteenth of these ...
...the fifteenth of these ...
...the sixteenth of these ...
...the seventeenth of these ...
...the eighteenth of these ...
...the nineteenth of these ...
...the twentieth of these ...

Plate No. 2. indicates the general arrangement of station.

CONSTRUCTION.

Construction work on foundations was commenced on September 16, 1915.

(A). EXCAVATION.

As a preliminary step on the arrival of forces on the ground in April, 1914, at which date work on the Mayfair shaft of the Wilson Avenue tunnel was started, a network of farm tile was laid over the entire area of the proposed station, and connected with the sewer of adjoining territory. This served to remove all surface water, and when ground was broken in the following year the upper strata was comparatively free from moisture.

(1). GENERAL EXCAVATION.

The general excavation consisted in removing the upper nineteen feet of earth from the building site by the open cut method. Starting at east end of pump room with a 3/4 yard Cs-good steam shovel, a strip 30 feet in width was

THE UNIVERSITY OF CHICAGO
LIBRARY

PHYSICS DEPARTMENT
5712 S. UNIVERSITY AVE.

CHICAGO, ILL. 60637
TEL. 773-936-3700

PHYSICS 309
PHYSICS 310
PHYSICS 311

PHYSICS 312
PHYSICS 313
PHYSICS 314

PHYSICS 315
PHYSICS 316
PHYSICS 317

PHYSICS 318
PHYSICS 319
PHYSICS 320

PHYSICS 321
PHYSICS 322
PHYSICS 323

PHYSICS 324
PHYSICS 325
PHYSICS 326

PHYSICS 327
PHYSICS 328
PHYSICS 329

opened. The shovel moved westward on a downward slope for a distance of 100 feet, until it reached bottom of pit at elev. + 12.75', the level of sub-soil for boiler room basement floor. This incline was covered with a single layer of 2" planking to afford easy passage for the dump wagons and teams passing over it to receive the excavated material. The shovel itself was provided with four timber floats, each about 8'- 0" long, 4'- 0" wide, and 3" in thickness. These floats were constructed of 3" x 10" pieces of oak bound together and the edges and sides reinforced with angle irons and steel plates. As the shovel traveled forward, its path was laid in advance, the rear float being swung to the front by fastening the attached chains of float to dipper stick of shovel. The dump wagons, of two yard capacity each, moving down runway into pit, were loaded with spoil and hauled to surface, assisted by an auxiliary snatch team of three horses. In like manner the coal receiving room and entire east half of boiler room, and pump room were stripped of the top

Faint, illegible text, possibly bleed-through from the reverse side of the page.

layers of soil.

At this stage a more permanent runway in the form of a timber trestle was constructed at the east end of boiler room, and the earth incline removed. The runway was about 25 feet in width, to provide clear passage for two wagons. On the south side a narrow guage track was laid. At the top in center of track was inserted a 24" pulley, over which was run a 3/4" wire cable to electric hoist on surface. Attached to the other end of cable was a small four wheeled truck operating on track, and serving to boost loaded wagons up the incline. The truck replaced the snatch team previously used for the work.

In laying out work for excavation, an additional strip of ten feet outside actual lines of building footings was included to act as berm, and prevent the loose ground from sloughing off, and falling into wall trenches alongside. The banks were not braced except in a few instances, in which shoring was provided to hold up tempor-

THE UNIVERSITY OF CHICAGO

PH.D. THESIS

BY

[Name]

SUBMITTED TO THE FACULTY OF THE DIVISION OF THE PHYSICAL SCIENCES
IN CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
DEPARTMENT OF CHEMISTRY

CHICAGO, ILLINOIS
[Year]

ary buildings on top at edge of pit. Care was taken throughout to keep the bottom of pit at same elevation, to insure against water accumulating in pockets. To remove drainage, steam lines were used to bring water to a central steam driven pump, which raised it to the level of surface lines leading to surrounding sewer.

A periodical progress record was kept of work accomplished by steam shovel, as is shown by Plate No. 3. The contract for disposing of spoil was assigned on the basis of loose yardage, measured in wagons. As a means of check, the percentage of swell was computed semi-monthly by measuring the yardage in place excavated and proportioning it to the corresponding loose yardage.

The accompanying photograph No. 1. shows the work in its preliminary stages. In the foreground to the right may be seen the trestle leading from headhouse over shaft and rock removed from the tunnel drift. Some difficulty was encountered in excavating coal receiving room

THE HISTORY OF THE UNITED STATES OF AMERICA
FROM 1763 TO 1876
BY CHARLES A. BEAUPRE
VOLUME I
CHAPTER I
THE EARLY YEARS OF THE COLONIES
The first English colony in North America was founded in 1607 at Jamestown, Virginia. It was a difficult and dangerous venture, but it marked the beginning of permanent European settlement in the New World. The colonists faced many hardships, including lack of food, disease, and conflict with the Native Americans. Despite these challenges, the colony survived and grew, laying the foundation for the future United States.

THE HISTORY OF THE UNITED STATES OF AMERICA
FROM 1763 TO 1876
BY CHARLES A. BEAUPRE
VOLUME I
CHAPTER II
THE GROWTH OF THE COLONIES
In the 17th century, the colonies experienced rapid growth and development. The population increased significantly, and the economy diversified beyond agriculture. The colonies began to assert their independence from British control, leading to the American Revolution. The war resulted in the colonies gaining independence and forming a new nation.

THE HISTORY OF THE UNITED STATES OF AMERICA
FROM 1763 TO 1876
BY CHARLES A. BEAUPRE
VOLUME I
CHAPTER III
THE AMERICAN REVOLUTION
The American Revolution was a pivotal event in the history of the United States. It was a struggle for independence from British rule, fought between 1775 and 1783. The revolution was led by a group of patriots who believed in the rights of the colonists to self-governance. The war ended with the signing of the Treaty of Paris in 1783, which recognized the United States as an independent nation.

THE HISTORY OF THE UNITED STATES OF AMERICA
FROM 1763 TO 1876
BY CHARLES A. BEAUPRE
VOLUME I
CHAPTER IV
THE EARLY YEARS OF THE NEW NATION
The early years of the United States were marked by challenges and uncertainty. The new nation was a fragile union of thirteen states, and it faced many difficulties, including economic problems and political disagreements. Despite these challenges, the United States emerged as a powerful and independent nation, setting the course for its future development.

and northwest section of boiler room due to proximity of rock pile, and extreme precautions were taken to secure ground showing any signs of cracking.

This completed the first step by the open cut method of excavation from elev.+ 31.5' to elev.+ 12.75', a depth of 18'- 9".

(2). TRENCH EXCAVATION.

Immediately after the general excavation had been finished by open cut, work was started on the trench excavation for the wall footings of building, beginning in the coal receiving room and following in the wake of the shovel. In the coal receiving room the depth of footings below grade of pit was 7'- 9". These trenches were opened by hand digging and the sides lined with 3" lagging, held in place by 6" x 6" waling pieces and 6" x 6" struts. The soil encountered was very firm and free from moisture, and in no instance was it necessary to drive any lagging in advance.

In the boiler room the footing trenches

Received of the [illegible] the sum of [illegible] Dollars for [illegible]

[illegible] on the [illegible] day of [illegible] 19[illegible]

[illegible]

[illegible]

[illegible]

were 3'- 9" below pit level, necessitating only the ordinary precautions taken in shoring shallow trenches.

The excavated soil was disposed of as in the open cut method by shoveling on dump wagons, and boosting them up incline with truck.

In trench excavation for pump room a problem of more intricate nature presented itself. The pump room, as previously described, embraces an interior area of 236' x 60', and is bounded by four reinforced concrete walls of the counterfort type. The south, east and west walls have a footing penetration to elev.- 13.00' or 25'- 9" below grade of pit, and in each case the footings are 25' in width. The north wall has a footing penetration to elev.- 10.15' or 23'- 2" below grade of pit, and a footing width of 15'- 0".

In the south, east and west wall trenches the first five foot cut was made by steam shovel, with exception of outer six feet, which was left as a factor of safety against the banks

The following information is being furnished to you for your information and guidance. It is based on the information available to the Bureau at this time.

The information was obtained from the files of the Bureau and is being furnished to you for your information and guidance. It is based on the information available to the Bureau at this time.

The information was obtained from the files of the Bureau and is being furnished to you for your information and guidance. It is based on the information available to the Bureau at this time.

caving in on shovel. In the north wall trench it was found impossible to operate the shovel due to the narrowness of trench, and all material was removed by hand digging.

As practically the same methods were employed in excavating all four trenches in pump room, an explanation of the procedure adopted in digging south wall trench will suffice. Actual hand digging was not begun until after severe cold weather had set in, and to prevent the frost from penetrating into exposed ground, as well as to facilitate construction, three eight hour shifts were organized to carry on the work.

The steam shovel being of service no longer for excavating, its dipper stick was replaced by a 30 foot boom, enabling it to be operated as a derrick. A steel swinging derrick was also placed in east end of pump room, the shovel taking care of west end of building. Beginning at grade of pit, the outer six feet of earth in trench was removed by hand, and loaded into skips of 2 yard capacity each. These skips

were constructed of 3" oak and mounted with chains, which could be fastened to boom of derrick. On being loaded with spoil they were lifted out of trench and elevated to a dumping hopper in pit, under which the wagons passed to receive the disposal. As soon as a section had been excavated to a depth of six feet, the sides were caught with 3" lagging secured with 8" x 10" wales and 8" x 8" struts. The digging was carried on until an additional six foot section was removed, and a similar six foot set of lagging placed. In this manner the excavation progressed in six foot drops, until trench bottom at elev. - 13.00' was reached. Throughout the digging it was found unnecessary to drive any lagging, the ground being of a firm texture and free from quick-sand and excessive moisture. To remove any water accumulating from underground sources or rainfall, steam siphons were extended into trenches, and connected with a steam driven pump on top. This kept the ground in trenches dry and enabled the digging to be prosecuted without interruption. Plate No. 4.

1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

shows the typical bracing used in south wall trench.

(3). CAISSON EXCAVATION.

Referring to Plate No. 5, showing general plan and section of south wall of pump room, it will be seen that the counterforts are centered upon caissons. These caissons, which are of the open well type, extend down past suction tunnel and rest upon hard pan. The method employed in excavating wells consists as follows. A tripod and windlass arrangement was placed over each opening at elev.- 13.00', the level of bottom of wall trench. The core was removed by hand digging in five foot sections, the sides of caisson being well secured by five foot sets of 3" maple lagging held in place by steel rings 2'- 6" apart. In a few instances wet ground and soil resembling quick-sand were encountered, making it necessary to use shorter sets of lagging and also to thoroughly pack the voids behind lagging with hay. The excavated material was raised in buckets to level of trench bottom by hand and emptied into

THE UNIVERSITY OF CHICAGO

LIBRARY

1100 EAST 58TH STREET

CHICAGO, ILL. 60637

TEL: 773-936-3200

WWW.CHICAGO.EDU

© 2010 THE UNIVERSITY OF CHICAGO

skips, which were in turn elevated to surface by derrick and the contents dumped into receiving hopper. From this receptacle the spoil was loaded into wagons and boosted up incline to street grade. The digging for caissons was carried on in three shifts, three men working in each shaft. A daily progress of the work was kept in graphical form, indicating the nature of the ground encountered and other general information necessary in computing costs for excavation. A specimen of these charts is illustrated in Plate No. 6.

A somewhat different method was employed in excavating caissons under chimney in boiler room. The foundations for stack consist of a 19'- 0" square slab of reinforced concrete 6'- 0" in thickness, resting upon four caissons of 5'- 0" diameter penetrating to solid rock at elev.- 50.00'. The digging was started at level of pit elev.+ 12.75' and was prosecuted in five foot sections as in south wall caissons in pump room. An electric hoist was installed about 25'

east of wells and connected by cable with spools over caisson openings. In this manner it was possible to work two diagonally opposite wells at the same time, the spoil buckets being raised to surface of pit by electric power instead of by hand. Plate No. 7. shows diagram of stack caissons and also soil borings taken in vicinity of work.

(4). CORE EXCAVATION.

After four walls in pump room had been constructed, there remained a core of earth 218' long, 46' wide and 25'- 9" deep approximating 9200 cu. yards in volume. At this stage the steel swinging derrick and 90 H.P. electric hoist were raised to surface and installed at south east corner of pump room, the mast of derrick resting on top of wall at elev. + 33.00'. The steam shovel was stripped of its boom and the dipper stick put back in place. A double track system of narrow gauge connected by a switching device was laid on surface of core at elev.+ 12.75', and several flat-bottomed wooden dump cars of two yard capacity each brought into service. As

Faint, illegible text at the top of the page, possibly a header or introductory paragraph.

Main body of faint, illegible text, appearing to be several lines of a letter or document.

the shovel cut into the ground it unloaded the excavated material into cars on track alongside. The loaded cars were switched to opposite track and pushed by hand to east end of pump room, at which point the chains of car were caught by hook on fall lines of derrick and elevated to surface. On top alongside east and south walls was laid a timber platform on trestle bents to carry a track of similar guage to that in pit. Over this track was run the loaded cars and the spoil dumped through openings in platform as backfill behind walls. Proceeding in this manner the core was excavated in 12' drops until level of bottom of south wall footing was reached at elev.- 15.00'. In order not to undermine north wall footing, the bottom of which is at elev. - 10.15', a bank of ground ten feet in width was left alongside, the surface being at same elev.- 7.15' as top of footing. Between this bank and edge of south wall footing a series of struts, each consisting of twelve 10" x 10" timbers bound together, was laid at intervals of 31'- 0" coming

between proposed adjacent engine beds. The purpose of these struts was to counteract any sliding motion on the part of either south or north walls. They were left in place until engine beds had been concreted as well as pump room floor section between north ends of pump foundations and north wall footing. Plate No. 8. shows analysis of procedure in core excavation. This practically completed all excavation for foundations of station.

(B). CONCRETE.-- (1). COAL RECEIVING ROOM.

On the completion of trench excavation in coal receiving room work was immediately started on the foundations. A temporary concreting plant was installed about 100 feet directly north of coal room site, being supplied with material from cars switched from C.M.& St.P. line and delivered on track alongside. The mixer consisted of a chain belt machine of 3/4 yard capacity operated by steam engine. The sand, gravel and cement were wheeled from material piles in barrows up incline and deposited in mixing drum. The con-

The first part of the paper deals with the general theory of the problem. It is shown that the problem can be reduced to a system of linear equations. The second part of the paper is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The third part of the paper is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution approaches a certain limit as $t \rightarrow \infty$. The fourth part of the paper is devoted to the study of the numerical solution of the problem. It is shown that the numerical solution is stable and convergent.

The fifth part of the paper is devoted to the study of the physical interpretation of the results. It is shown that the results are in good agreement with the experimental data. The sixth part of the paper is devoted to the study of the applications of the results. It is shown that the results can be used in a wide variety of applications. The seventh part of the paper is devoted to the study of the conclusions. It is shown that the results are very important and should be taken into account in future work.

crete was received from mixer in buggies and wheeled to edge of foundation pit. A series of chutes placed around pit received the concrete and conducted it to place in foundations. The structure was completed in three separate pours, a 1:2:4 mixture being used throughout. The footing constituted the first step, the trench lagging taking the place of formwork. The second and third pours consisted of the surrounding walls and cross girders. Construction keys were provided in footings and walls after first and second pours, and extreme care was taken to secure a good bond of new concrete by thoroughly sweeping and washing the surface of old concrete and covering it with a layer of grout of 1:2 proportions. In view of the fact that this work was being done during the month of December, precautions were taken against the concrete freezing by covering the forms with canvas after pour had been made and placing salamanders alongside so as to keep the frost out until set had taken place. As an additional measure of safety the

The following is a list of the names of the persons who have been appointed to the various positions in the office of the Secretary of the State of New York, for the term ending on the 31st day of December, 1892.

SECRETARY OF STATE - JOHN W. ALBANY

CLERK OF THE SENATE - JAMES W. ALBANY

CLERK OF THE ASSEMBLY - JAMES W. ALBANY

CLERK OF THE SUPREME COURT - JAMES W. ALBANY

CLERK OF THE COURTS - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE LAND OFFICE - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF AGRICULTURE - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF EDUCATION - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF HEALTH - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF LABOR - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF MINES - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF PUBLIC WORKS - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF SOCIAL WELFARE - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE ENVIRONMENT - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE OCEANIC AND NAVIGATION - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE TARIFF - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE TREASURY - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE WAR - JAMES W. ALBANY

CLERK OF THE COMMISSIONERS OF THE DEPARTMENT OF THE YACHTING - JAMES W. ALBANY

sand and gravel were heated by means of steam lines before being placed in mixer. Plates No. 9. & 10. show sections of formwork and details of walls and girders in coal receiving room.

(2). MIXING PLANT.

A more permanent mixing plant was constructed at this stage to control entire building. The coal receiving room, being divided by cross girders into three separate compartments, offered an excellent location for central plant. The two north sections were separated by a dividing wall of 6" x 6" timbers, and served as storage bins for sand and gravel. The south section was cut off from storage bins by a similar shield of 6" x 6" timbers and subdivided into two hoppers, the bottoms of which were built on an incline of 3" x 8" planks. These hoppers for sand and gravel respectively were fed from storage bins by means of a grab bucket on Browning locomotive traveling crane, operating on material track alongside coal room. The coal bins, each of a storage capacity of 400 cu. yds., were supplied

THE

PROCEEDINGS

OF THE

ANNUAL MEETING

OF THE

AMERICAN MEDICAL ASSOCIATION

HELD AT

CHICAGO, ILL.,

MAY 15-18, 1910.

PUBLISHED BY THE ASSOCIATION.

CHICAGO, ILL., 1910.

from material cars switched from main line of C.M.& St.P.Ry. and unloaded by crane. On the west side of bins was situated a cement shed of a storage capacity of 9000bbls. of cement.

Beneath roadway slab and in direct connection with sand and gravel hoppers was located the mixing plant, which consisted of the same equipment as previously used in construction of coal room foundations. The mixer engine however, was operated by steam supplied by 90 H.P. scotch marine boiler on top alongside cement house. A detailed layout of this concreting plant is shown in Plate No.14. The hopper bucket which received sand and gravel through hopper openings regulated by slides, had been previously gauged for a 1:2:4 mixture of concrete, and the marks representing the proper volumes visibly placed on sides. By referring to these indentations the operator was able to regulate the flow of material for each batch. The corresponding amount of cement was set aside in cement house and delivered to bucket below through small grav-

1. *Wendell Phillips*
 2. *Wendell Phillips*
 3. *Wendell Phillips*
 4. *Wendell Phillips*
 5. *Wendell Phillips*
 6. *Wendell Phillips*
 7. *Wendell Phillips*
 8. *Wendell Phillips*
 9. *Wendell Phillips*
 10. *Wendell Phillips*
 11. *Wendell Phillips*
 12. *Wendell Phillips*
 13. *Wendell Phillips*
 14. *Wendell Phillips*
 15. *Wendell Phillips*
 16. *Wendell Phillips*
 17. *Wendell Phillips*
 18. *Wendell Phillips*
 19. *Wendell Phillips*
 20. *Wendell Phillips*
 21. *Wendell Phillips*
 22. *Wendell Phillips*
 23. *Wendell Phillips*
 24. *Wendell Phillips*
 25. *Wendell Phillips*

ity chute, on receiving signal from operator. The material, being properly proportioned, was released from bucket through opening in bottom and dumped into mixing drum. The water for each batch was received from water barrel connected with supply pipe, the proper quantity being determined by gauge glass on side of barrel.

The central concreting tower was located in center of roadway slab, the concrete bucket moving through slab opening in 4" x 4" guides fastened to sides of tower. This bucket was fed from mixing drum by means of an apron on mixer and hoisted to top of tower, 50 feet above roadway slab, by electric hoist situated alongside cement house. Two additional towers of a proportional decrease in height were placed, one in boiler room and one in pump room, supporting Ransome concrete chutes. The location of these towers could be changed so as to control any part of structure.

(3). BOILER ROOM.

The boiler room walls were constructed

The first of these is the fact that the
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...
... of the ... of the ... of the ...

in two pours, the footings forming the first step and the neatwork section of walls the second. In concreting the footing the trench lagging served as formwork, a construction key being provided to properly bond the wall sections to footings. Moreover the concrete was carefully scrubbed and covered with a 1:2 mixture of grout after forms for walls had been erected, and shortly before second pour was made. For details of walls and formwork in boiler room see Plate No. 11.

The north wall of boiler room was concreted before central concreting plant had been installed, and the same methods were employed in pouring as in constructing coal receiving room foundations. The east and west exterior and interior walls of boiler room were concreted by means of the main plant then under operation. Throughout a 1:2:4 mix was used for walls and footings of this part of station. As the work was being carried on in cold weather the same precautions were taken against the concrete freez-

ing as employed in pouring coal room walls.

(4). PUMP ROOM.

Immediately after the bottom of caissons under south wall of pump room had been belled out, the lower sections, the sides of which were unprotected by lagging, were concreted so as to secure the ground. The upper sections were poured at a later date when several wells were ready, together with a four inch layer over the entire bottom of wall trench to serve as a bed for footing reinforcement. This facilitated the laying of the heavy steel bars specified, and kept the reinforcing comparatively free from contact with any foreign matter, such as mud and slime which otherwise might have accumulated in trench bottoms due to the thawing of the frozen ground together with the spring rains. In order to guard against a horizontal joint in footing in plane of reinforcing this four inch bed was thoroughly cleaned and covered with a layer of grout before next pour was started. This precaution was taken in all cases where it was neces-

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILL.

1910

THE UNIVERSITY OF CHICAGO PRESS

sary for horizontal joints in structure. In view of the fact that the wall section between counterforts was designed as a continuous slab, all vertical construction joints were made at the quarter point in span, this being theoretically the point of zero bending moment. By a judicious handling of the trench shoring, as illustrated in Plate No. 13., it was possible to bring pump room wall sections to top, a distance of 40 feet, without leaving any holes in structure for bracing.

This method, although involving some additional expense due to reshoring against walls, justified itself by the results obtained. No serious leaks were encountered in all four walls of pump room, practically a water-proof structure being secured which was the chief object sought after in its construction. The formwork for these walls was of a similar nature to that employed in coal receiving room and boiler room walls, sections of which are shown in Plate Nos. 10 & 11. This work was done during the early

spring and part of the summer following. The proportions of 1:2:4 were adhered to in pouring caissons, footings and walls throughout this part of structure. Plate No. 12, shows a section of south wall of pump room. The same methods were followed in constructing north, east and west walls as previously explained.

This completed the concreting in engine room until core of earth from elev.+ 12.75, to elev.- 13.00' was removed. Work was then resumed on the engine beds, each of the seven being concreted in one pour, a 1:2:4 mix being used. The pump room floor, condenser piers, pipe piers and other foundations of smaller volume were taken in order until concrete work in this section of building was entirely finished.

(5). CHIMNEY FOUNDATION.

As soon as stack caisson excavation had been completed for two diagonally opposite wells, the lower sections were concreted, and work started on other two wells. The lower sections of these were poured together with upper

...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...

...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...

... ..

...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...
...the ... of the ...

sections of first pair of caissons. The slab, resting on caissons was constructed in one pour, a 1:2:4 mix being used throughout.

(C). PLANT EQUIPMENT.

In so far as possible in the course of work on the pumping station, the policy adopted was to employ machinery in the handling of all materials, and to carry out the actual construction on building.

A Browning locomotive crane of 15 ton capacity served to handle all material cars received from C.M.& St.P.Ry. alongside building site. By means of a grab bucket all sand and gravel were unloaded from cars into storage bins in coal room foundations, and the material hoppers supplied from storage bins in same fashion. The grab bucket could be replaced by a hook and chain, and thus enable the crane to act as a derrick in lifting or moving heavy objects such as structural steel, stone, granite and other miscellaneous material. A second track was installed at a later date alongside east walls of

Faint, illegible text, possibly bleed-through from the reverse side of the page. The text is mirrored and difficult to decipher.

boiler and pump rooms, which made it possible for crane to operate in that vicinity and thus control these sections of the station. As a typical instance of the adaptability of this machine, the following case is cited.

After excavation had been completed in pump room, the steel swinging derrick was dismantled and elevated to surface by crane, at which level it was then installed. The steam shovel was raised in like manner from pit, a lift of approximately 12 tons being made through a vertical distance of nearly 50 feet. During superstructure construction the crane was used in erection as well as handling materials.

The uses of the steel swinging derrick have been mentioned in previous description of methods of excavation. On being no longer of service in pump room pit, it was elevated to surface and there employed in conjunction with the locomotive crane.

The Osgood steam shovel was used principally in straight open cut excavation, although

and it is the duty of the
State to provide for the
education of all its
citizens.

It is the duty of the
State to provide for the
education of all its
citizens. It is the duty
of the State to provide
for the education of all
its citizens. It is the
duty of the State to
provide for the education
of all its citizens.

It is the duty of the
State to provide for the
education of all its
citizens. It is the duty
of the State to provide
for the education of all
its citizens. It is the
duty of the State to
provide for the education
of all its citizens.

it was also employed in the role of a derrick in pump room excavation the dipper stick being replaced by boom. After foundation excavation had been completed its period of service was ended, and it was raised to street grade from pump room pit and moved to another construction site.

Electric hoists of various ratings were used to carry on construction work. A 90 H.P. machine was used continuously in conjunction with swinging derrick. Hoists of smaller capacity were employed in excavating chimney wells, and boosting dump wagons up runway from pit, as described in article on open cut excavation.

The steam supply for building was obtained from 90H.P. scotch marine boiler, installed directly west of coal room site. The concrete mixer engine received its steam supply from this boiler as well as the drainage pumps in boiler and pump rooms. Pipe lines were connected to the main supply in thawing out frozen

... ..
... ..
... ..
... ..
... ..
... ..

... ..
... ..
... ..
... ..
... ..
... ..
... ..

... ..
... ..
... ..
... ..
... ..
... ..

sand and gravel and also to heat concreting materials in cold weather.

Directly north of coal room and east of rock pile was located a plot of ground which served for storage of materials, such as reinforcing steel, lumber for bracing and formwork, structural steel, brick, stone and other building products. Photograph No.1. shows view of material yard.

ORGANIZATION AND COSTS.

Construction work on the substructure of the Mayfair Pumping Station was prosecuted on the day labor plan. All building material was ordered either directly from job site in small assortments, or let out by contract in large lots through main office. Labor, skilled and common, was obtained through civil service commission, the men being certified to their places of work when requisition was made from job by engineer in charge. The wage rates were in accordance with the union scale and the working hours from 8:00 A.M. to 4:30 P.M.

... ..

... ..

... ..

... ..

... ..

... ..

... ..

The following system was adopted in recording all charges and costs of work.

Each name on the payroll was represented by a numbered brass check. On reporting for work the men received their checks at the timekeeper's office, and on leaving returned the checks to same office. No man was permitted to work without a check. A man failing to return his check at the close of the day's work was given time up to the last hour he was noted in field by timekeeper.

A daily list, called a check sheet, was made, showing numbers of checks which had been called for at the beginning of the day's work. On the first trip around job in morning these numbers were located and checked off by timekeeper on this sheet. A similar trip was made in the afternoon and the same procedure followed. The hours and rates of each employe were entered on sheet opposite corresponding number, and turned in to payroll clerk about 8:00 A.M. the following day.

The following is a list of the names of the

persons who have been named in the

report of the committee on the

subject of the proposed

amendment to the

constitution of the

state of New York.

The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

report are as follows:

1. The names of the persons named in the

The distribution of time was also made by field timekeeper, who was constantly on the outside and in contact with work. The time of each man was charged against the proper class and location of work on a field distribution sheet. These charges were classified by symbols in accordance with schedule as submitted on Plates No. 15, 16 and 17. All special occurrences as to the beginning and completion of work, etc. were recorded, the sheet practically constituting a field diary. This sheet was delivered to payroll clerk with check sheet.

The office distribution consisted in bringing together all charges of same symbol, from which the daily force account was made. This sheet contained all charges properly classified as well as unit costs of work and other information bearing on the job. A copy of each daily force account was sent to main division office together with a cost sheet at the end of each period, of approximately two weeks in length, which consisted of a general summary of all money

The following is a list of the names of the persons who have been appointed to the various offices of the State of New York, for the year 1880.

GOVERNOR: ALBION K. BURNETT

COMMISSIONERS OF THE LAND OFFICE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF AGRICULTURE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF EDUCATION: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE INTERIOR: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE TREASURY: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE MILITARY AND NAVAL AFFAIRS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE COMMONS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE SENATE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE JUDICIARY: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC WORKS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC HEALTH: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC SCHOOLS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC LANDS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC UTILITIES: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC INFRASTRUCTURE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC TRANSPORTATION: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC SAFETY: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC DEFENSE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC ORDER: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC MORALS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC WELFARE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC PROGRESS: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

COMMISSIONERS OF THE DEPARTMENT OF THE PUBLIC FUTURE: JOHN W. WOODRUFF, JOHN W. WOODRUFF, JOHN W. WOODRUFF

expended for labor and material for the foregoing period.

The personnel of overhead organization was as follows:

Engineer in charge.

General foreman.

Junior engineer.

Rodman - instrumentman.

Rodman - draftsman.

Field time clerk.

Cost clerk.

Material clerk.

Payroll clerk.

Messenger.

The work was carried on under the supervision of Mr. Henry W. Clausen, Engineer of Water Works Construction. Mr. F.C. Martini is the engineer in local charge of construction, and the writer is first assistant to engineer in charge.

— the first and foremost principle of the movement
is the complete independence of the individual

— the second principle is the complete independence of the individual
from the state

— the third principle is the complete independence of the individual
from the church

— the fourth principle is the complete independence of the individual
from the family

— the fifth principle is the complete independence of the individual
from the nation

— the sixth principle is the complete independence of the individual
from the world

— the seventh principle is the complete independence of the individual
from the future

— the eighth principle is the complete independence of the individual
from the past

— the ninth principle is the complete independence of the individual
from the present

— the tenth principle is the complete independence of the individual
from the universe

The following unit costs of work are submitted.

EXCAVATION. (Steam Shovel.)

General Excavation and Engine Room Core.

39,750 cu. yds. @ \$.35 per cu. yd.

EXCAVATION. (Hand Digging.)

South, West and East Wall Trenches of Eng. Room.

9,000 cu. yds. @ \$1.70 per cu. yd.

North Wall Trench of Eng. Room.

2,882 cu. yds. @ \$1.50 per cu. yd.

Caissons under South Wall of Engine Room.

777 cu. yds. @ \$4.29 per cu. yd.

Caissons under Chimney of Boiler Room.

230 cu. yds. @ \$4.20 per cu. yd.

BRACING & LAGGING.

South, West and East Wall Trenches of Eng. Room.

9,000 cu. yds. @ \$1.22 per cu. yd.

North Wall Trench of Eng. Room.

2,882 cu. yds. @ \$1.21 per cu. yd.

Caissons under South Wall of Eng. Room.

777 cu. yds. @ \$1.99 per cu. yd.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity and transparency of the financial system.

Furthermore, it highlights the need for regular audits and reviews to identify any discrepancies or irregularities. This process should be conducted in a systematic and unbiased manner.

The document also outlines the responsibilities of various stakeholders, including management, employees, and external auditors. Each party has a role to play in ensuring that the financial reporting process is robust and reliable.

In addition, it provides guidance on how to handle complex or unusual transactions. It stresses the importance of clear communication and documentation in such cases to avoid any potential misunderstandings.

Finally, the document concludes by reiterating the commitment to high standards of financial reporting and the continuous improvement of internal controls. It expresses confidence in the ability of the organization to meet these challenges effectively.

BRACING & LAGGING.

Caissons under Chimney of Boiler Room.

230 cu. yds. @ \$1.95 per cu. yd.

ELEVATING & HOISTING.

Core of Engine Room.

9,000 cu. yds. @ \$.46 per cu. yd.

South, West and East Wall Trenches of Eng. Room.

9,000 cu. yds. @ \$.77 per cu. yd.

North Wall Trench of Eng. Room.

2,882 cu. yds. @ \$.81 per cu. yd.

DISPOSAL. (Including Backfill.)

Wall Trenches of Eng. Room.

11,882 cu. yds. @ \$.93 per cu. yd.

FORMWORK.

Walls of Engine Room.

69,100 sq. ft. @ \$.17 per sq. ft.

Walls of Boiler Room.

20,100 sq. ft. @ \$.17 per sq. ft.

Walls and Girders of Coal Receiving Room.

11,300 sq. ft. @ \$.17 per sq. ft.

Engine Foundations.

9,570 sq. ft. @ \$.17 per sq. ft.

CONCRETE. (Mixing & Placing.)**Engine Room Walls.**

5,360 cu. yds. @ \$.75 per cu. yd.

Boiler Room Walls.

1,229 cu. yds. @ \$.75 per cu. yd.

Coal Receiving Room Walls and Girders.

569 cu. yds. @ \$.75 per cu. yd.

THE UNIVERSITY OF CHICAGO

PHILOSOPHY DEPARTMENT

PHILOSOPHY 101: INTRODUCTION TO PHILOSOPHY

LECTURE 1: THE PHILOSOPHER'S LIFE

LECTURE 2: THE PHILOSOPHER'S LIFE

LECTURE 3: THE PHILOSOPHER'S LIFE

LECTURE 4: THE PHILOSOPHER'S LIFE

INDEX OF DRAWINGS.

- Plate No. 1. General Plan. Buildings and Property.
- Plate No. 2. Transverse Section of Pumping Station.
- Plate No. 3. Excavation Progress Chart.
- Plate No. 4. Trench Bracing for Pump Room Walls.
- Plate No. 5. Caissons for South Wall of Pump Room.
- Plate No. 6. Progress Diagram for Caisson Excavation.
- Plate No. 7. Stack Foundations and Soil Borings.
- Plate No. 8. Core Excavation in Pump Room.
- Plate No. 9. Coal Receiving Room Details.
- Plate No. 10. Coal Receiving Room Formwork.
- Plate No. 11. Boiler Room Wall Details and Formwork.
- Plate No. 12. Pump Room Wall Details.
- Plate No. 13. Method of Concreting Pump Room Walls.

CONTENTS

1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

INDEX OF DRAWINGS.

- Plate No.14. General Layout of Concreting
Plant.
- Plate No.15. General Key to Cost Schedule.
- Plate No.16. Numeral Schedule for Excavation.
- Plate No.17. Numeral Schedule for Concrete.

CONTENTS

Introduction	1
Chapter I. The History of the	1
Chapter II. The History of the	1
Chapter III. The History of the	1
Chapter IV. The History of the	1

MAYFAIR PUMPING STATION
GENERAL PLAN
BUILDINGS AND PROPERTY.

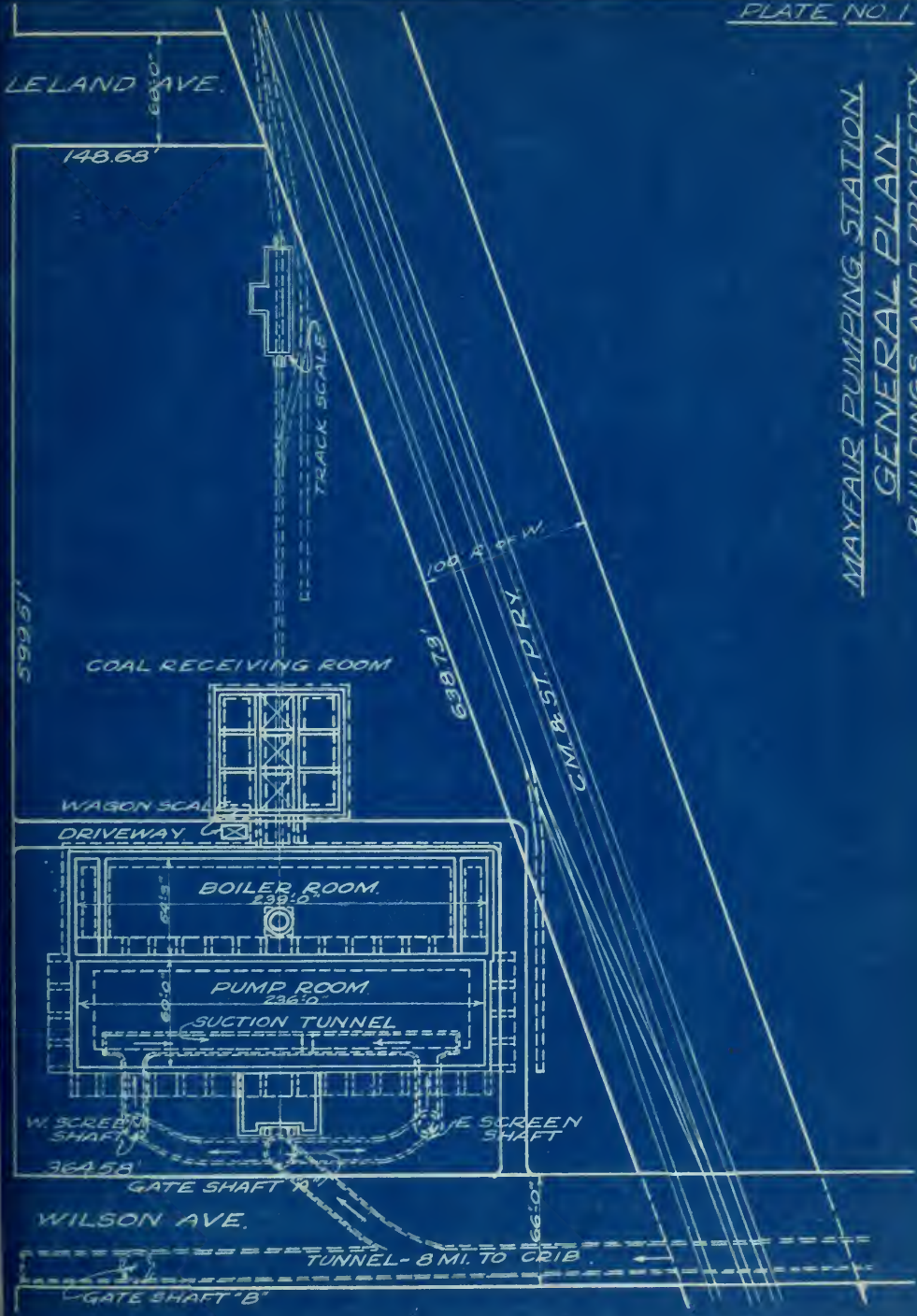
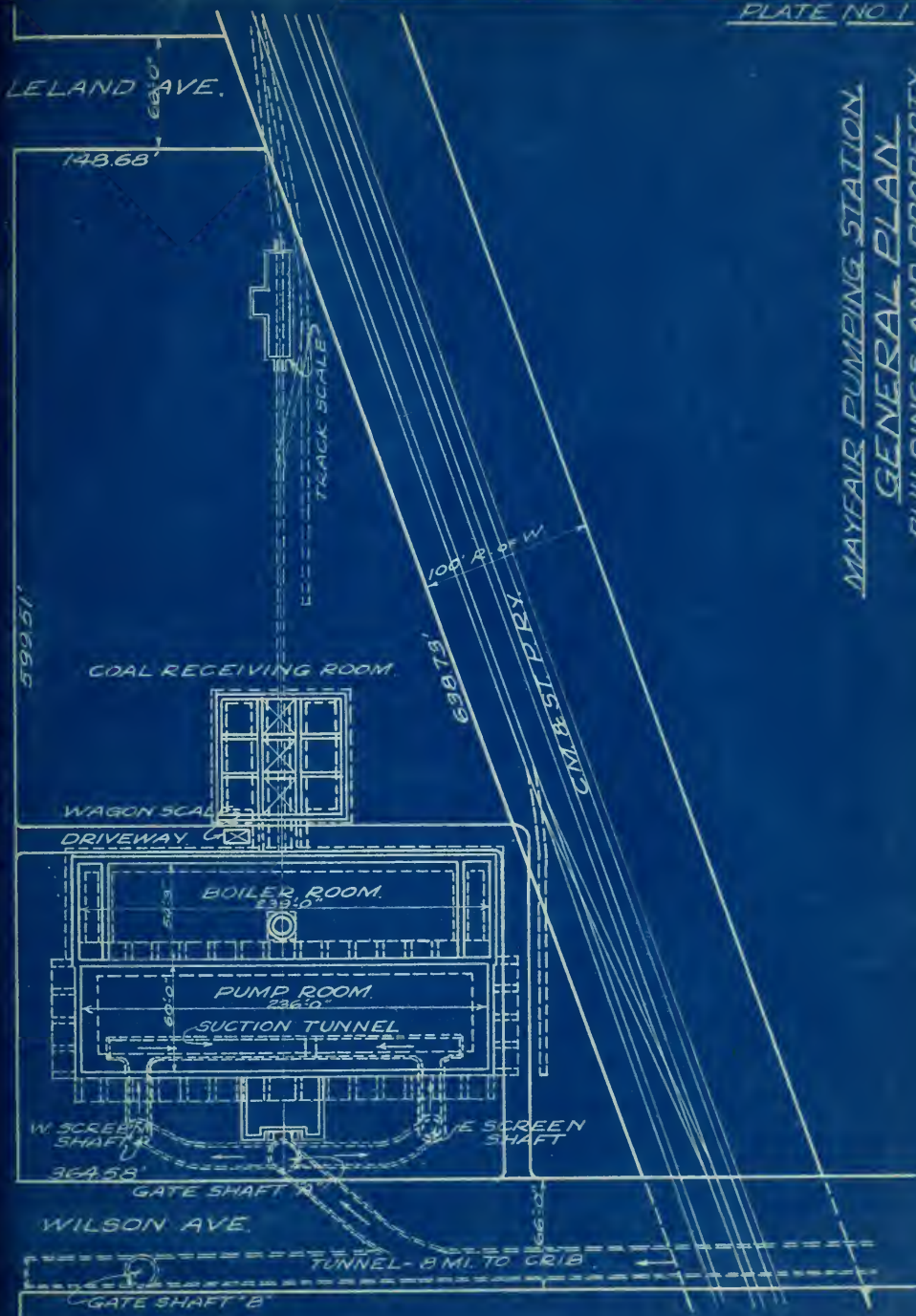
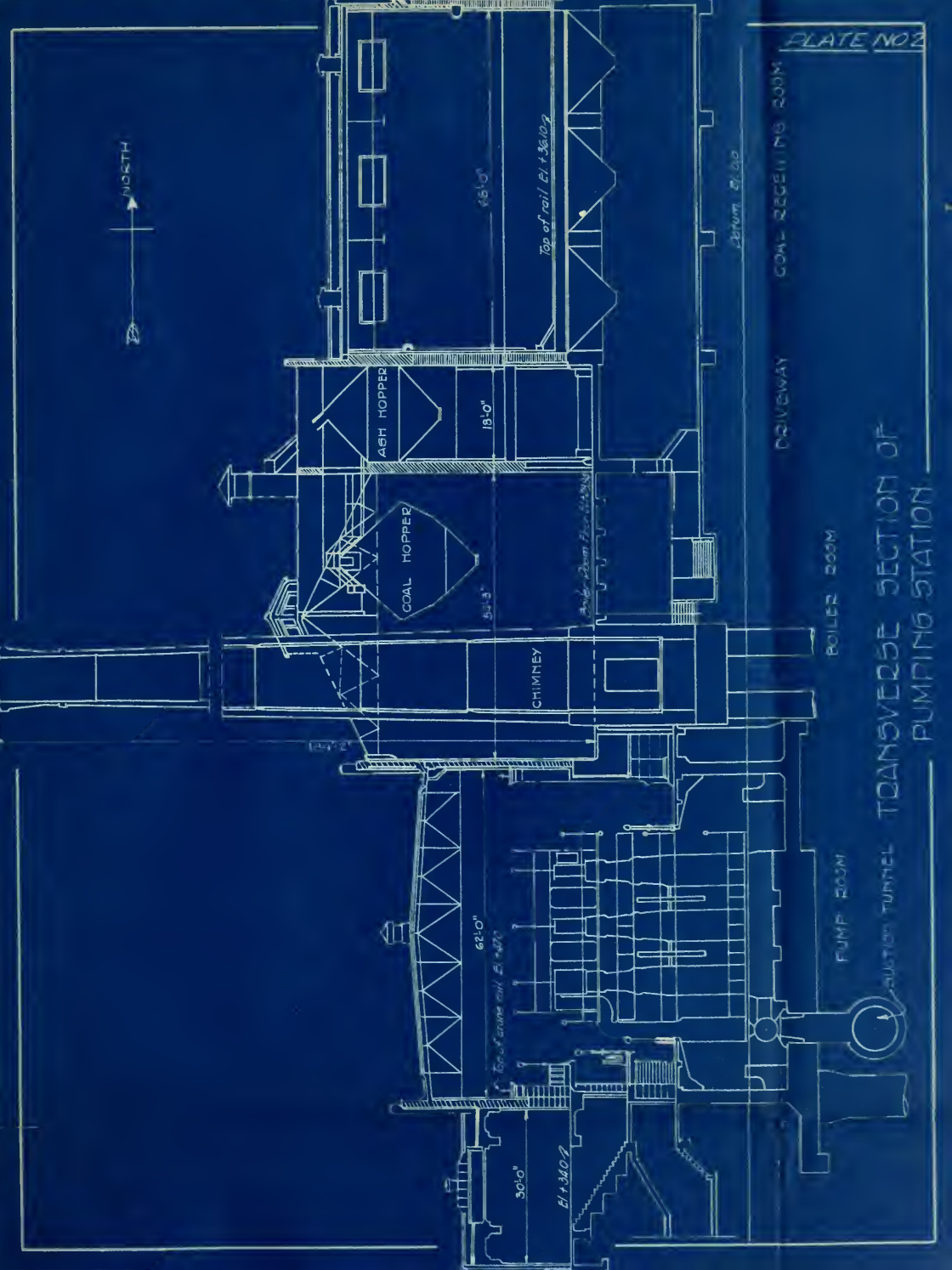


TABLE OF CONTENTS

Introduction	1
CHAPTER I. THE HISTORY OF THE	1
CHAPTER II. THE HISTORY OF THE	1
CHAPTER III. THE HISTORY OF THE	1
CHAPTER IV. THE HISTORY OF THE	1

MAYFAIR PUMPING STATION.
GENERAL PLAN.
BUILDINGS AND PROPERTY.

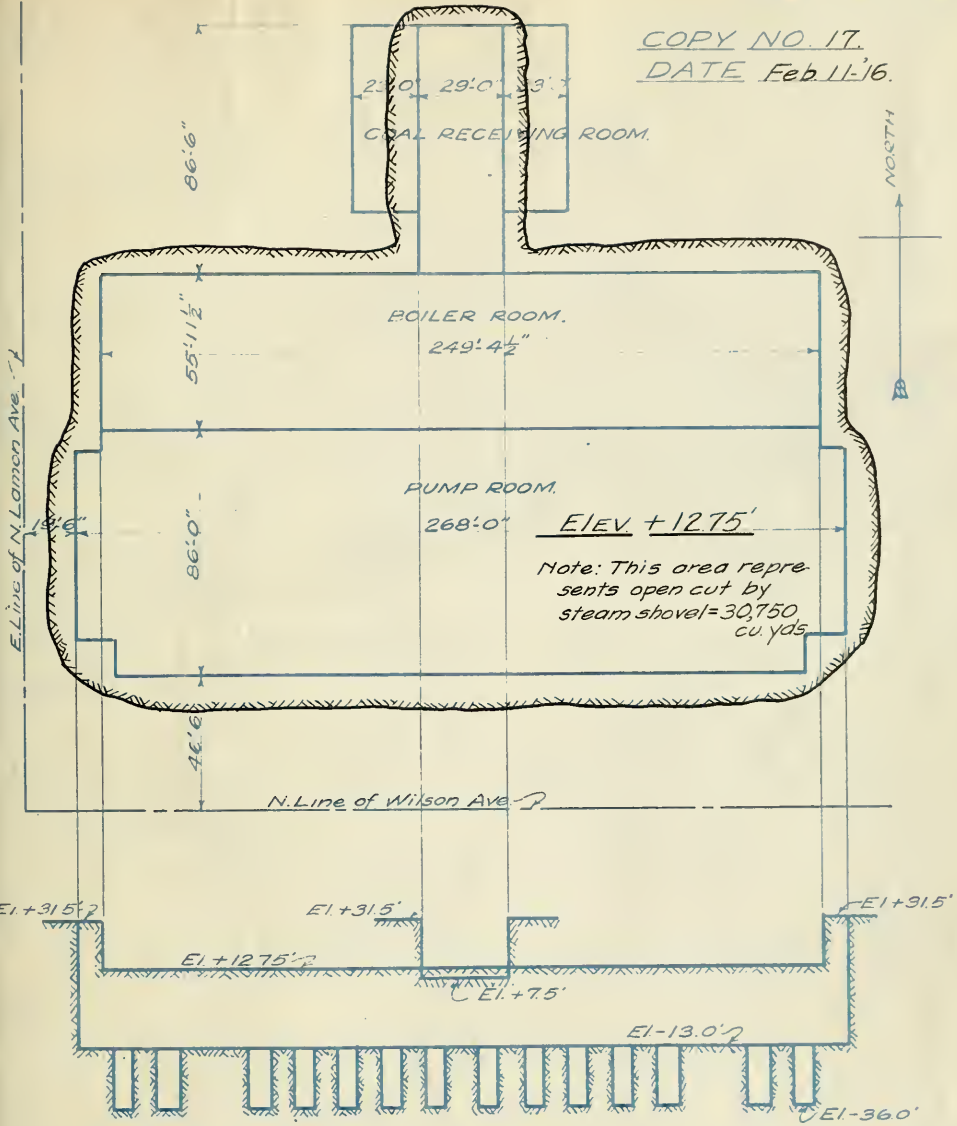




TRANSVERSE SECTION OF PUMPING STATION

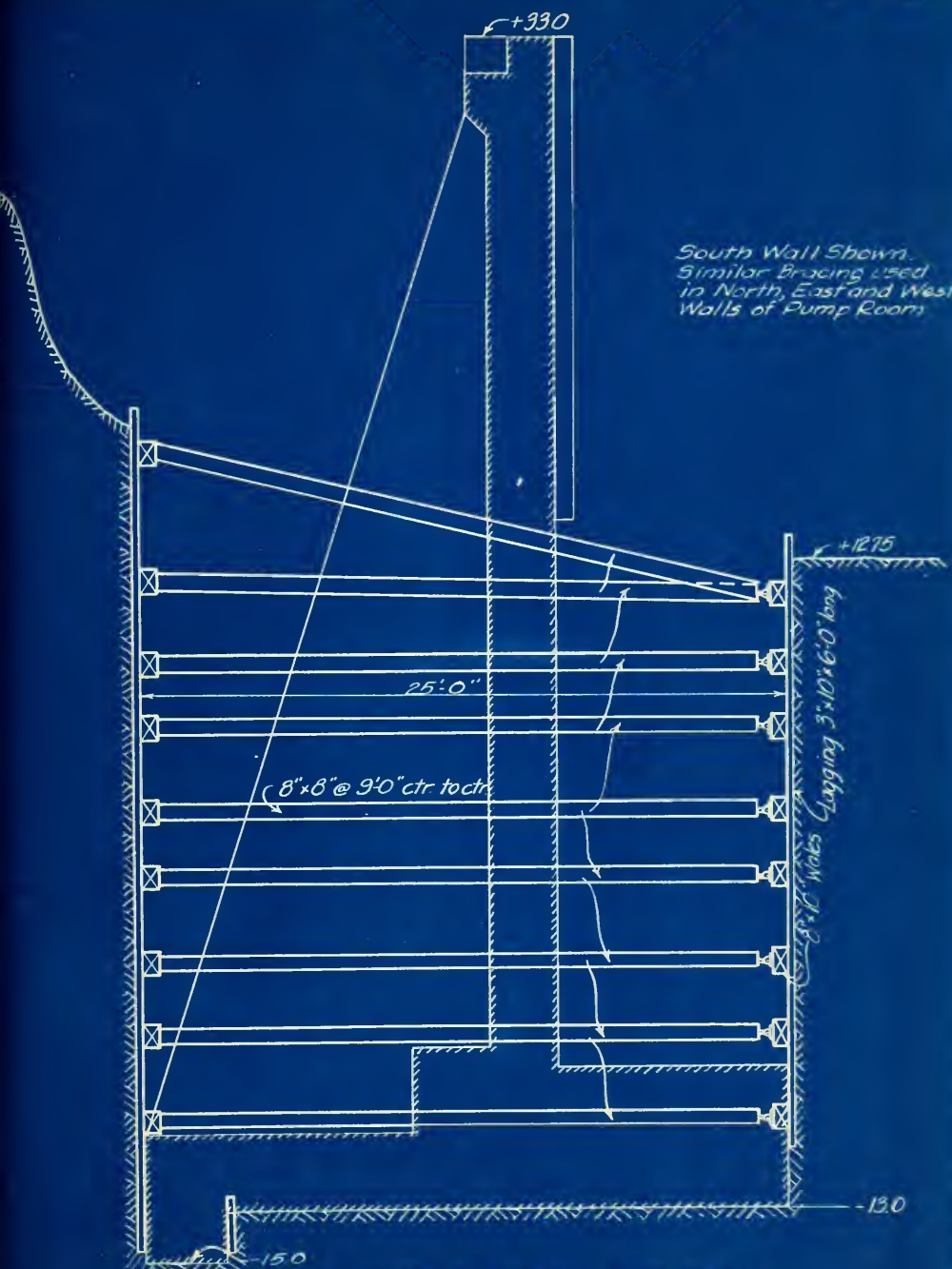


COPY NO. 17.
DATE Feb. 11 '16.

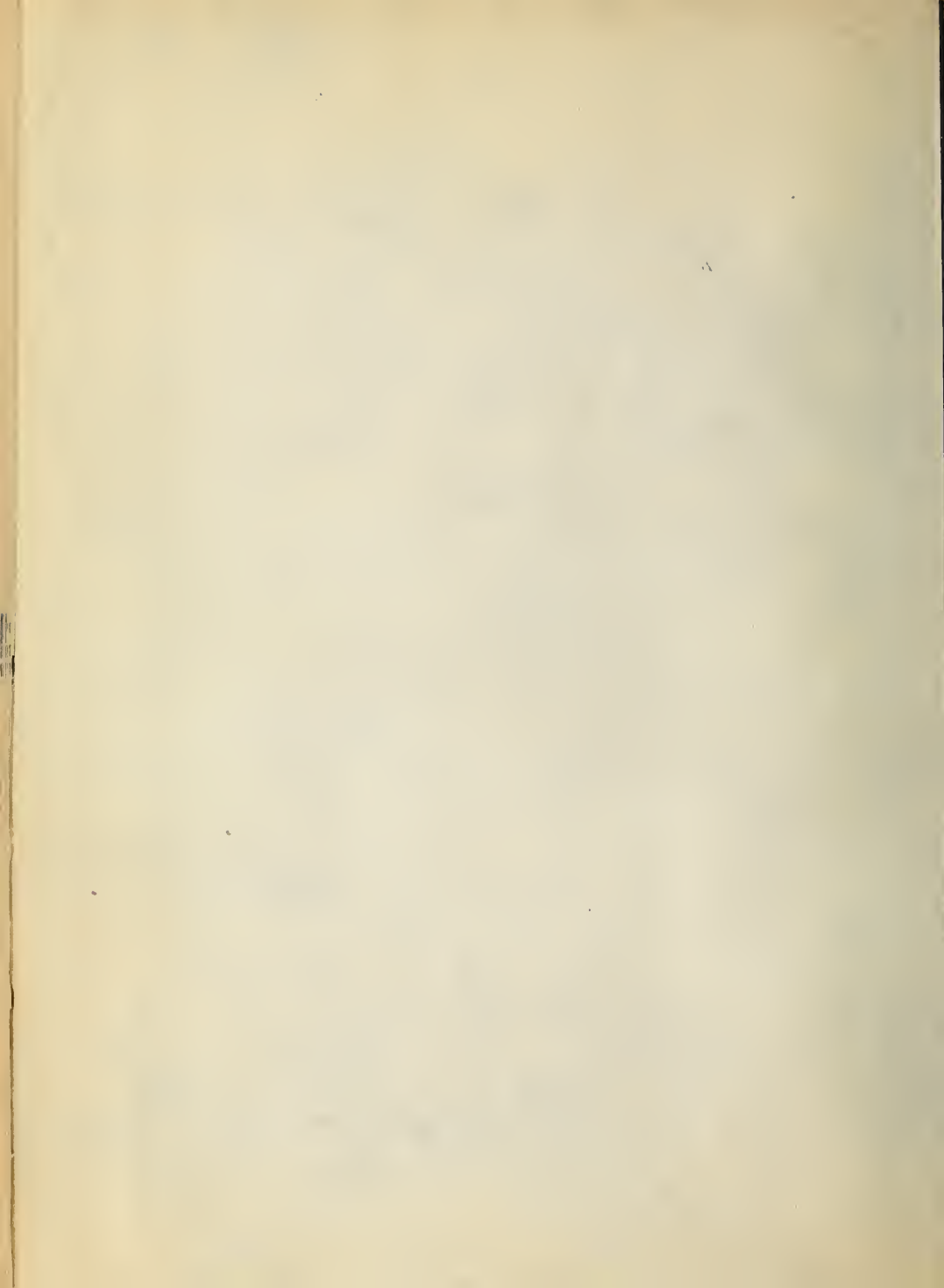


MAYFAIR PUMPING STATION.
EXCAVATION PROGRESS CHART



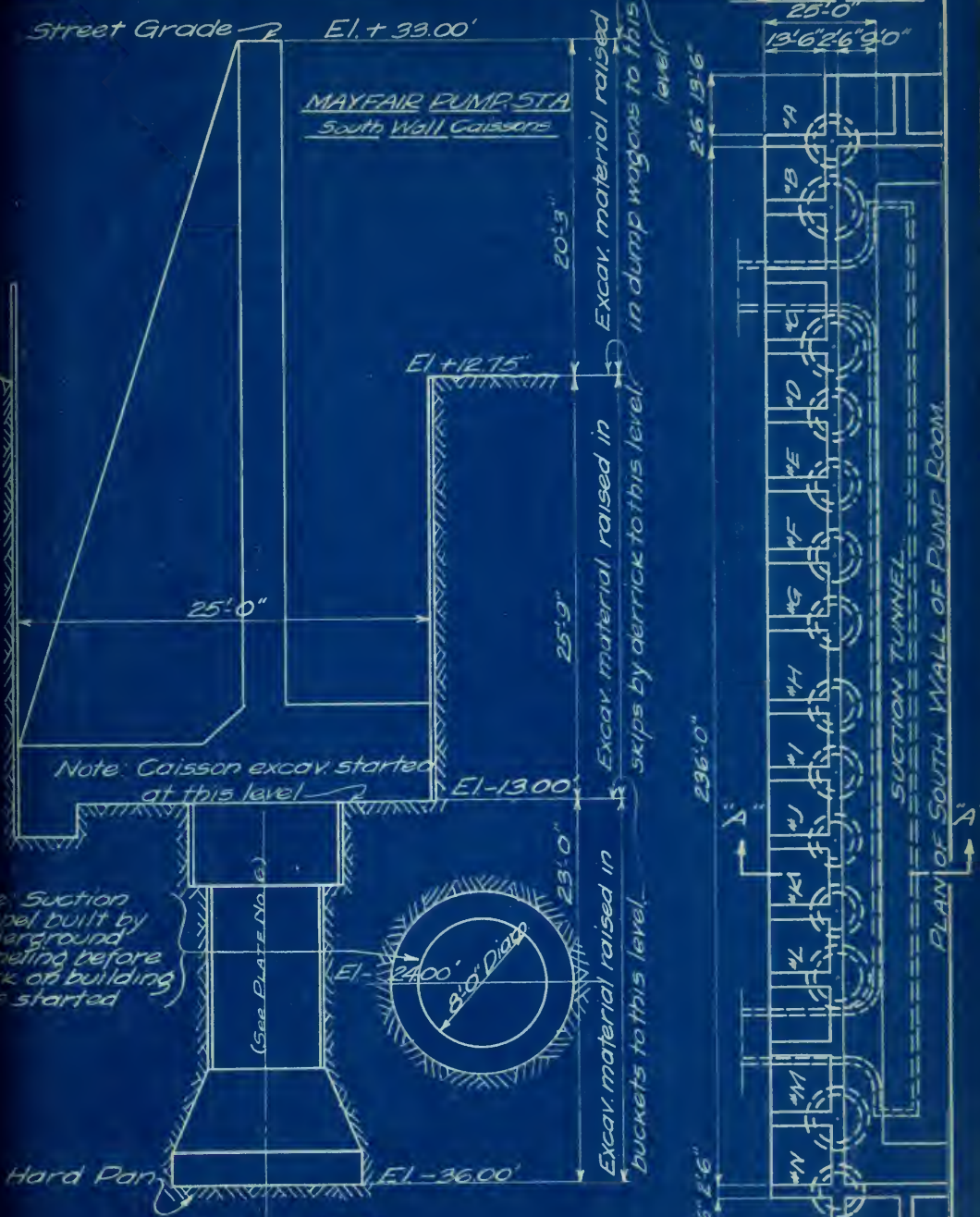


MAYFAIR PUMPING STATION
TYPICAL TRENCH BRACING



Street Grade \rightarrow El. + 33.00'

MAYFAIR PUMP STA
South Wall Caissons



Note: Caisson excav. started at this level \rightarrow

Note: Suction tunnel built by underground tunneling before work on building was started

(See PLATE NO. 6)



Hard Pan \rightarrow

Section "A-A"
Scale 1/8" = 1'-0"

236'-0"

13'-6" x 26'-9"

SUCTION TUNNEL
PLAN OF SOUTH WALL OF PUMP ROOM

Excav. material raised in dump wagons to this level
Excav. material raised in skips by derrick to this level
Excav. material raised in buckets to this level

20'-3"

25'-9"

23'-0"

El. + 12.75'

El. - 13.00'

El. - 36.00'

25'-0"

2'-6" x 13'-6"

236'-0"

13'-6" x 26'-9"

"A"

"B"

"C"

"D"

"E"

"F"

"G"

"H"

"I"

"J"

"K"

"L"

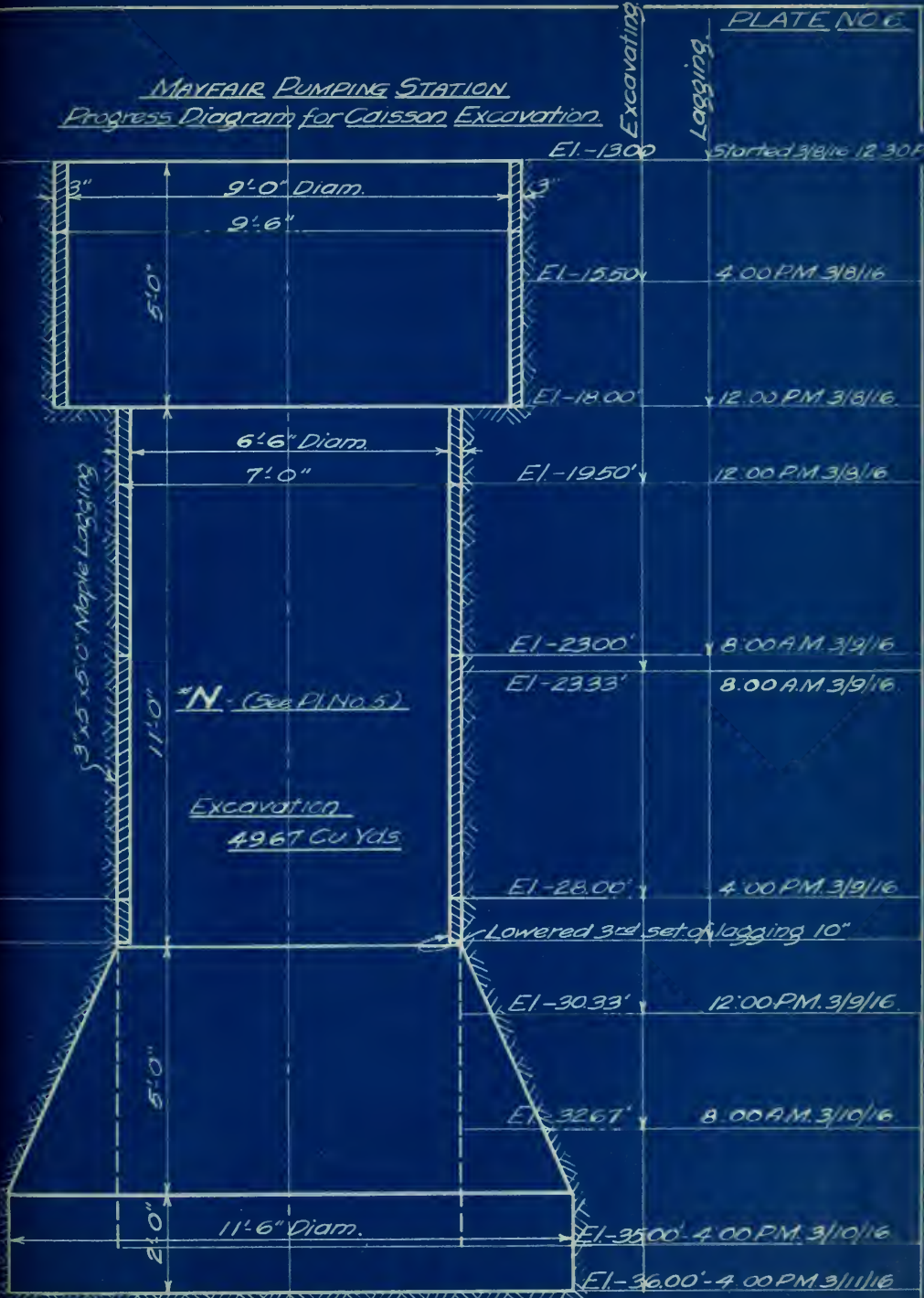
"M"

"N"

WEST



MAYFAIR PUMPING STATION
Progress Diagram for Caisson Excavation



Excavating

Lagging

EI.-1300

Started 3/8/16 12:30 PM

9'0" Diam.

9'6"

5'0"

EI.-1550

4:00 PM 3/8/16

EI.-1800

12:00 PM 3/8/16

6'6" Diam.

7'0"

EI.-1950

12:00 PM 3/8/16

3x5 15'0" Maple Lagging

*N - (See Pl. No. 5)

EI.-2300

8:00 AM 3/9/16

EI.-2333

8:00 AM 3/9/16

Excavation
4967 CU Yds.

EI.-2800

4:00 PM 3/9/16

Lowered 3rd set of lagging 10"

EI.-3033

12:00 PM 3/9/16

5'0"

EI.-3267

8:00 AM 3/10/16

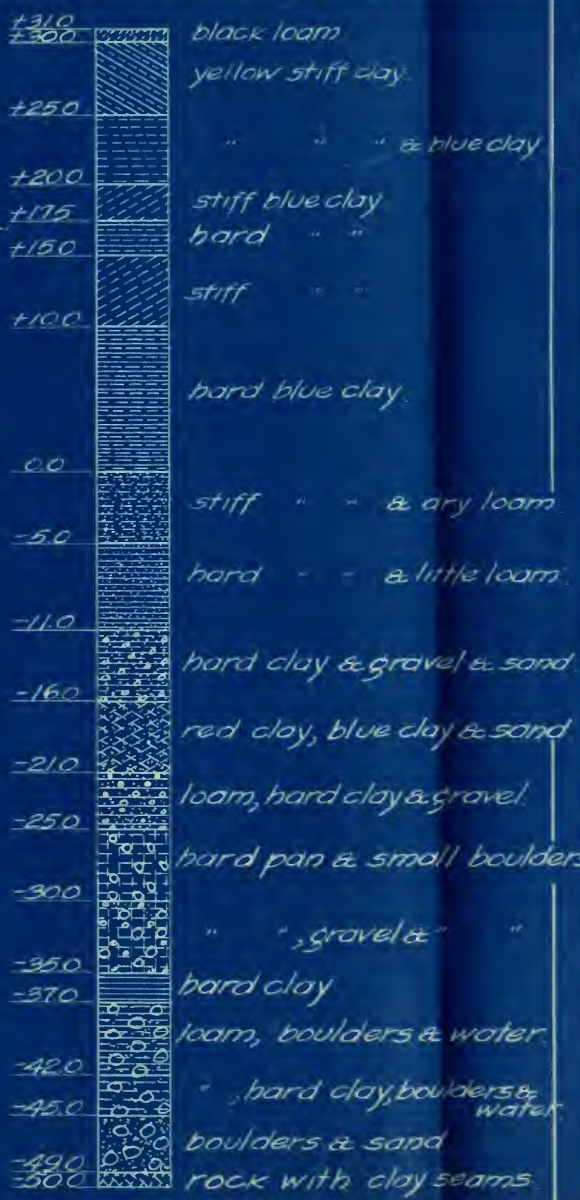
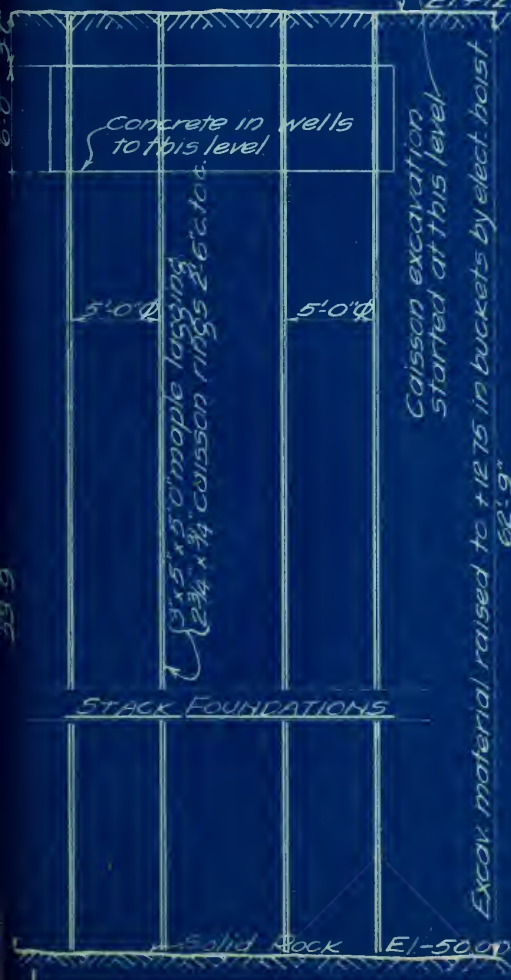
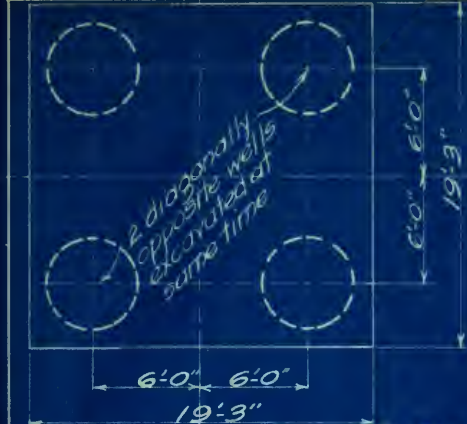
11'6" Diam.

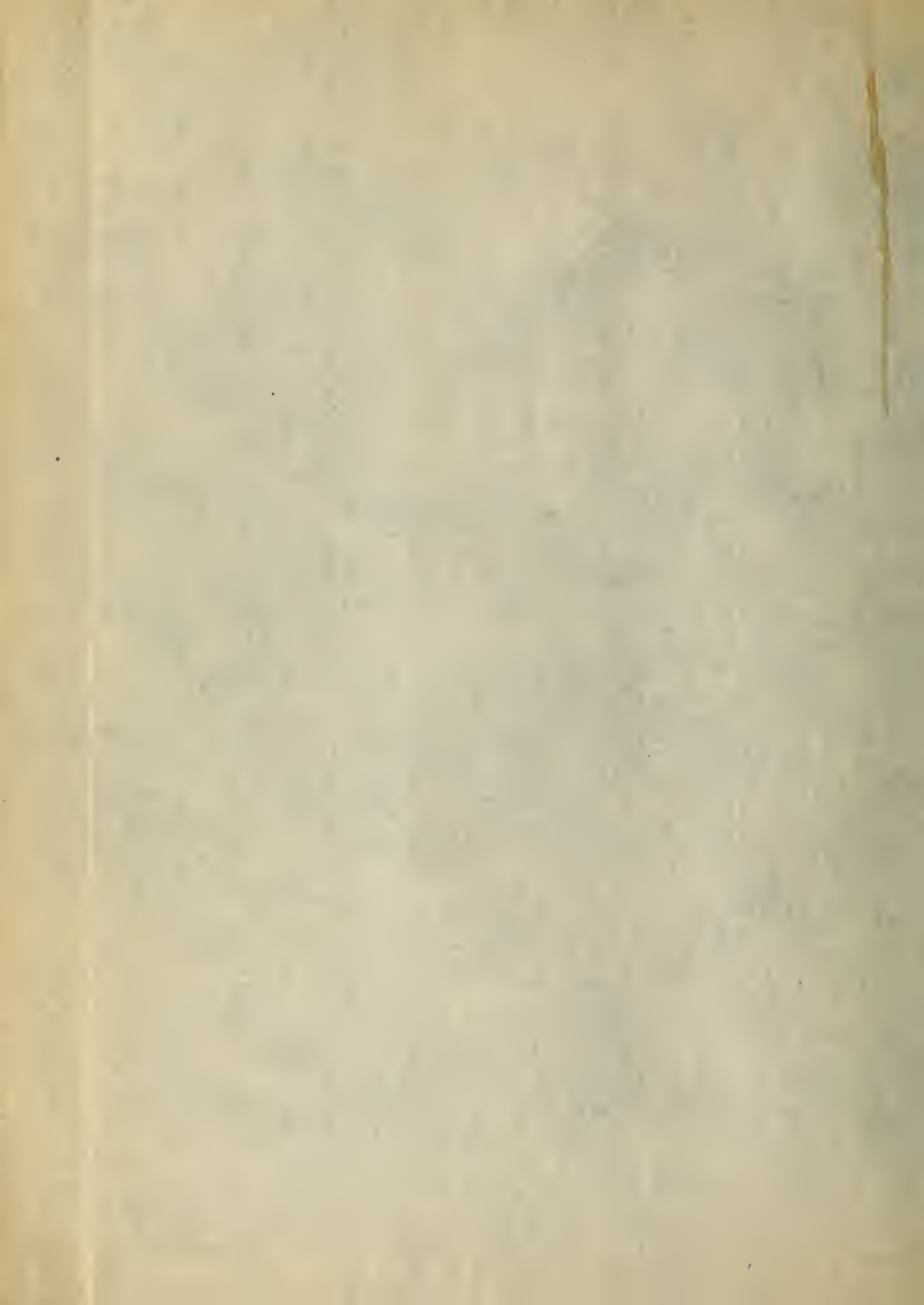
2'0"

EI.-3500 - 4:00 PM 3/10/16

EI.-3600 - 4:00 PM 3/11/16

MAYFAIR PUMP STATION
SOIL BORINGS NEAR STACK CAISSONS

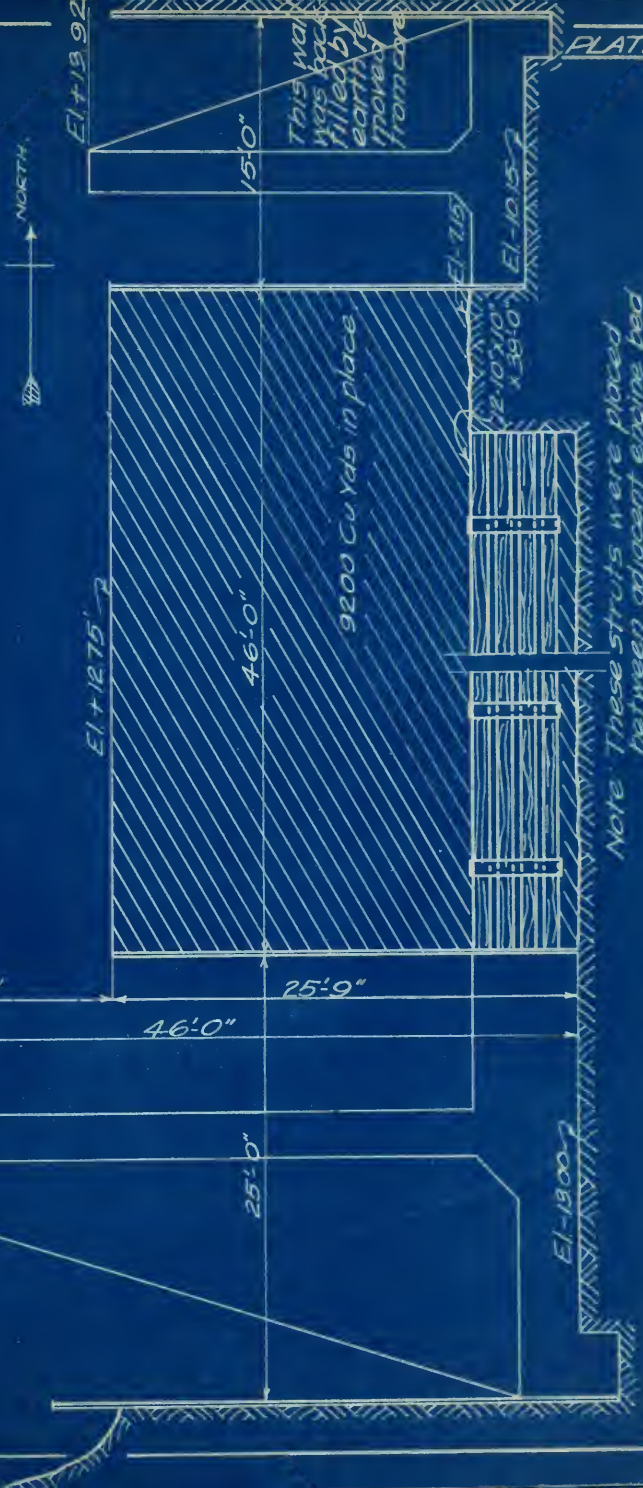




Derrick set at El + 950
this level.

This wall was
backfilled by
earth removed
from core

Note: Core represented by shaded area 9200 cu yds
was removed by steam shovel and loaded into
dump cars. Loaded cars were elevated to surface
by derrick and emptied behind walls as backfill.

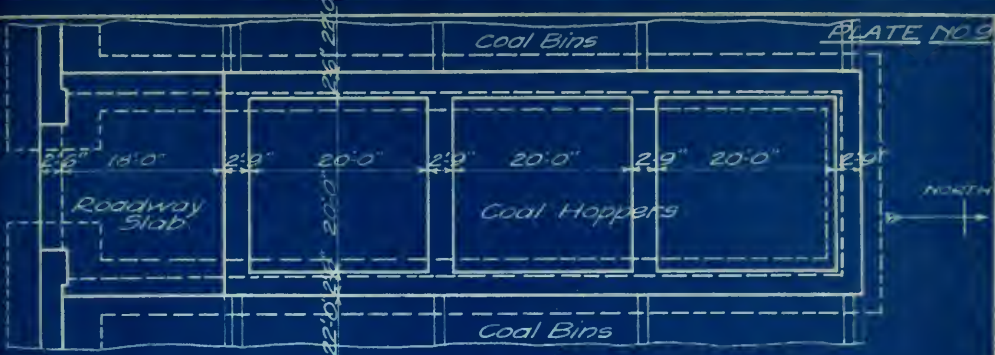


This wall
was back
filled by
earth re
moved
from core

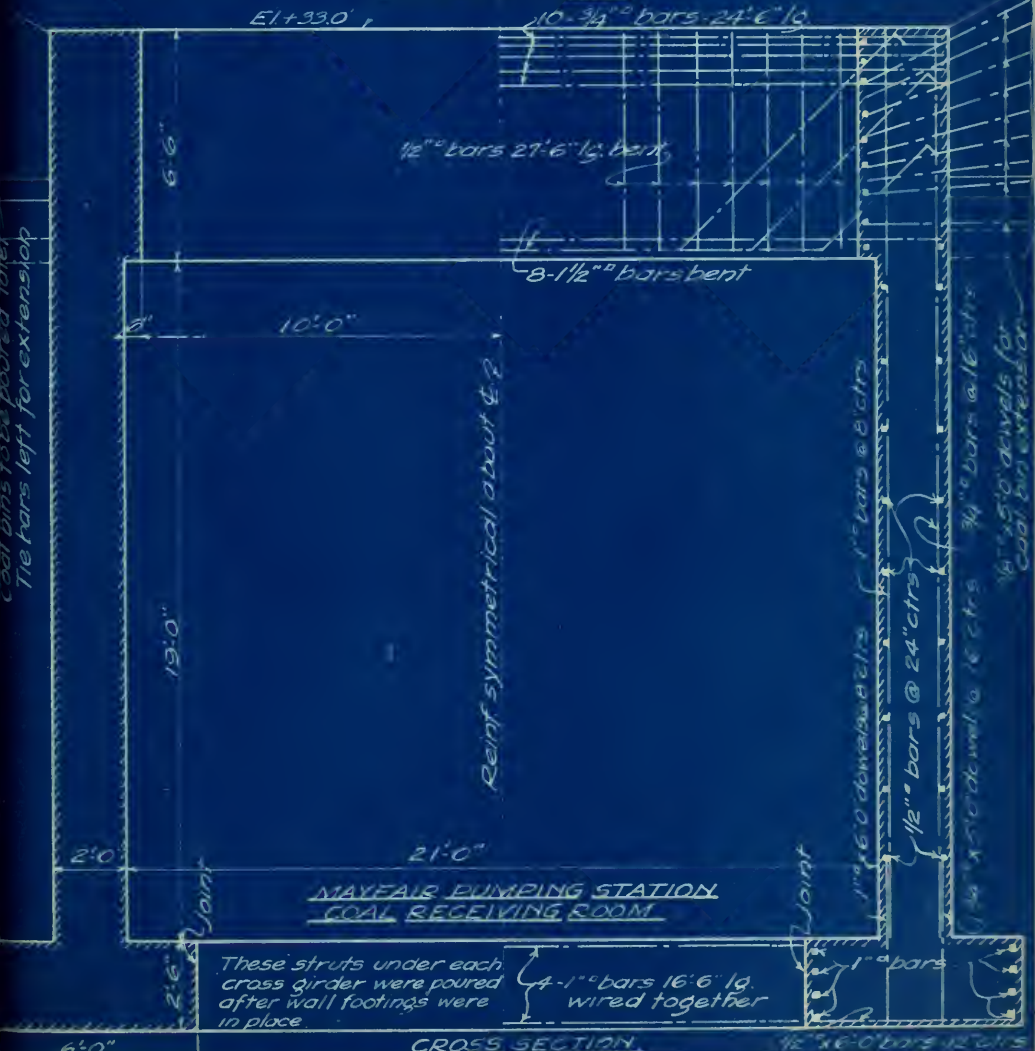
9200 Cu Yds in place.

Note: These struts were placed
between adjacent engine bed
locations, 31'-0" c/c.

TRANSVERSE SECTION OF PUMP ROOM
MAYFAIR PUMPING STATION

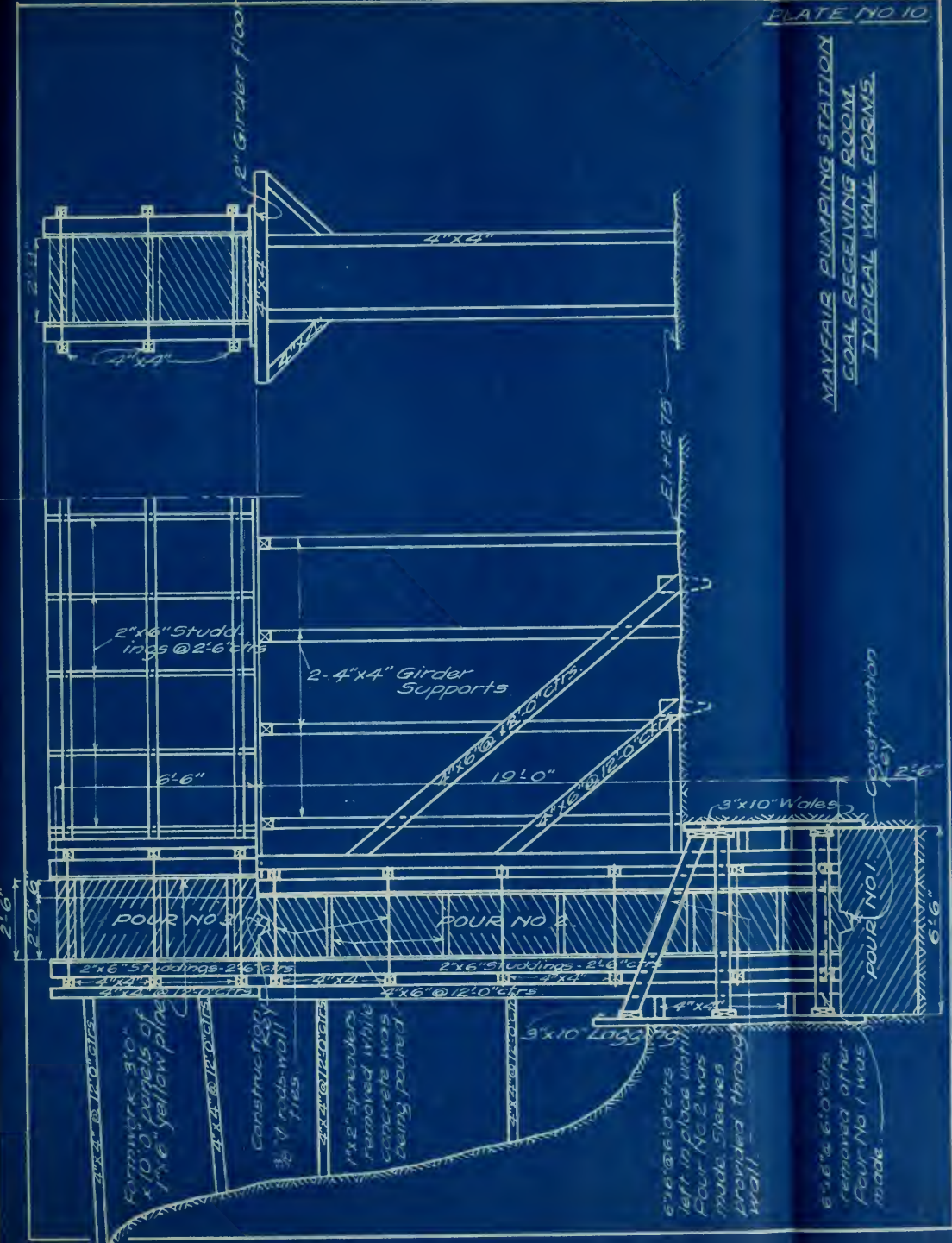


GENERAL PLAN



Tie bars left for extension
coal bins to be poured later.

MAYFAIR PUMPING STATION
COAL RECEIVING ROOM.
TYPICAL WALL FORMS.



2'6" x 2'0" x 2'6" x 2'0"

2" Girder floor

4" x 4"

2"x6" Studs
1735 @ 2'6" cts

2-4"x4" Girder
Supports

6'6"

10'-0"

2"x6" @ 12'-0" cts.
2"x6" @ 12'-0" cts.

EL. +12.75

3"x10" Wale

Construction
Key

POUR NO 1

POUR NO 2

POUR NO 1

6'6"

2'6" x 2'0" x 2'6" x 2'0"

Formwork 3'0" x 10'0" panels of 1/2" 6" yellow pine

Construction Key
1/2" red-wall ties

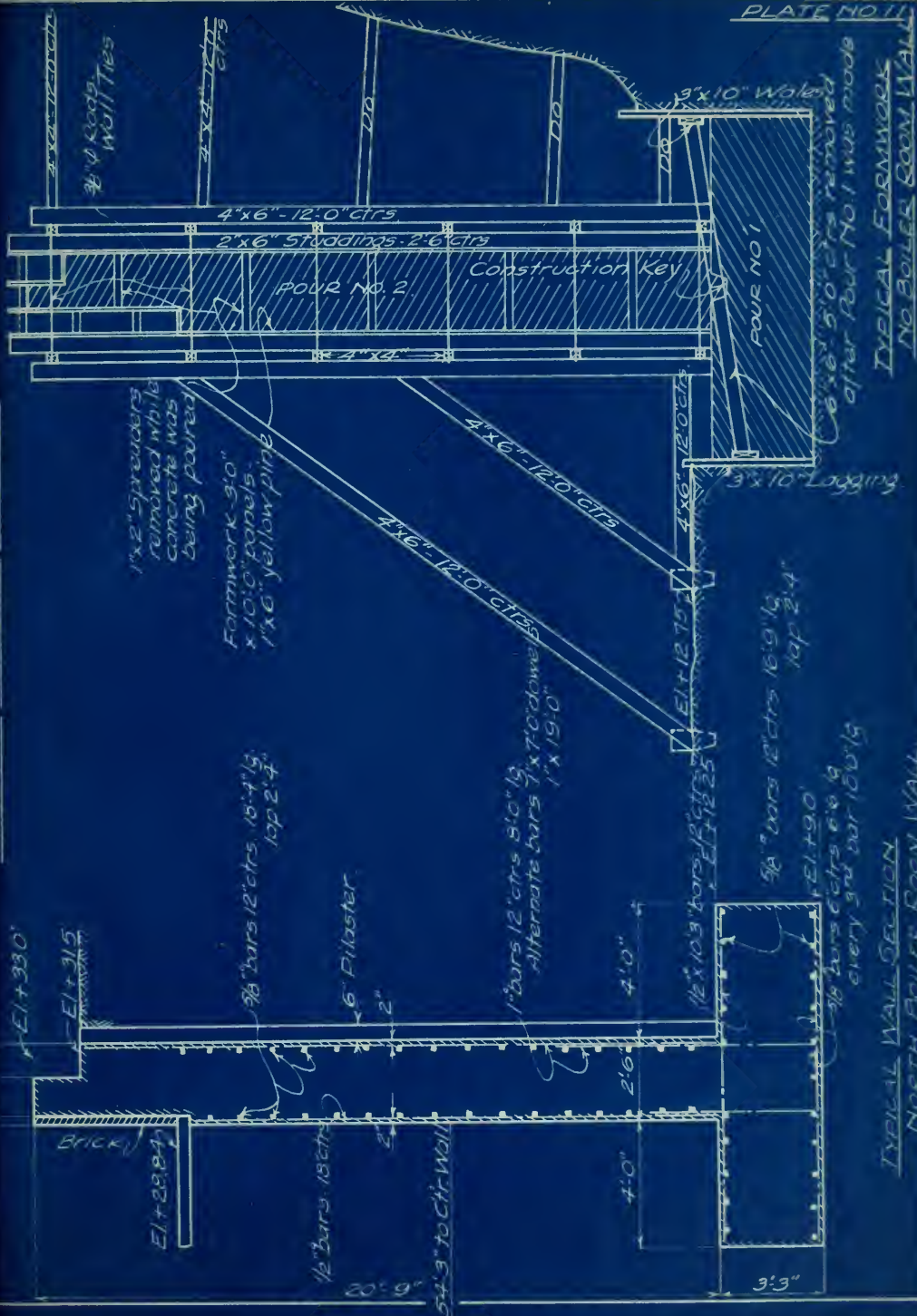
1"x2" spacers removed while concrete was being poured.

3"x10" Logs
6"x6" @ 10' cts left in place with four No 2 rods. Slices provided through wall.

6"x6" @ 6'0" cts removed other four No 1 was made.

WALLS - LIVING STATION

PLATE NO. 11



3/4" Rods Wall Ties

4"x6" - 12'-0" cfrs.
2"x6" Studdings - 2'-6" cfrs

POUR NO. 2

Construction Key

4"x6" - 12'-0" cfrs

4"x6" - 12'-0" cfrs

4"x6" - 12'-0" cfrs

3"x10" Logging

E/1+12.25

E/1+12.25

E/1+90

E/1+90

E/1+90

E/1+90

E/1+90

E/1+90

1"x2" Spacers removed while concrete was being poured

Formwork 3/4" x 10'-0" panels, 1"x6" yellow pine

3/8" bars 12" cfrs. 18'-4" lg. lap 2'-7"

6" Filaster

1" bars 12" cfrs 8'-0" lg. Alternate bars 1" x 7'-0" down to 1" x 19'-0"

3/8" bars 12" cfrs 16'-9" lg. lap 2'-4"

3/8" bars 12" cfrs 6'-6" lg. every 3rd bar 10'-0" lg.

3'-3"

POUR NO. 1

3"x10" Waler
6"x6" 5'-0" str removed after Pour No. 1 was made

TYPICAL FORMWORK
NO. BOILER ROOM WALL

TYPICAL WALL SECTION
NORTH BOILER ROOM WALL

PROGRAM

Original trench shoring represented by dotted lines - Nos 1 to 9 inclusive.

Pour No. 1 consists of 4" bed for steel reinf.

Pour No. 2: Braces 10 & 11 removed.

Pour No. 3: Brace No 9 removed.

Pour No. 4: Braces Nos 4, 5, 6, 7 & 8 removed. Reshoring "A, B, C, D & E" placed. Also "M & N" placed.

Pour No. 5: Braces Nos 2 & 3 removed; also shores "D & E" Reshoring "F & G" placed.

Pour No. 6: Brace No. 1 removed. Reshoring "H & I" placed.

Note: See Pl. No. 4 for trench shoring.

Wale "M"

1st Step of bracing shown thus

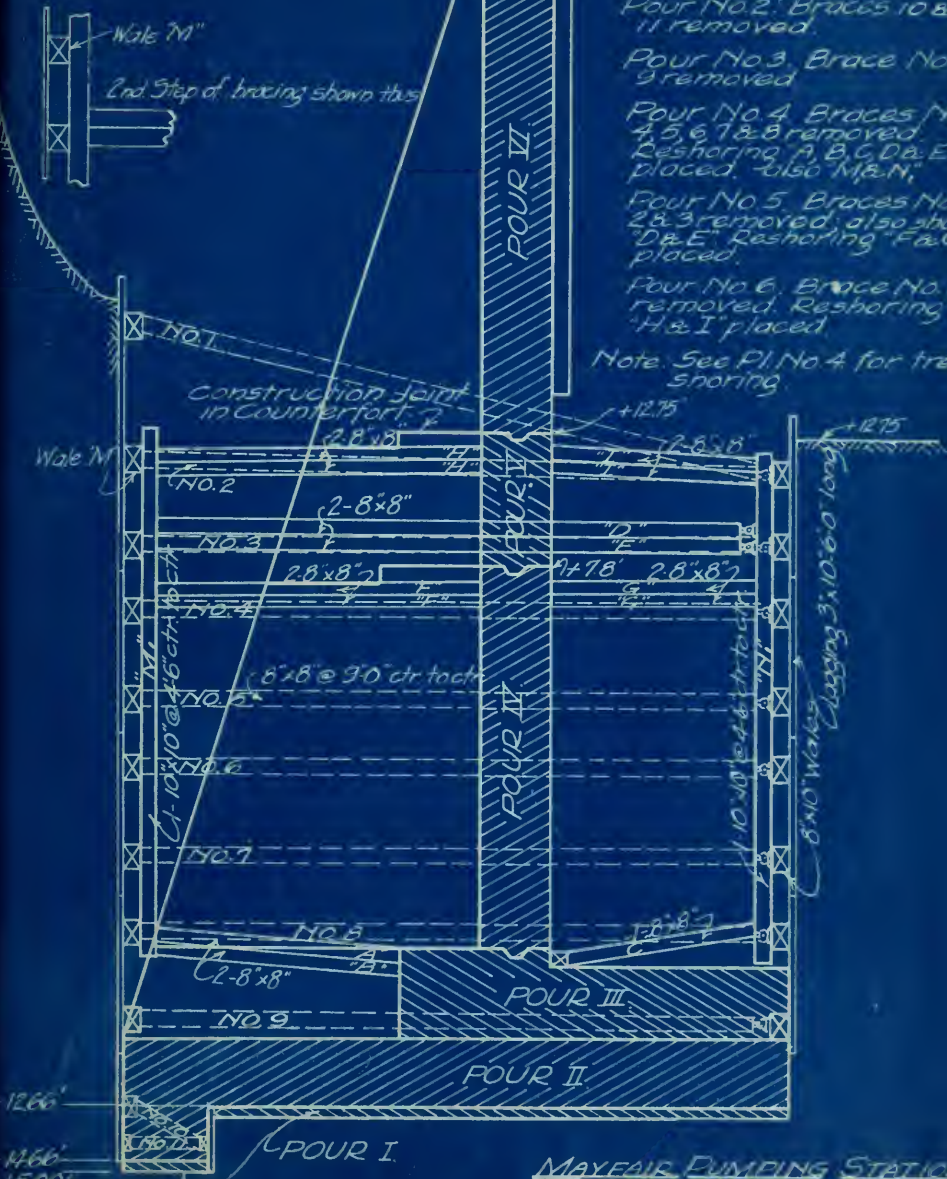
Wale "M"

Wale "M"

2nd Step of bracing shown thus

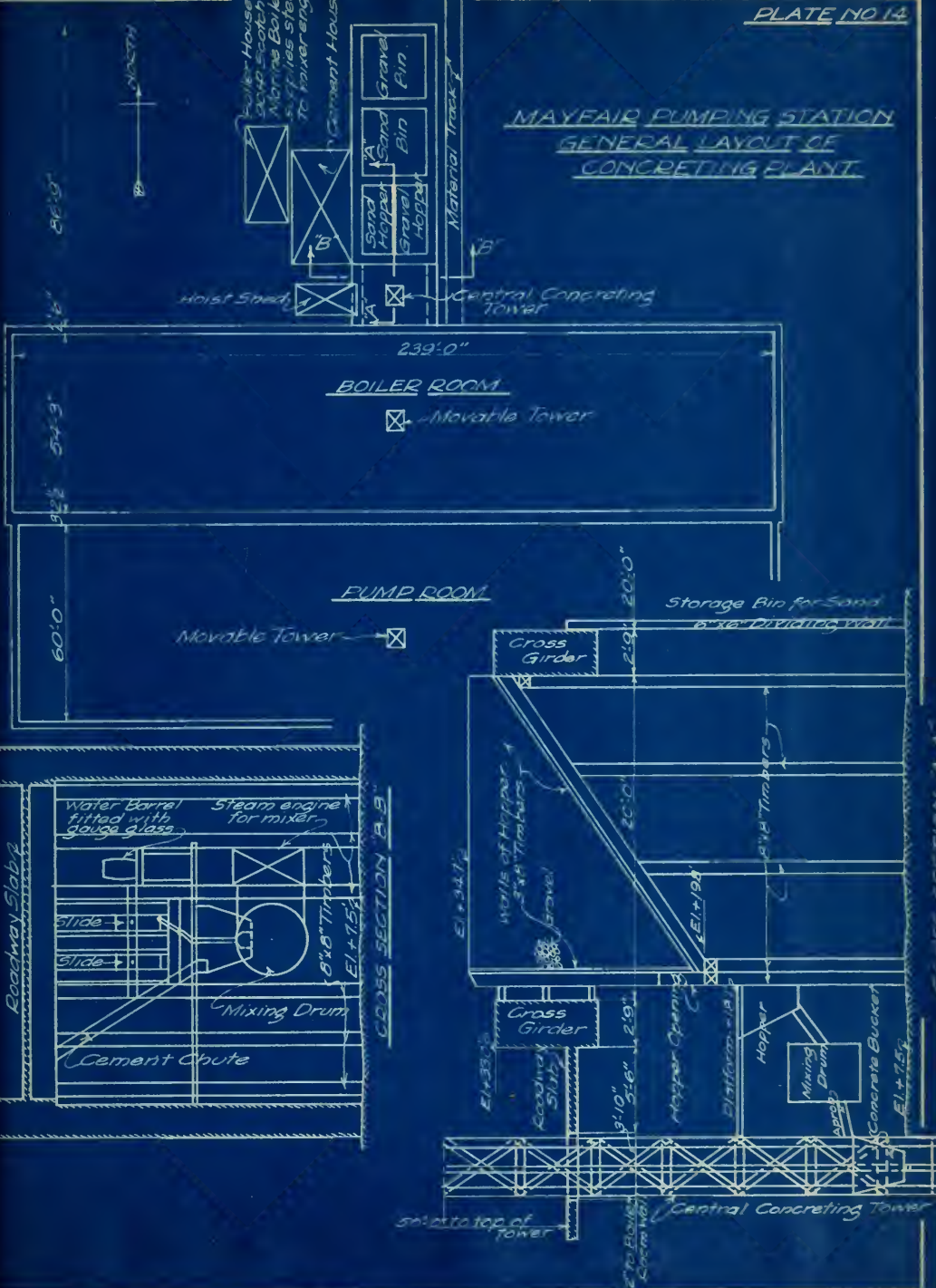
Wale "M"

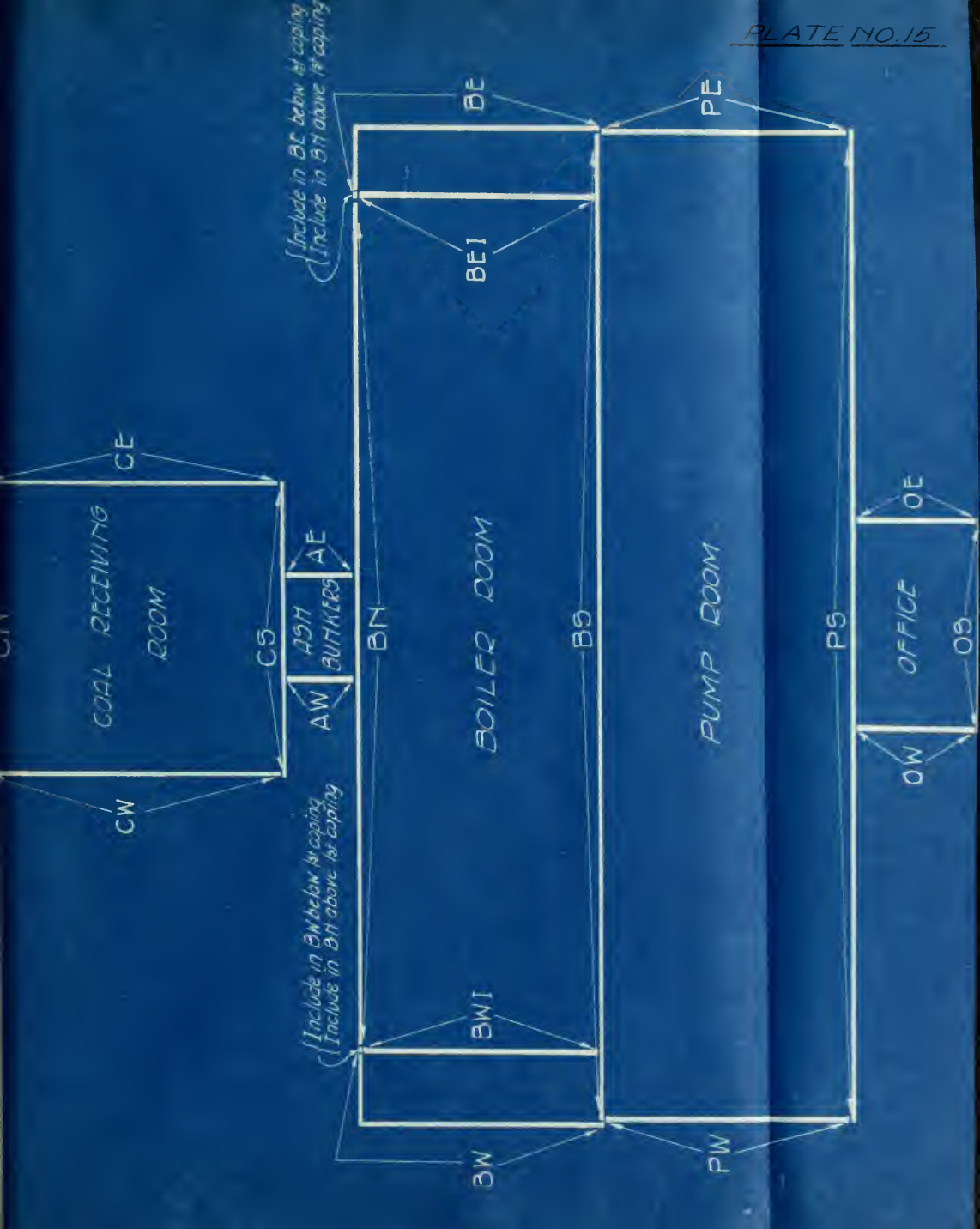
-1266'
-1466'
-1500'



MAYFAIR PUMPING STATION
METHOD OF CONCRETING
PUMP ROOM WALLS

MAYFAIR PUMPING STATION
GENERAL LAYOUT OF
CONCRETING PLANT.





PLACE WHERE WORK WAS DONE

SEWERS

PIPPING

HIGHWAYS
and
RAILWAYS

BIWAYS

BRIDGES

TUNNELS

MACHINERY

BOARDS

PIPING

CLASS OF WORK

CONCRETE

MASONRY

EXCAVATION

WORK DONE

NOT DEVELOPED ON THIS SHEET

NOT DEVELOPED ON THIS SHEET

FOREMAN

DIGGING

HOISTING

PUMPING

CLEARING SITE

BACKFILLING

BRACING

GRABBING

TRANSFERRING

CARPENTER WORK OTHER THAN FORMS

HAIR

TEAM

STEAM SHOVEL

HOIST

DEDRICK

CORNER

NOT DEVELOPED ON THIS SHEET

SEWERS 210	PIPS 210	HIGHWAYS RAILWAYS 310	BLDS. 410	BDS 510	TUNNELS 610	MACHINERY 710	BOILERS 810	PLANTS 910
---------------	-------------	-----------------------------	--------------	------------	----------------	------------------	----------------	---------------

CLASS OF WORK	CONCRETE							
EXCAVATION								
MASONRY								
	CARPENTERED WORK OTHER THAN FORMS							

MATERIAL USED	CEMENT 1	AGGREGATE 2	FORMS 2	SCAFFOLD, CHUTES & TOWER 3	REINF. IRON 4	ANCHORS 5	WATER ROOFING 6	FUEL 7						
---------------	-------------	----------------	------------	----------------------------------	------------------	--------------	-----------------------	-----------	--	--	--	--	--	--

WORK DONE	FORTRAN 1	UNLOADING 2	SALVAGE 2	MACHINE MIXING 3	HAND MIXING 4	MACHINE SLACING 5	HAND SLACING 6	WRECKING & CUTTING 7	EROSION 8	FINISH 9	NOT DEVELOPED ON THIS SHEET			
-----------	--------------	----------------	--------------	---------------------	------------------	----------------------	-------------------	-------------------------	--------------	-------------	-----------------------------	--	--	--

SECTION	OFFICE 1	PUMP ROOM 2	BOILER ROOM 3	ASH BANKER A	COAL ROOM C	ELEVATED SHAFT E	TRANSFER ROOM T	INTERIOR PARTITION I						
---------	-------------	----------------	------------------	-----------------	----------------	---------------------	--------------------	-------------------------	--	--	--	--	--	--

NOTE - Refer to standard sheet for correct insertions.

PLATE NO 17

INDEX OF PHOTOGRAPHS.

- Photo No. 1. General View of Work in Preliminary Stages.
- Photo No. 2. North Boiler Room Wall.
- Photo No. 3. Open Cut Excavation by Steam Shovel.
- Photo No. 4. Trench Bracing for Pump Room Walls.
- Photo No. 5. General View of South and West Engine Room Walls.
- Photo No. 6. Coal Receiving Room.
- Photo No. 7. Boiler Room.
- Photo No. 8. Pump Room.

Table of Contents

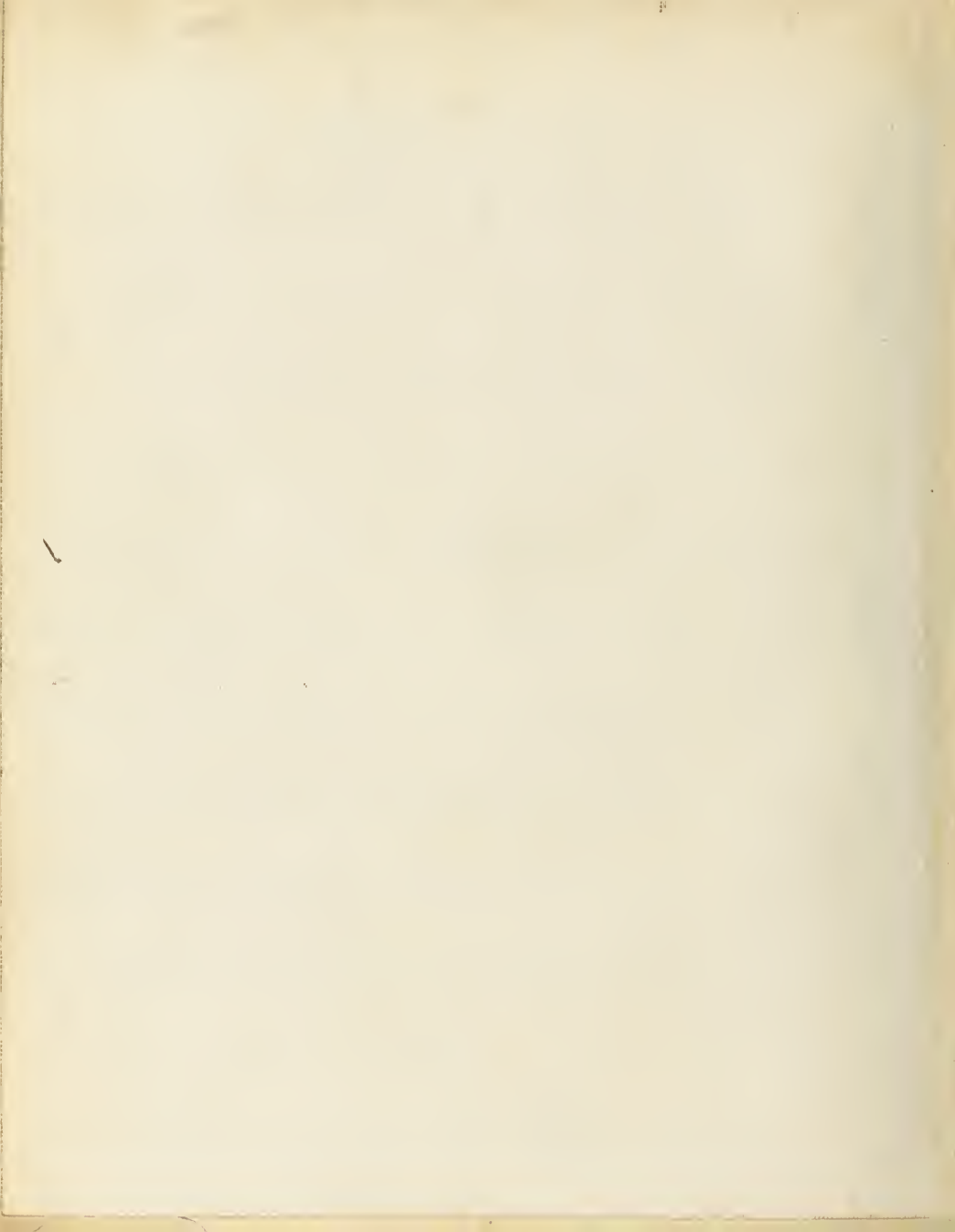
Chapter I. The History of the United States	1
Chapter II. The Constitution of the United States	15
Chapter III. The Federal Government	35
Chapter IV. The State Governments	55
Chapter V. The Local Governments	75
Chapter VI. The Judiciary	95
Chapter VII. The Executive	115
Chapter VIII. The Legislative	135
Chapter IX. The Administration	155
Chapter X. The Public Opinion	175
Chapter XI. The Foreign Relations	195
Chapter XII. The International Law	215
Chapter XIII. The Diplomatic Service	235
Chapter XIV. The Consular Service	255
Chapter XV. The Treaties	275
Chapter XVI. The International Organizations	295
Chapter XVII. The International Trade	315
Chapter XVIII. The International Law of the Sea	335
Chapter XIX. The International Law of the Air	355
Chapter XX. The International Law of Space	375
Chapter XXI. The International Law of the Environment	395
Chapter XXII. The International Law of Human Rights	415
Chapter XXIII. The International Law of the Arctic	435
Chapter XXIV. The International Law of the Antarctic	455
Chapter XXV. The International Law of the Polar Regions	475
Chapter XXVI. The International Law of the Submarine Cables	495
Chapter XXVII. The International Law of the Outer Space	515
Chapter XXVIII. The International Law of the Moon	535
Chapter XXIX. The International Law of the Planets	555
Chapter XXX. The International Law of the Stars	575

PHOTO NO. 1.

MAYFAIR PUMPING STATION
LOOKING S.
FROM ROCK PILE
NOV. 16 1915

J. R. TAYLOR
113







MAYFAIR PUMPING STATION
LOOKING W. SHOWING N. BOILER ROOM WALL
DEC 7 1915



PHOTO NO. 3.



MAYFAIR PUMPING STATION
LOOKING W-
JAN-11-1916

J. TAYLOR
137

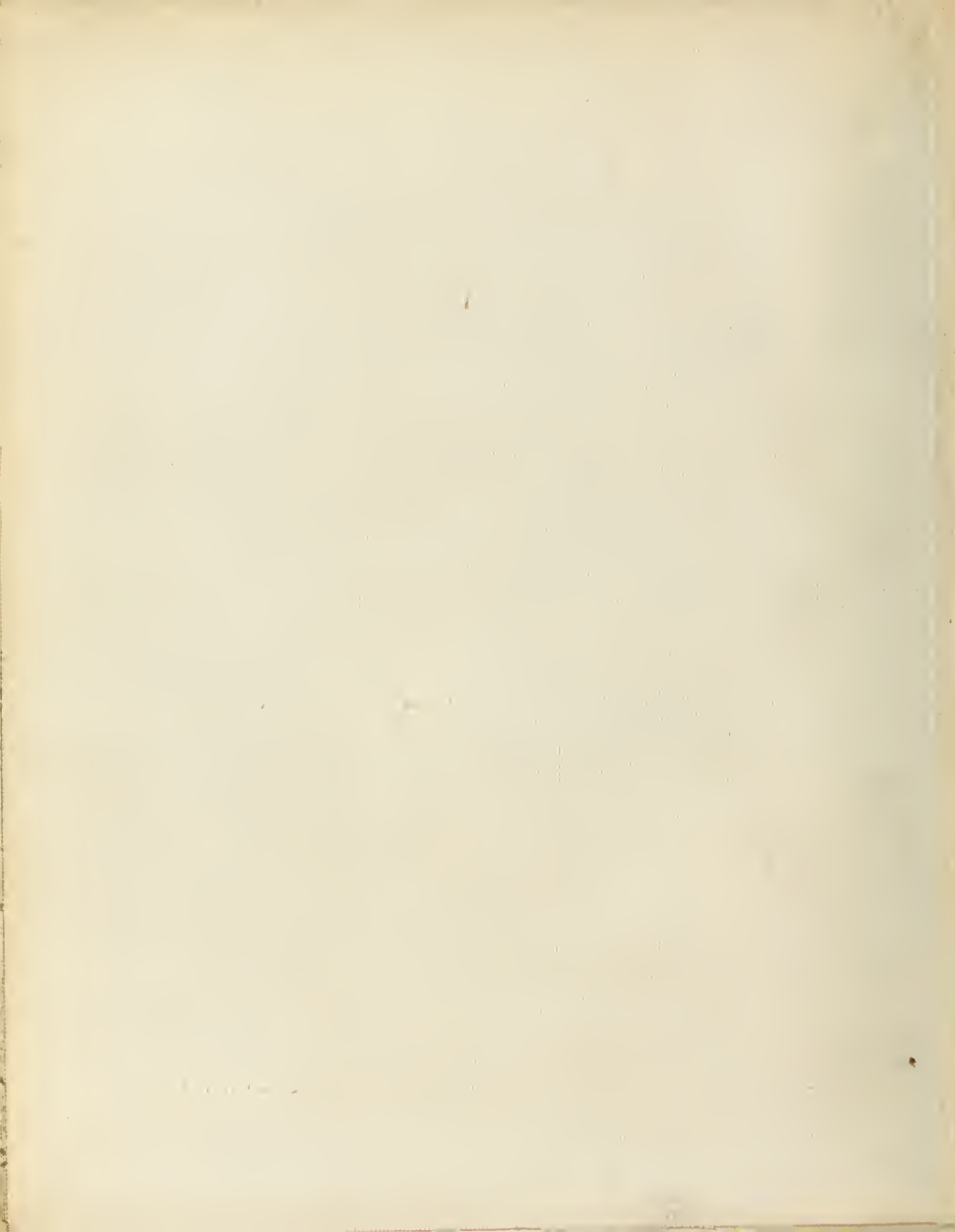


PHOTO NO. 4.

MAYFAIR PUMPING STATION
LOOKING SE
FEB. 25 1916



OSGOOD
18

J. R. TAYLOR
157

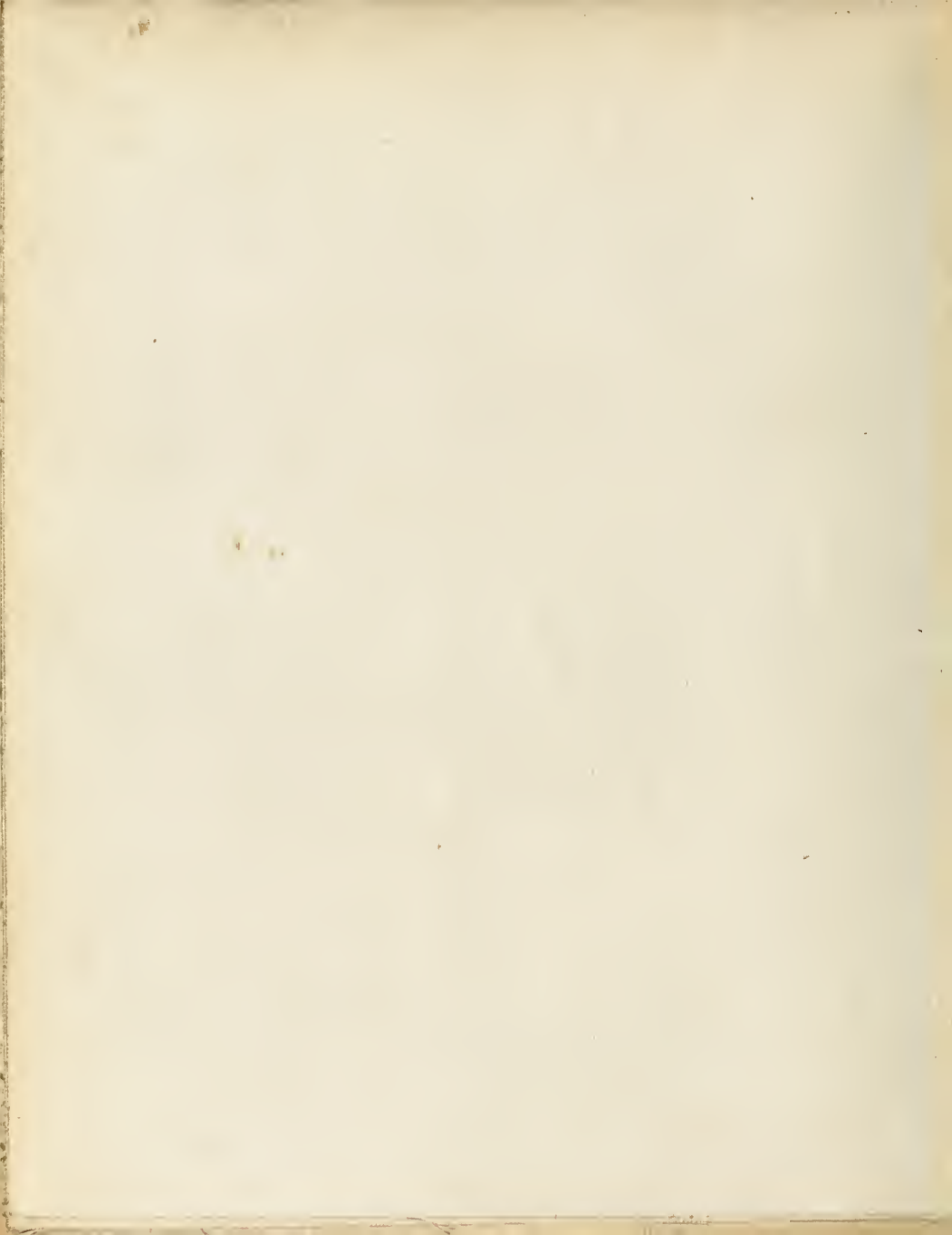


PHOTO NO. 5.

REPAIRS TO BRIDGE WEST
MAY 19 1918







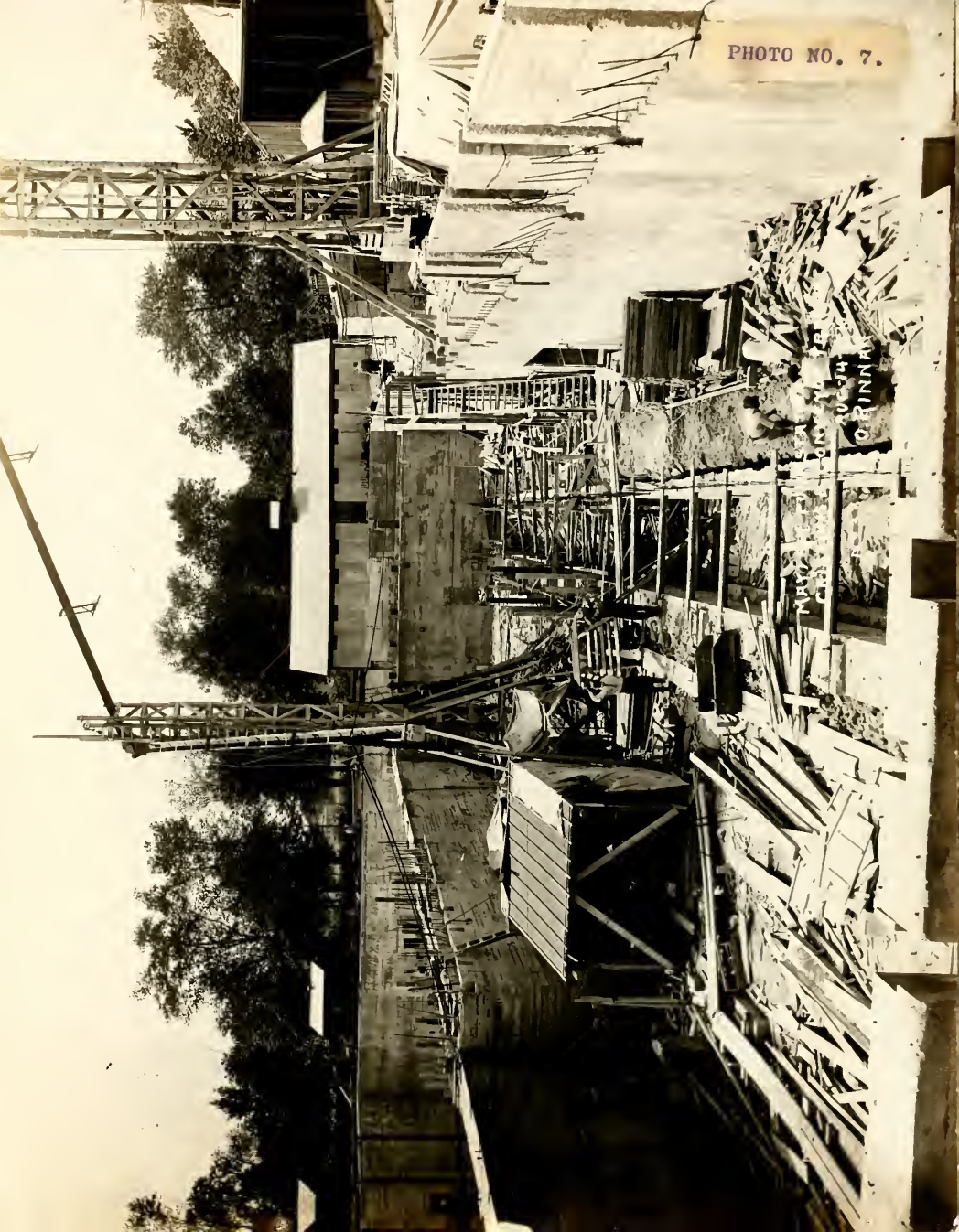
PHOTO NO. 6.

MAYFAIR PUMPING STATION
COAL RECEIVING ROOM LOOKING S
JAN 11 1912

J.R. TAYLOR
140



PHOTO NO. 7.



U.S. GEOLOGICAL SURVEY
WASHINGTON, D.C.

PHOTO NO. 8.



JACOB BOLLA
Photographer
2180 Archer Ave.
Phone Calumet 8206

