EARLY HISTORY

of

THE SOLVAY PROCESS COMPANY

By

EDWARD N. TRUMP

(In Chapters)

Chapter IV. Design of N° 2 Element.

CHAPTER IV.

Design of N° 2 Element.

In laying out the N° 2 Apparatus Room we changed the position of the D.S. so that the R.H. could be located on top of them, running up into the monitor in the center of the peaked roof.

The A.B. and D.Os were located as in N° 1 Element, the L.G.I. being made like the A.B.

This arrangement allowed the location of the pumps along the wall in good light, and the 5 Compressors, the Distillation Engines, and additional Duplex water pump, were in the Engine Room, at 3 ft. 6 in. higher elevation.

The arrangement worked out well, and was followed in future Elements.

Plan D-1168 - Shows the elevation of the vessels in N° 2 Apparatus Room, with the shower R.H. on top of the D.S., and the wrot iron type A.B. and L.G.I. with cone bottom and plunger pipes.

All the wrot iron vessels, including the D.S., D.Os, A.B., L.G.I., and tanks for filter liquor, with the long vacuum filters, were made by Philo S. Curtis, of Utica, and were an excellent job. They were completed on November 13th, 1885.

We began the brickwork of N° 2 Element on April 13th, 1885, and finished it in June. The apparatus foundations and cisterns were completed July 2nd; the R.Hs were erected by December 8th; new Ingersoll Compressors by December 29th, and the Element started up February 1st, 1886.

C. Ls.:
Plan D-1152
10/7/1885. The C.Ls in N° 2 Tower were provided with 6 water boxes with 8 - 4 in. tubes, the first one in the 3rd ring from the bottom, the others in five rings above. The holes in the plates were made 20 in. diameter instead of 10 in.; the plates were provided with lugs, which the passettes were locked under and pinned, and the R.Fs were changed to closed

tubular type, with 3 in. tubes and cast iron rings of same diameter as the C.L.

The liquor was put through the tubes and water outside. These were set up on end in No 2 Tower, alongside the C.Ls. They were not put in until the R.F. of the old type were taken out.

The gas from the R.H. was taken to a tubular R.G.R.H. located in tower, where it was cooled with water before it entered the A.B.

This R.G.R.H. was intended to take the place of the lead cooling coil in the top of N° 1 R.H., which had given trouble by leaking. The condensate was taken back to the R.H., and the pipe continually gave trouble by getting full of crystals and stopping up.

The tubes of wrot iron also corroded, and this led to the design of the 2nd type of R.G.R.H., which was a pipe cooler like the R.F., located on the roof between N° 1 and N° 2 Elements, and showered with water on the outside, a wrot iron pan under it to receive and carry off the water.

The section of Tower, N° 2 Element, (Plan D-1152, Oct. 7, 1885), shows the general arrangement of the 5 C.Ls, the 3 R.Fs, the R.G.R.H. and R.F.C.L., and the L.C.L., with the small L.A.F. used to wash the gas from the filters on the way to the vacuum pumps. The L.G.S., the A.B. and the L.G.I., as arranged in N° 2 Element, are also shown.

S.H.: As the S.H. was the limiting apparatus it was necessary to build an annex to the Drying Room. Plan D-1011, 9/13/1884 shows a sectional view of N° 1 and N° 2 Elements Dryer Building; Plan D-1195, 7/17/1886, shows a sectional view of N° 2 Element and N° 1 Annex. Plan D-1197, 1/14/1886, shows a side section of N° 1 Annex, and Plan D-1123, a plan of N° 1 Annex.

Two horizontal Kingsford Engines, duplicates of those used for Compressors, were located in N° 1 Annex, to drive 12 S.Hs in N° 2 Element, and 16 S.Hs in N° 1 Annex.

Two vertical boilers were erected as part of the S.H. stacks to economize the heat from the S.H. fires. They made steam at boiler pressure, and supplied the engines.

The S.Hs were supplied with wet B.C. from the filters located parallel with tower wall, by bottom-dump cars running on tracks on platforms, with turntable at each line of posts.

When N° 2 Annex was built later some filters were located parallel with the S.H. supported on vacuum tank carried on main building posts by brackets.

The B.C. could be shoveled out in front of the S.H.

PACKING: The B.Ls and Packers are shown in Plan D-1479, 1/21/1889 with B.Ls N° 1, 2, 3 & 4, and with the driving engine for driving the packer and jumper , also used as a spare engine for S.H. in N° 2 and Annex.

Mac Tear Furnace. When N° 2 Annex, shown in Plans D-1612, 5/8/1890, and D-1623 6/6/1890, was built, 13 more S.Hs, and a Mac Tear Furnace for densifying the Ash, were put in. This furnace was fired with producer gas from a Taylor Producer using small anthracite coal.

Three additional B.Ls, one for the Dense Ash, were also built. The section Plan D-1623 shows how the furnace was arranged; also a section of the S. H. furnace, and the gas piping for S.H. CO_2 gas.

LIME KILNS: During 1885 the number of Kilns for N° 1 Element had been increased to 5, and 5 additional kilns were built for N° 2 Element on the West side of the elevators.

M.L. : The trouble with the old C.H.L., used as a lime slaker, led to the design of the M.L. See Plan L-1095, 3/18/1885.

We built and installed, after August 1885, two M.Ls,

arranged to receive lime in cars from the stone elevators at the level of the top of the lime hopper. See Plan L-1126.

These M.Ls worked so well that two additional ones were put in for N° 2 Element during 1886, and the C.H.L. was abandoned and taken out.

A vertical screen over a cone was afterwards installed to take out the sand from the milk of lime, and pumps to deliver it to the D.V., which became a reservoir when the milk was pumped direct into the D.S. top compartment of the N° 2 Element, where the liquid from the bottom of the R.H. above it met the milk.

This system abandoned the principle of the Prelimers, which has been so successful in our modern plants, and which was started with the D.V. and D.C. in the first plant.

The kilns, which we had, gave a gas of only 32 % CO_2 , which sometimes went down to 24. The limestone was not well burned, and the coke required was excessive--during 1884 it averaged 177 kos. per ton of stone, and 335 kos. per ton of Soda, and during 1885 the coke averaged 116 kos. per ton of stone and 210 kos. per ton of Soda.

The stone was generally red hot on top, and much heat was lost in the gas and through the thin sides.

Increase Height of Kilns. We therefore decided to increase the height, and prepared Plan L-1266, Feb. 23, 1887, of an extension to all of the kilns, and Plan L-1264, Feb. 3, 1887, a sectional view of kiln and lining, which shows the plant which was gradually evolved from the old plant.

These kilns increased the gas to 36% and decreased the coke also. The stone consumption was also reduced.

This type of kiln (See Plan L-2316) was satisfactory enough so that by 1893 the number of them in use at Syracuse was 32, and the M.Ls had increased to 10.

Limestone Supply:

The limestone was purchased from Britton's quarry, near Jamesville, and shipped at the rate of two cars a day, in flat cars that had to be unloaded off the limestone trestle by hand. We also bought grey limestone spalls which were delivered by team from Split Rock quarries, where grey limestone was quarried for building purposes.

We began to buy quarry land at Split Rock and study means of transportation, and finally decided on a Bleichert Tramway, and organized the Split Rock Cable Road Company, obtaining a right-of-way to the Split Rock Quarry.

The Cable Road from Split Rock had plans prepared in October 1885, and at that time there were 12 small lime kilns in place.

In the winter of 1886 we had trouble with our water supply from the canal, because the canal had to be repaired and the water was removed, so we had to put in a temporary dam. We therefore sought a supply from the lake, and on March 1st, 1886, Mr. Cogswell leased land from the New York Central Railroad for the Lake Pumping Station, and the 16 in. pipe with spherical joints was laid through a tunnel under the West Shore R. R. and across the Marsh and out into the lake from a scow.

The Knowles Pump, with a boiler and pump house, was erected, and a 12 in. pipe laid through a tunnel under the New York Central and Delaware, Lackawanna & Western R. R. across the canal on a small bridge alongside the Willis Avenue bridge, and along the berme bank to the Works, and connected to the tower tank.

This gave us a colder supply of water, as the inlet end was in 60 feet of water some 2200 feet from the pump.

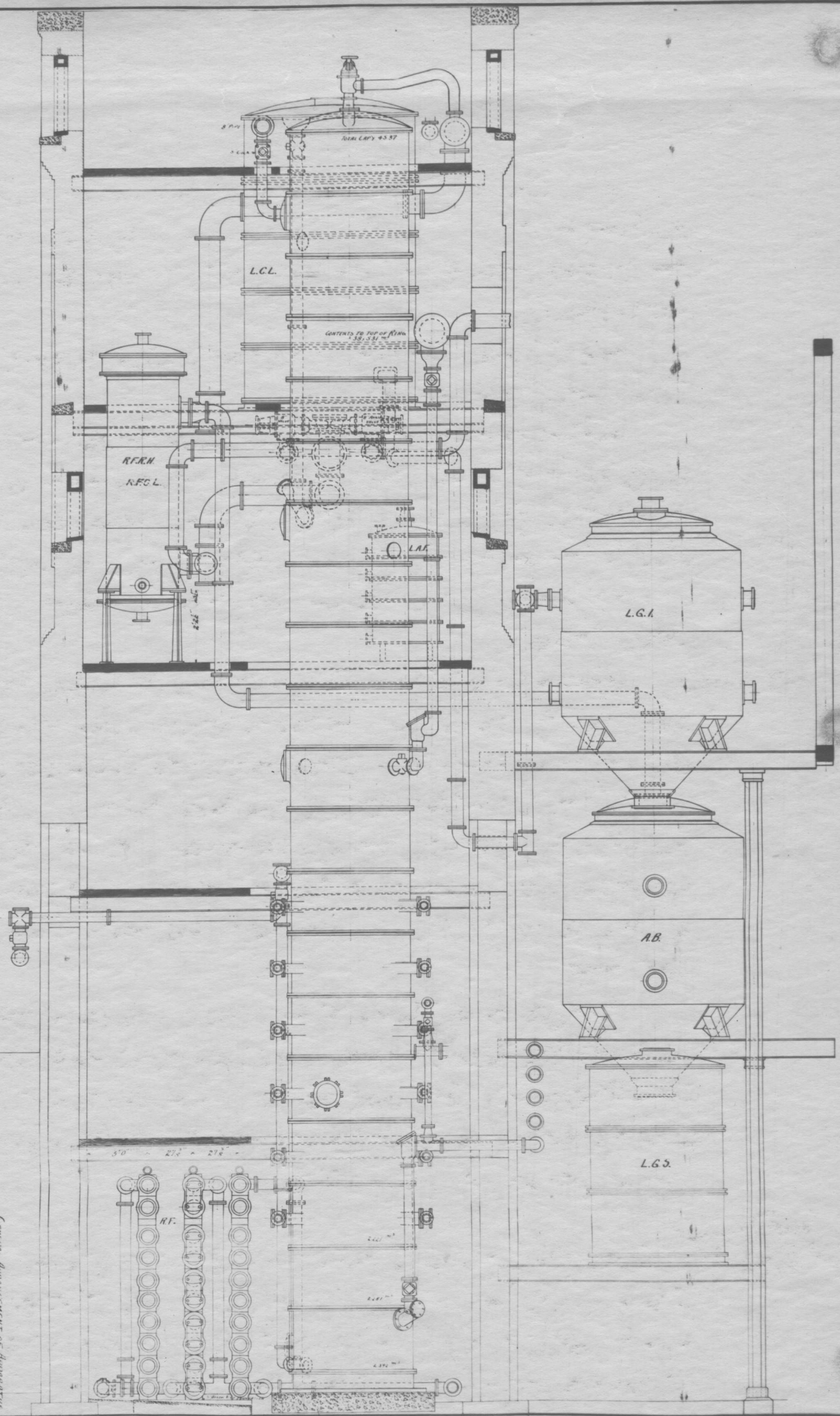
This pumping plant was soon enlarged by an additional boiler, a 10,000 gal. Worthington high-duty Pumping Engine, and a 30 in. pipe into the lake.

SEWER: We had no sewer to the lake, and had to depend on an open drain through the Blast Furnace property. Our waste ponds first started to the East of the old Salt Building, drained into the culvert under the canal and contaminated the spring water, which was used for cooling the Blast Furnace when the canal was empty. We arranged to supply them with water, and settled with them, but they were always a source of trouble, as the Gere's were largely interested and wanted to sell the property. The Company finally had to buy it at a good round price, to prevent being shut down and obtain a right-of-way to the lake.

We did not build the main sewer until 1890.

The D.S.Waste ponds were extended to fill in the low land of the old canal bed, and covered with cinders.

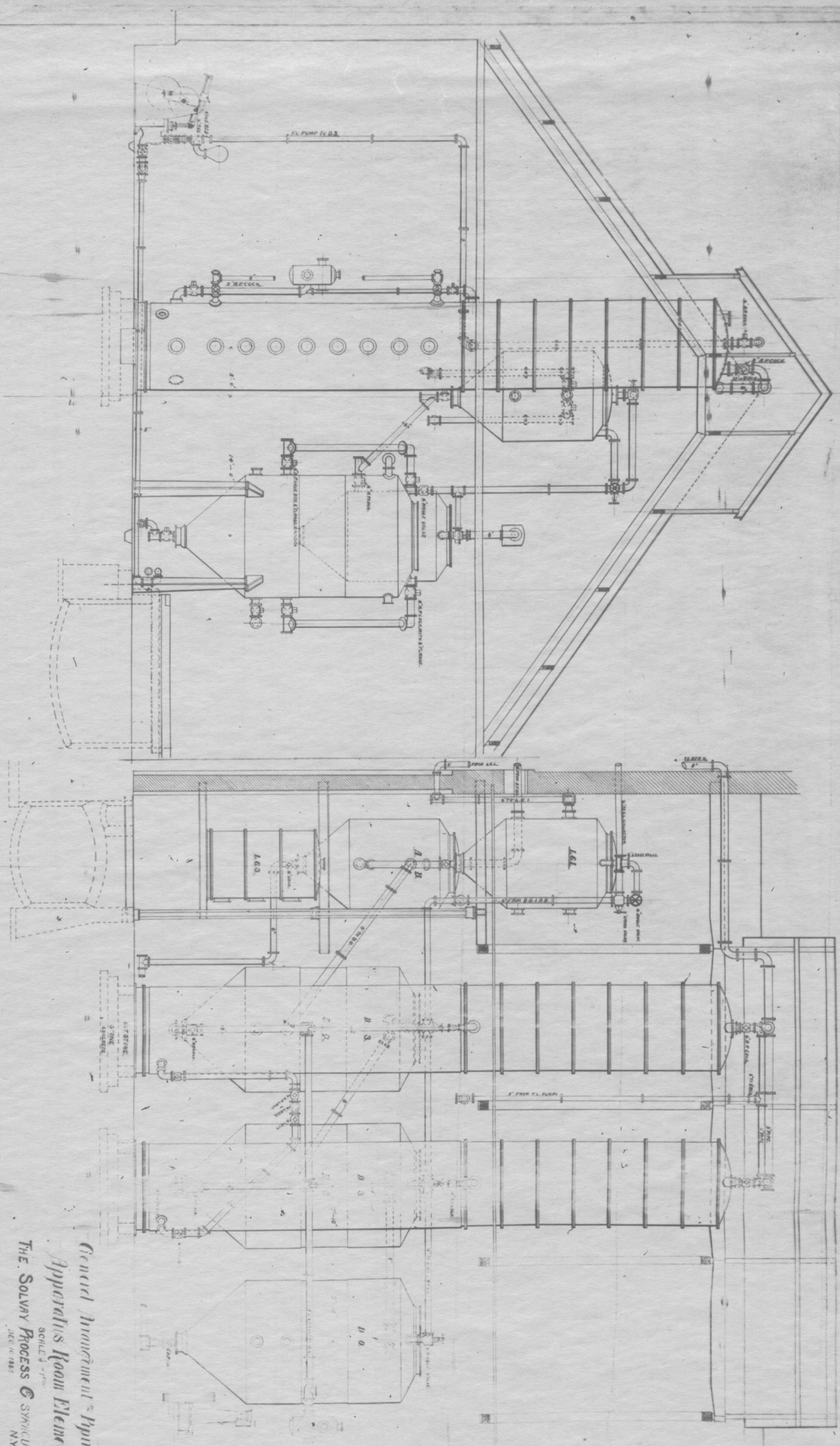
The writer remembers seeing a horse,attached to a delivery wagon, run away down the road tdwards the old office. The driver jumped just before he reached the waste pond, and the horse plunged into the waste six feet deep. We rescued the wagon and part of the harness, but the horse is there yet.



GENERAL ARRANGEMENT OF APPARATUS
IN TOWER - ELEMENT No. 6.
Scale 2" = 1'-0"
THE SOLVAY PROCESS CO., SYRACUSE N.Y.
Drawn By
Traced By
Checked By
Approved By
Date June 7 1883.

D 1152

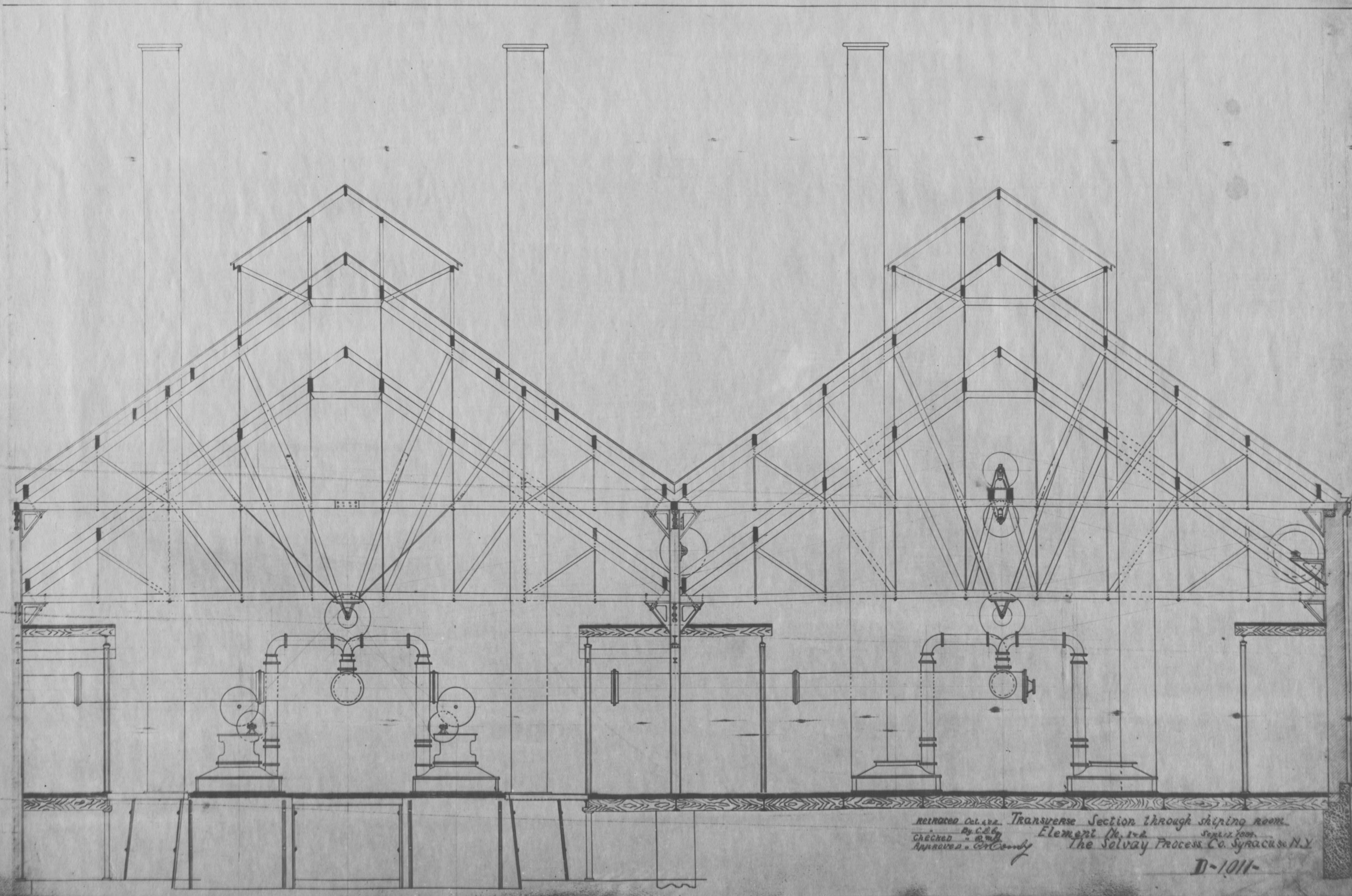
D-1152-IV-p44



General Arrangement & Piping
Apparatus Room Element 2
SCALE 1/4"
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
DEC 11 1883

D 1168

D-1168-IV-p44

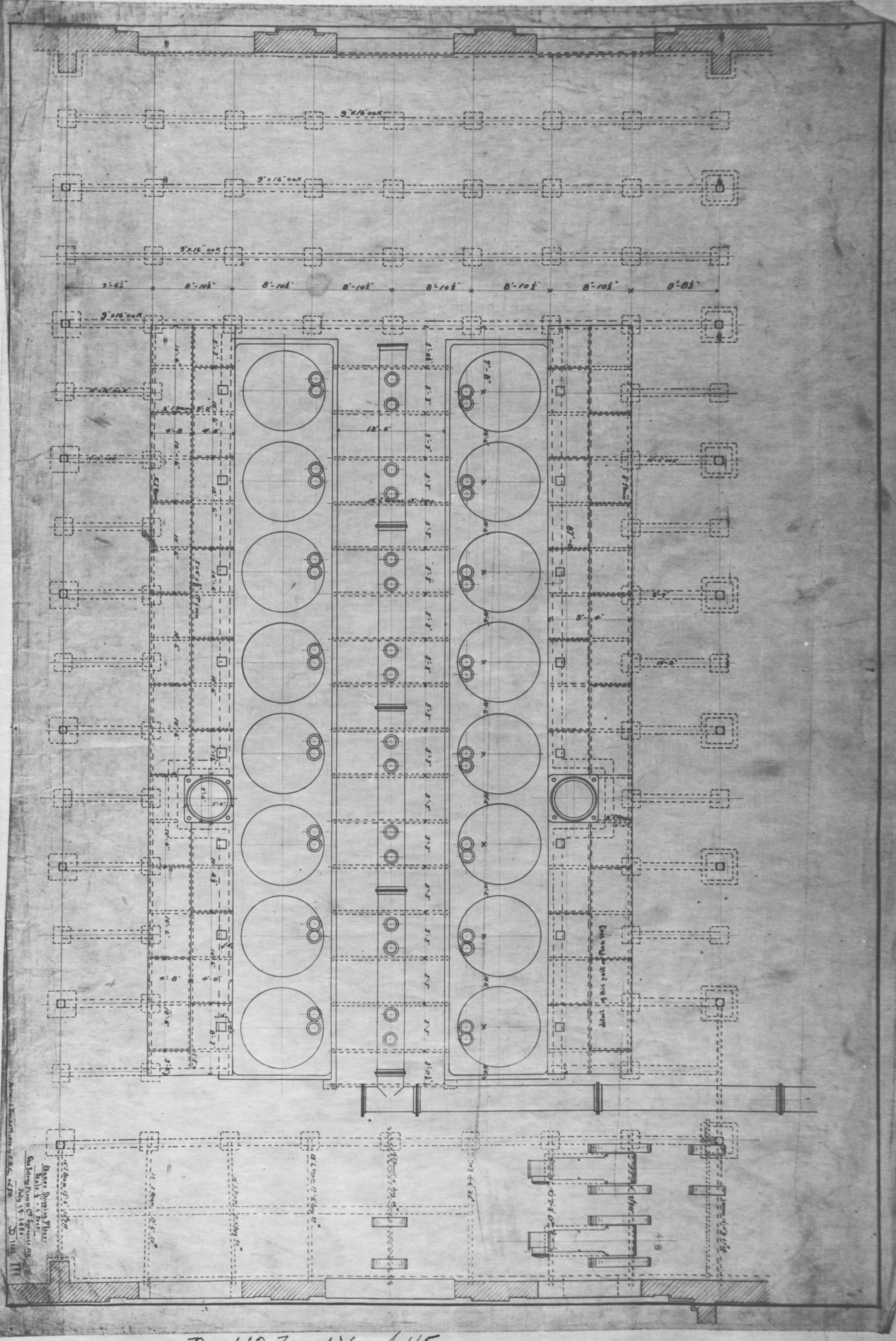


Retraced Oct. 4 '02.
" By C.L.G.
Checked " R.M.B.
Approved " CM Comly

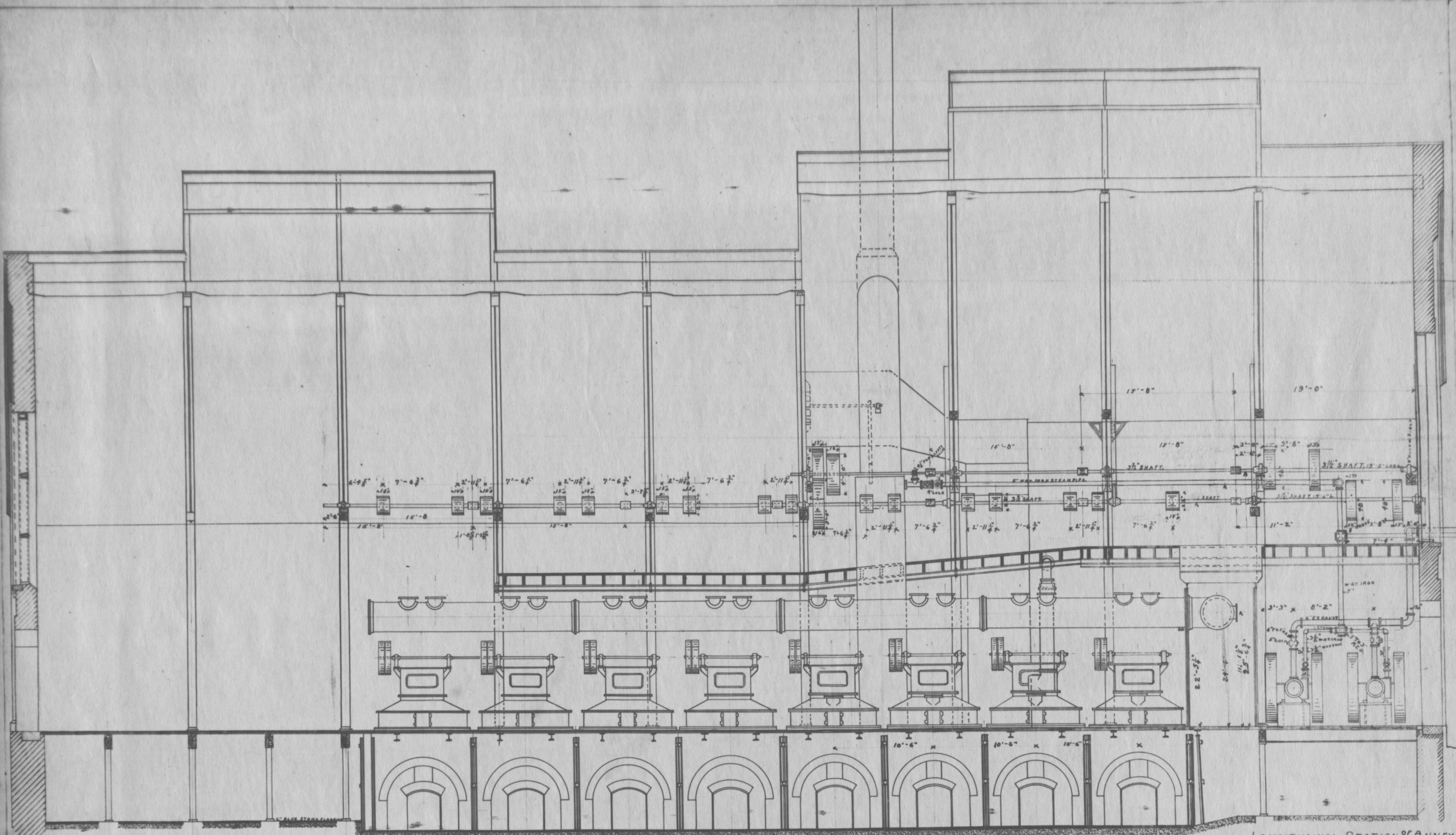
Transverse Section through shiping room.
Element No. 1 & 2. Sept. 17. 1889.
The Solvay Process Co. Syracuse N.Y.

D-1011-

D-1011 - IV - p45


Annex Shipping Floor.
Scale 1/4" = 1 Foot.
The Solvay Process Co. Syracuse N.Y.
July 15. 1888.
9" x 16" oak
12'-0"

D-1123-IV-p45



D-1197- IV- p45

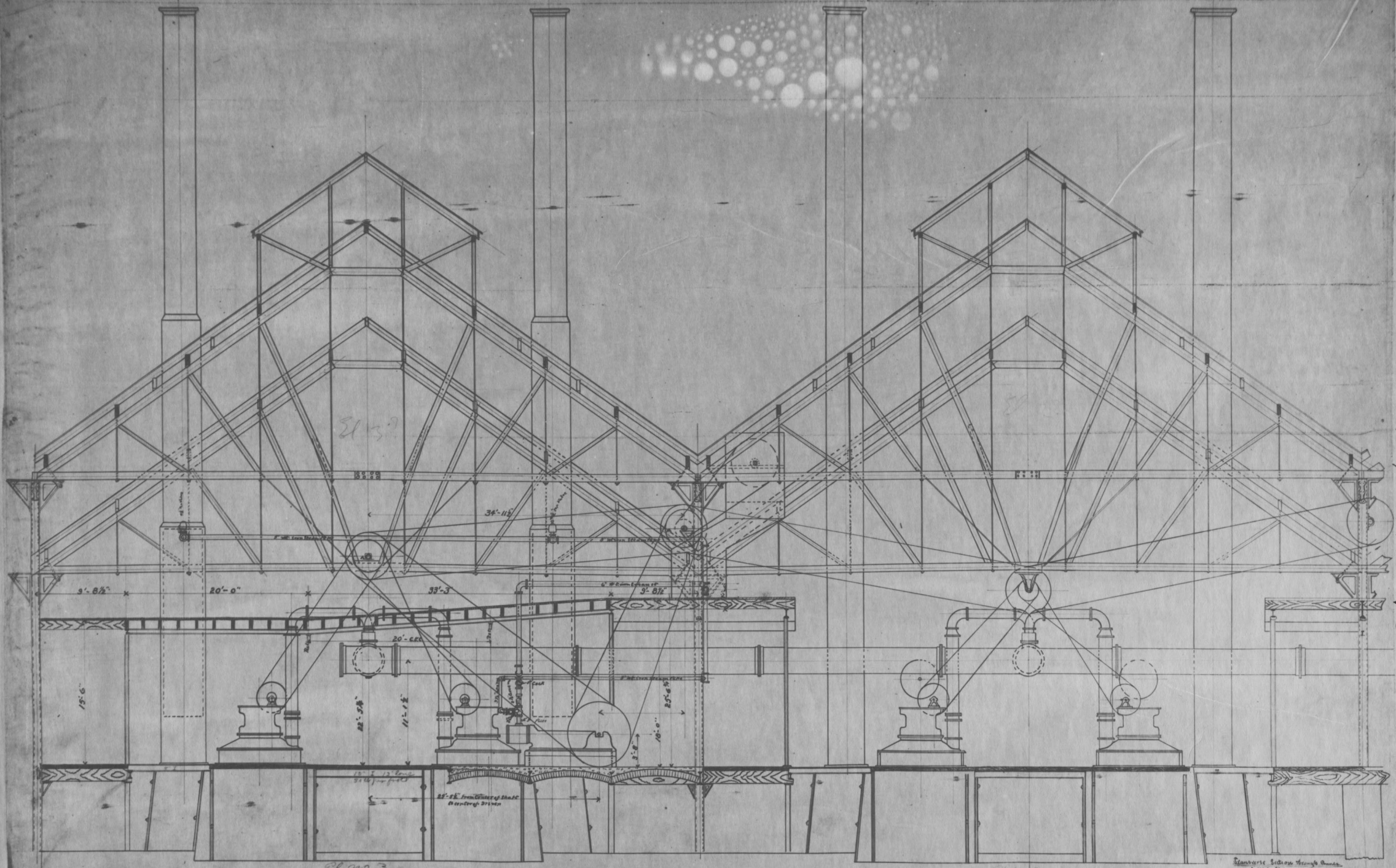
LONGITUDINAL SECTION OF ANNEX.
No. 1.

SCALE ¼ = 1'. JAN. 14, 1886.
The Solvay Process Co., Syracuse, N.Y.

RETRACED BY J.T.K. MAR. 17, 1899.
CHECKED
APPROVED

D 1197

now Ship. room El. 3 Look. East.

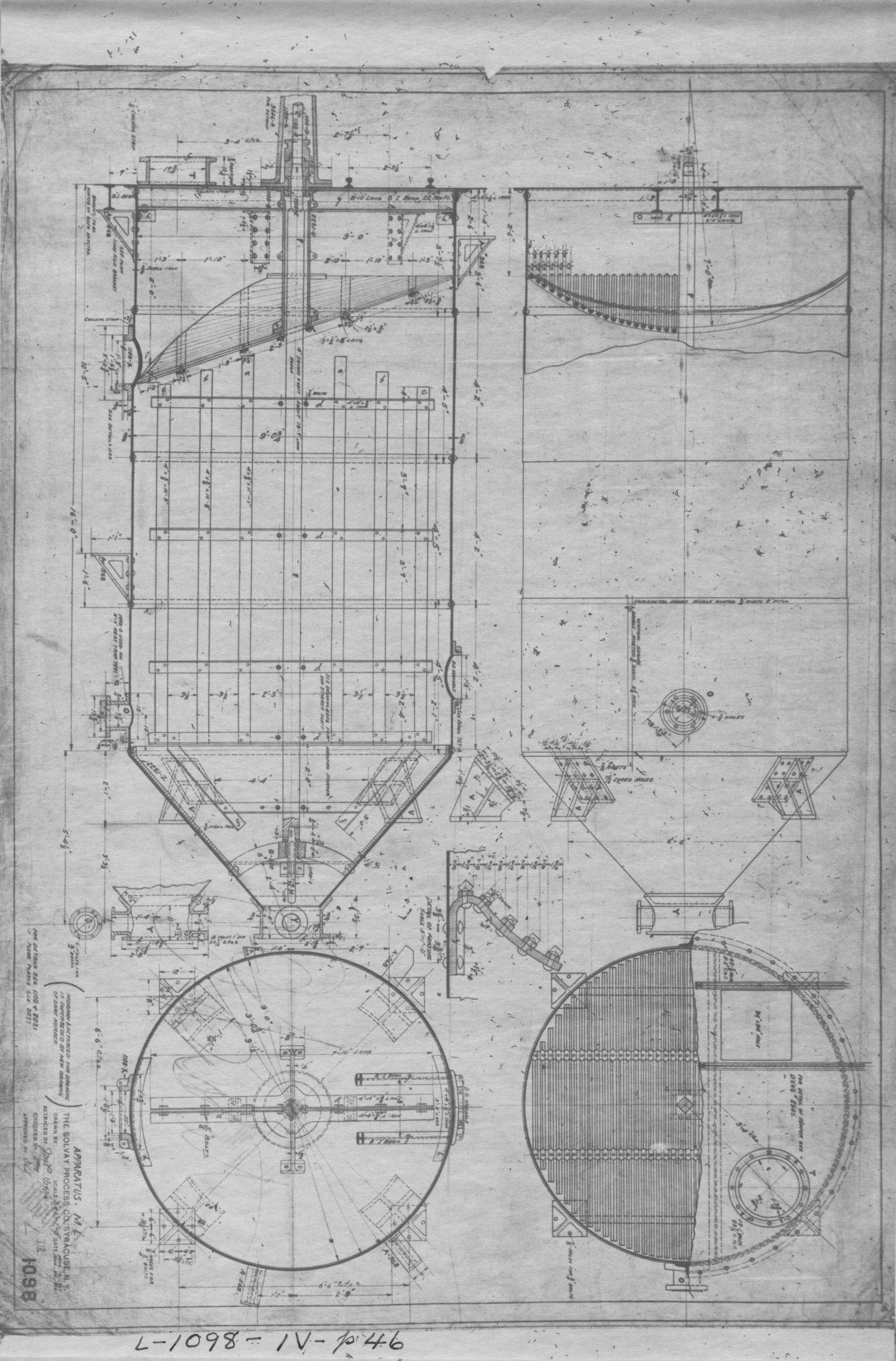


Transverse Section through Annex and No 2 Stripping Room
Scale ½ = 1 foot
Site Solway Process & Syndicate Ltd.
Redpath 1886.

Retraced 2 Dec 14th 1920 by ABC

D1196.

D-1198 - 11 - 45

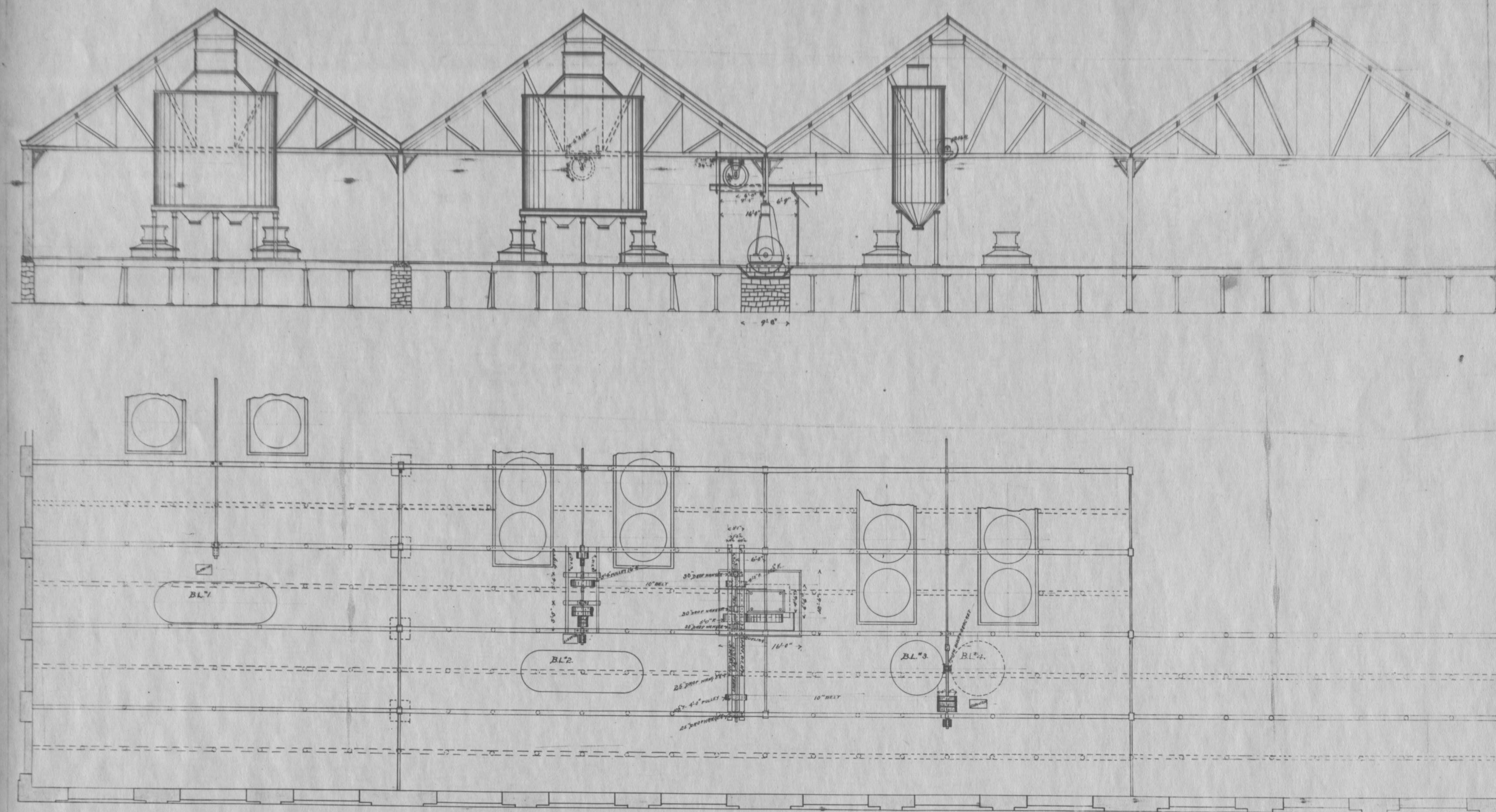


APPARATUS. M.E.
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
DRAWN BY
TRACED BY
CHECKED BY
APPROVED BY
SCALE
DATE

(REDRAWN & ELECTRIFIED THIS ARRANGING IS SUPERSEDED BY NEW DRAWING OF SAME NUMBER)

1098

L-1098 - IV - p. 46



GENERAL ARRANGEMENT
OF
B.L. ENGINE & SHAFTING ANNEX

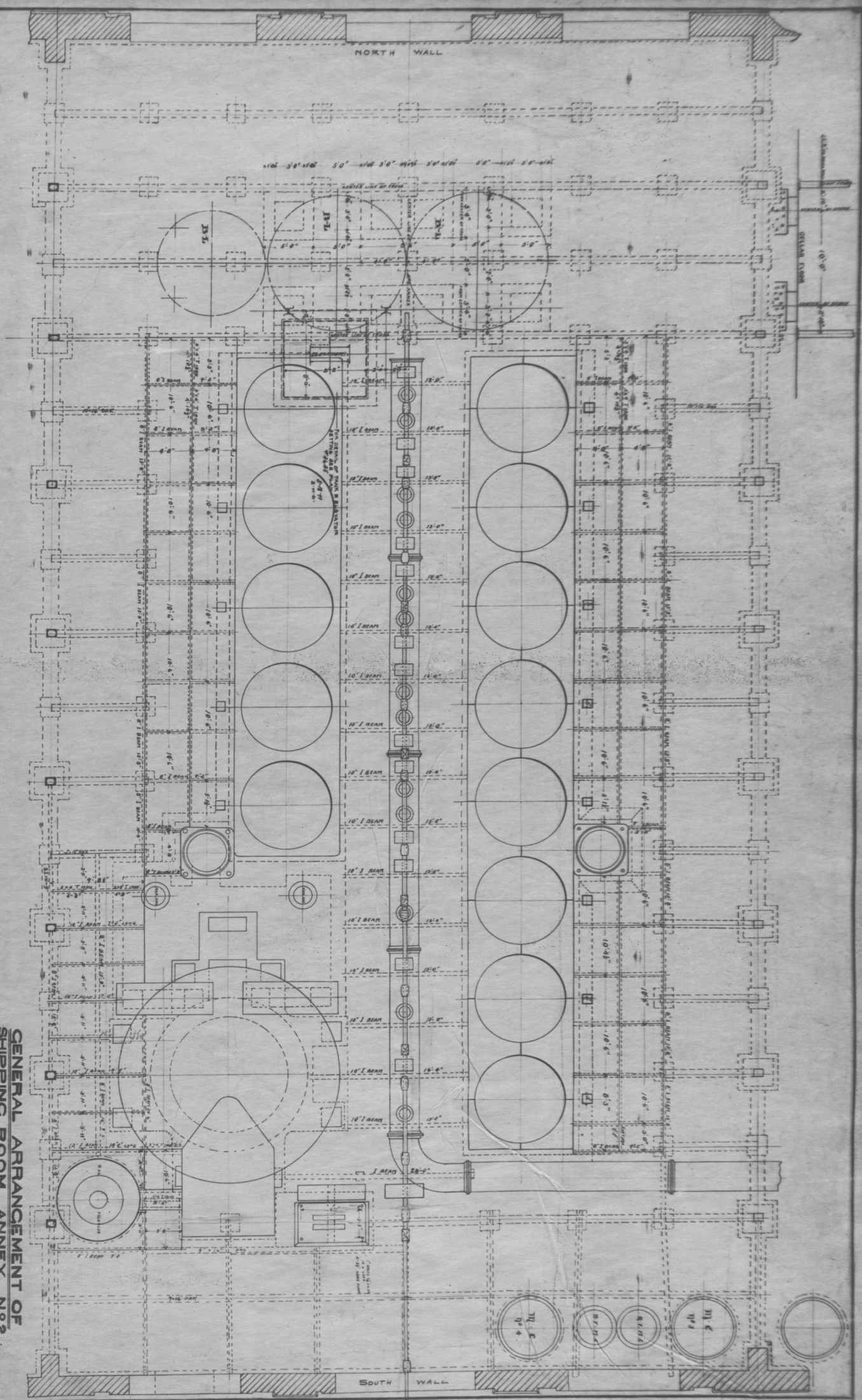
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.

JAN. 21, 1889. SCALE 1/8" = 1 FT.

RETRACED AUG. 7, 1899 BY E.H.F.
CHECKED BY X
APPROVED BY A.C.

D 1479.

D-1479- IV- p46



NOTE—
SEE DR 11629 FOR
CORRECT ARRANGEMENT
5/24/07 HL

GENERAL ARRANGEMENT OF
SHIPPING ROOM ANNEX No 2.

SCALE 1/4" = 1 FOOT.

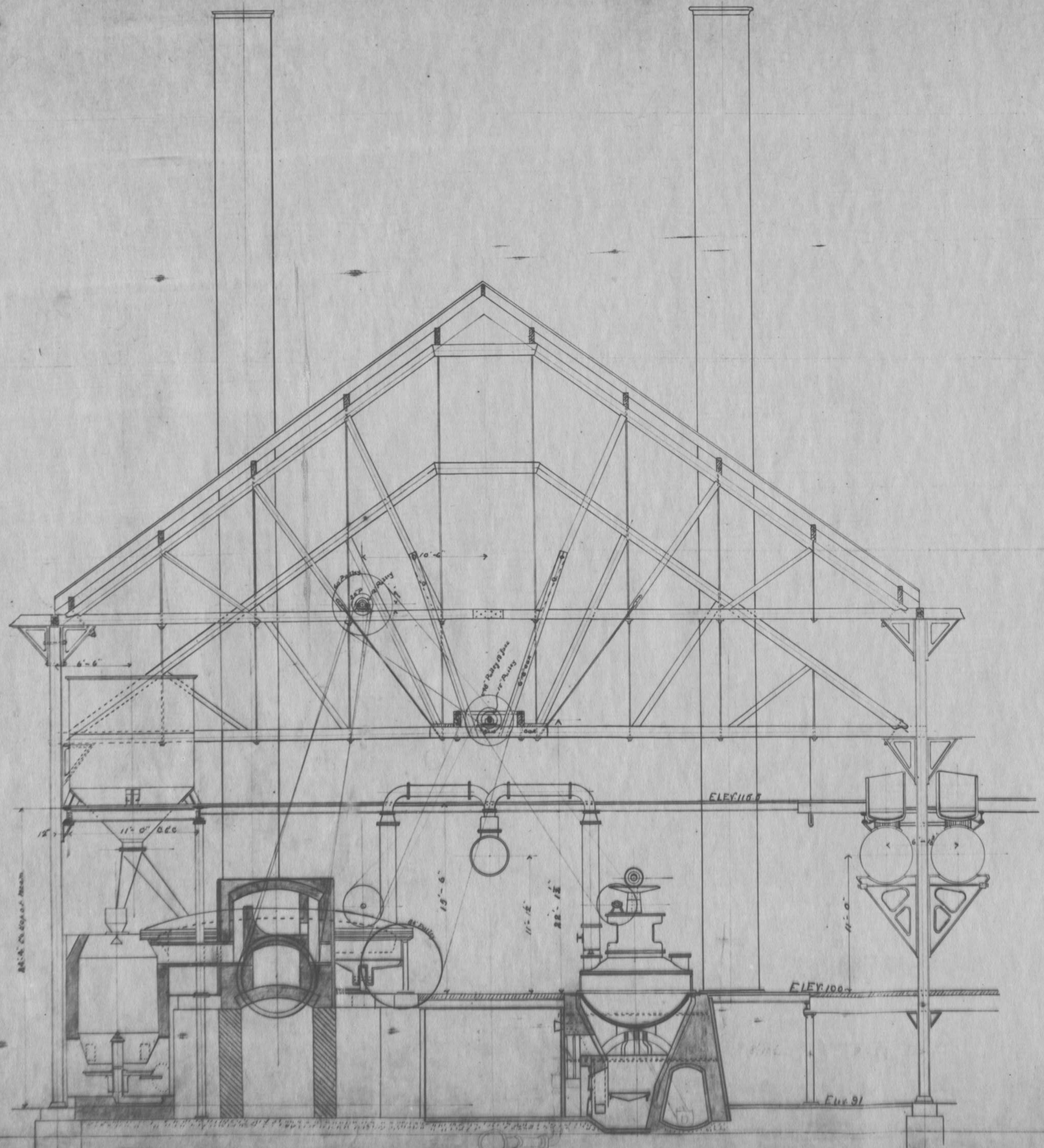
THE SOLVAY PROCESS CO. SYRACUSE. N.Y.

DRAWN APRIL 14 1892 EL. BOX MAY. 8. 1890

CHECKED BY

D 1612 III

D-1612-IV-p46



Transverse Section of Ammonia

Scale ¼" - 1 Foot

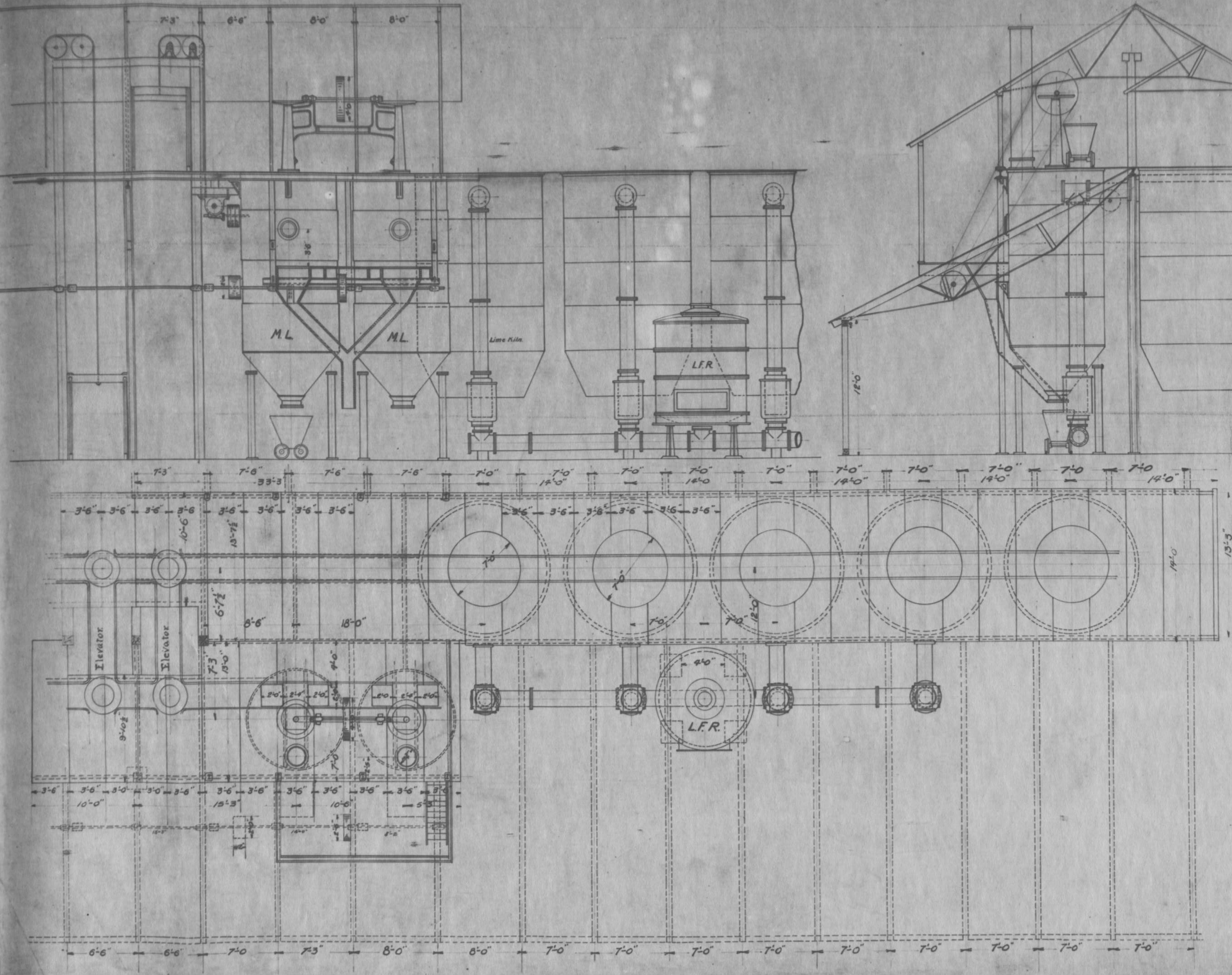
The Solvay Process Co.

Syracuse N.Y. 111

Drawn By
Checked By
Approved By
Retraced Oct 31, 1896 by OBC

June 6th 1890 - D1623

D-1623-IV-046



BILL OF PLATE IRON
FOR Lime Kiln AND M.L. Floor. E.N. 2.

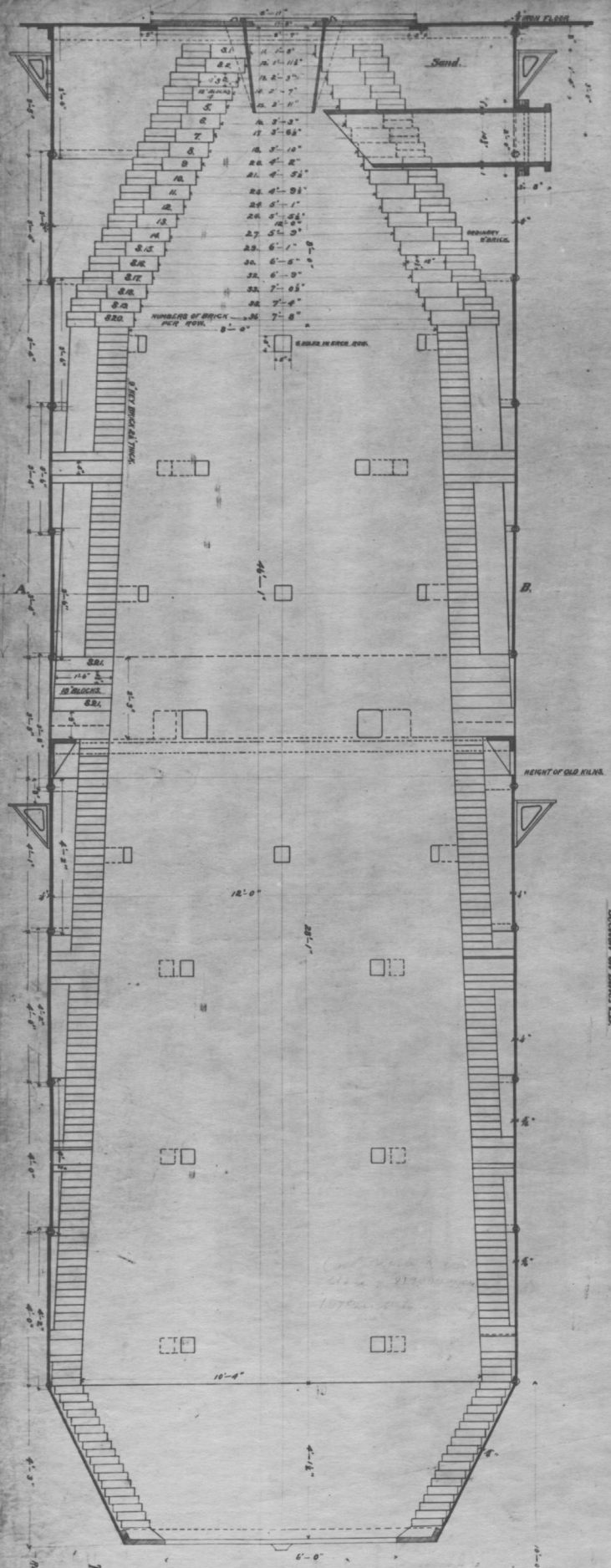
Number of Pieces	Size	Name.	Length	Width.	Square Feet	Weight per Sq. Ft.	Total Weight
2	3/8"	Plate Iron.	10'-6"	3'-6"			
7	"	"	13'-7½"	3'-6"			
8	"	"	13'-0"	3'-6"			
2	"	"	9'-10½"	3'-6"			
2	"	"	9'-10½"	3'-0"			
15	"	"	14'-0"	3'-6"			
10	"	"	4'-0"	3'-6"			
18	3/8"	Fish Plates.	13'-0"	0'-5"			
2	"	"	9'-6"	0'-5"			
5	"	"	9'-0"	0'-5"			
20	"	"	2'-9"	0'-5"			

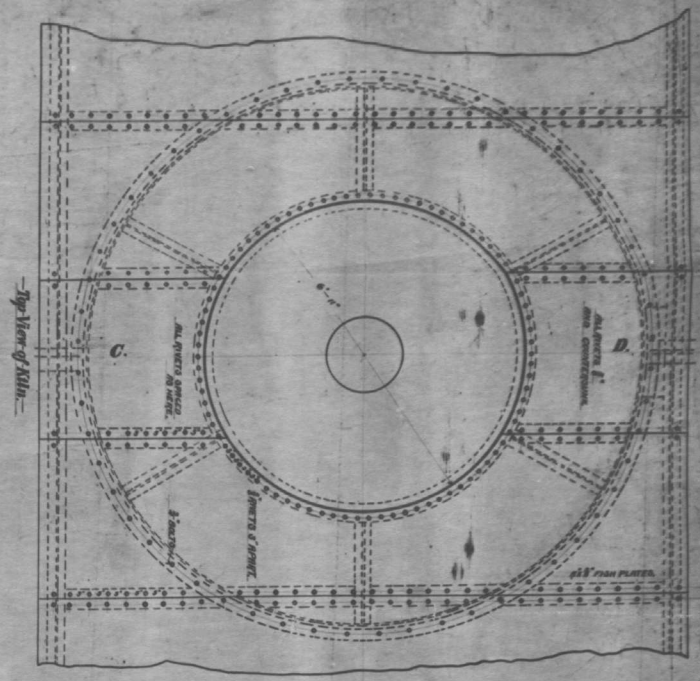
ROOFS AND IRON FLOOR FOR LIME KILN AND M.L.
Element No. 2.
Scale ¼ inch = 1 Foot.
The Solvay Process Co., Syracuse, N.Y.
July 22-1885.
RETRACED BY A.C.P. Jan 28 '98
CHECKED BY J.G.C.S.
APPROVED BY [illegible]

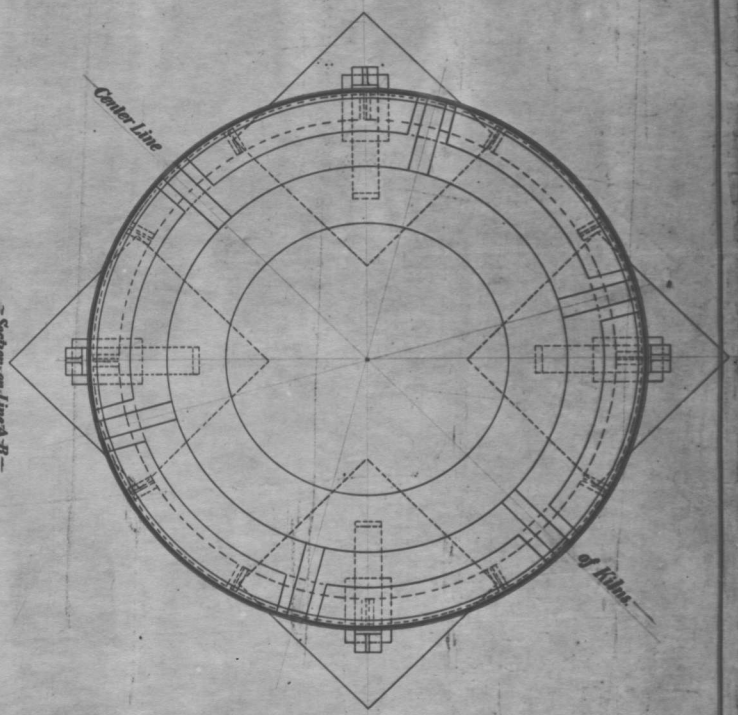
II

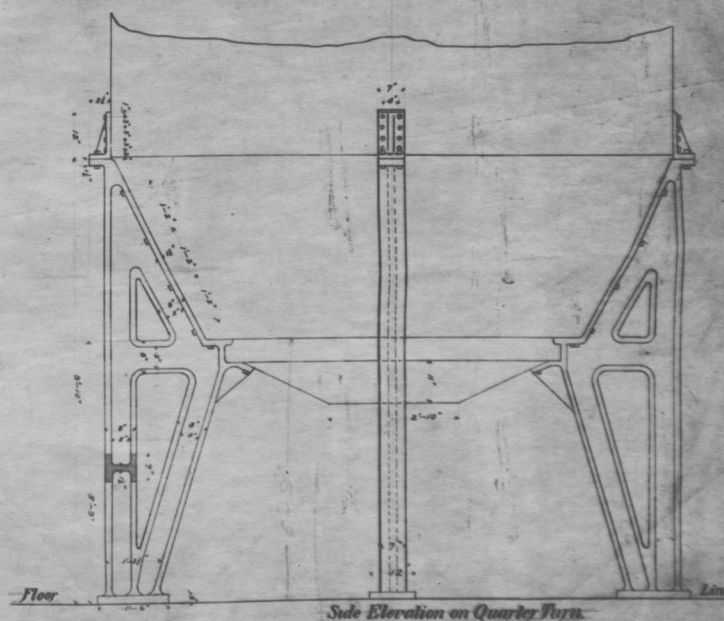
L1126.

L-1126- IV- p47







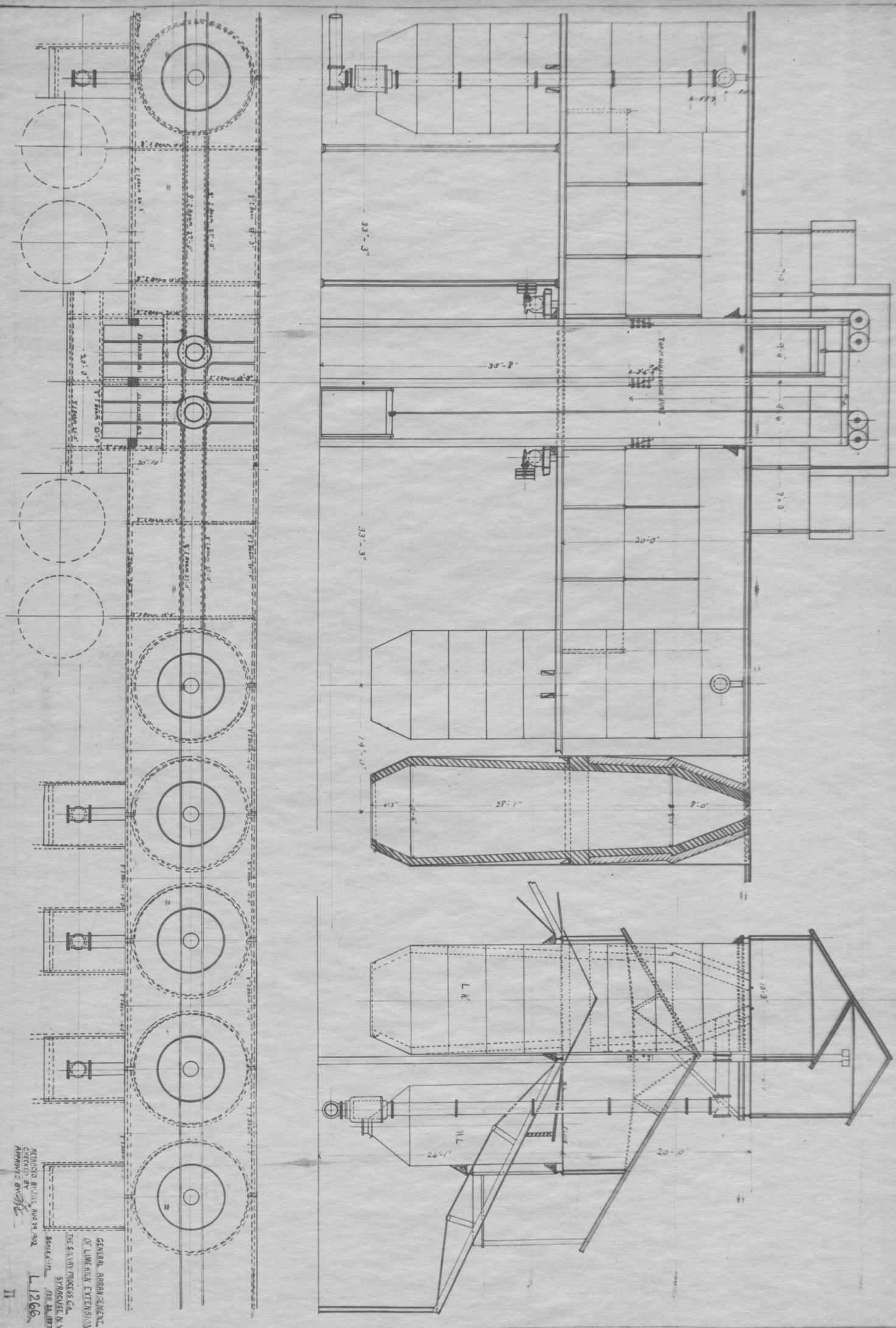


Detail of Modified LIME KILN
SCALE 1" = 1'-0"
The Solvay Process Co. Syracuse, N.Y.
FEBR. 1907.

RETRACED FEB. 15, 1908 BY WHC.

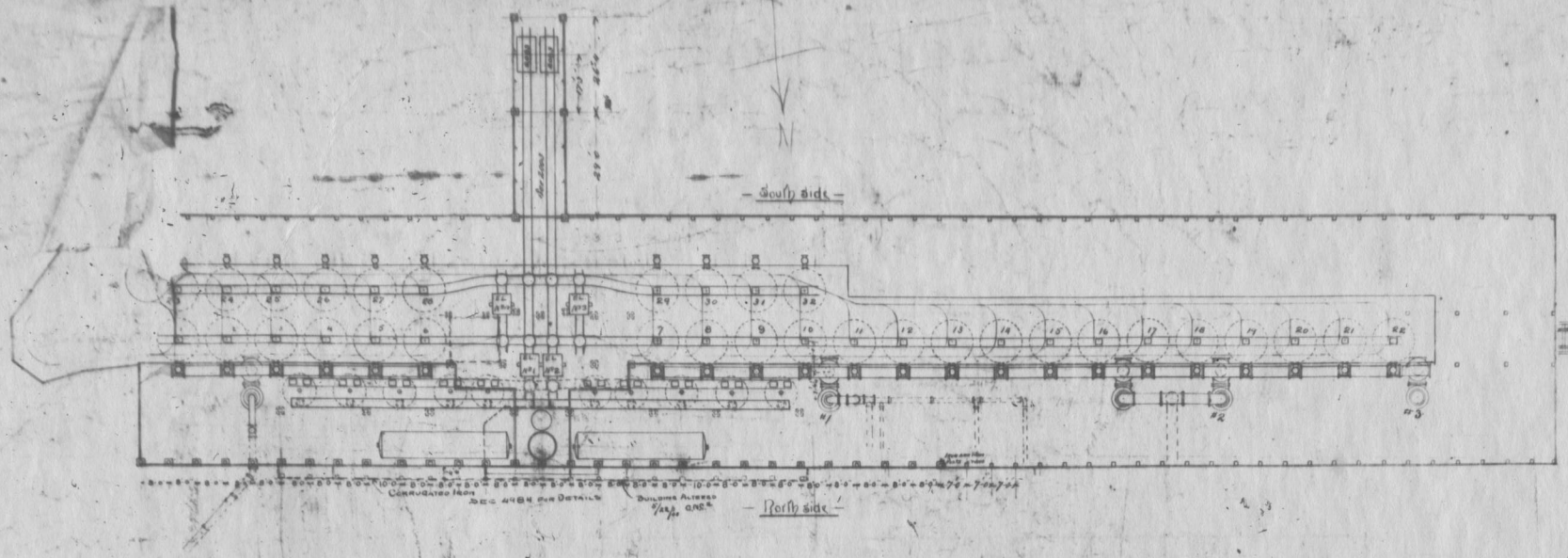
L-1264

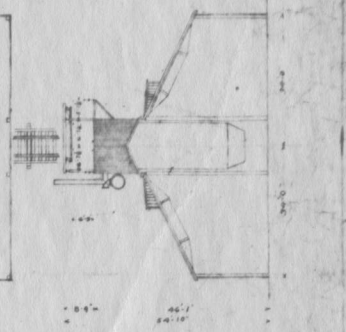
L-1264 - IV - p 47



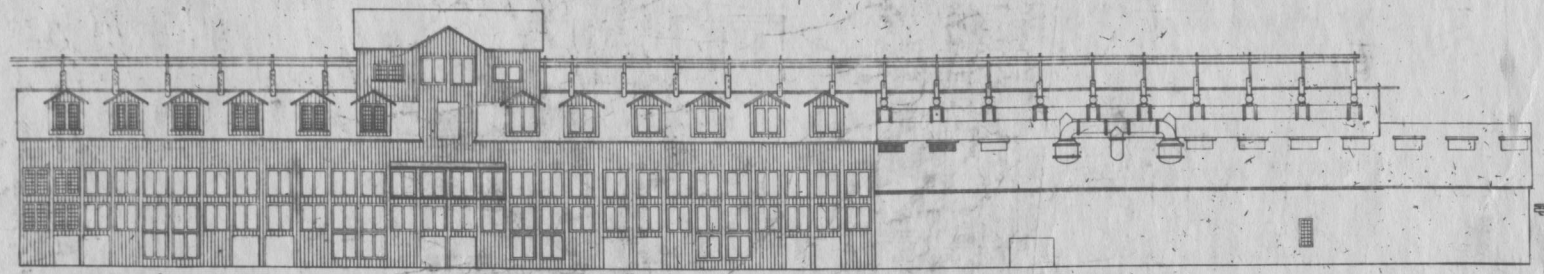
GENERAL ARRANGEMENT
OF LIME KILN EXTENSION
THE SOLVAY PROCESS Co.
SYRACUSE N.Y.
DRAWN BY
TRACED BY
CHECKED BY
APPROVED BY
L-1266

L-1266- IV- p 47

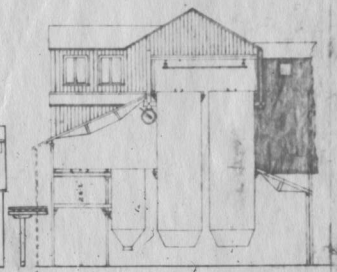




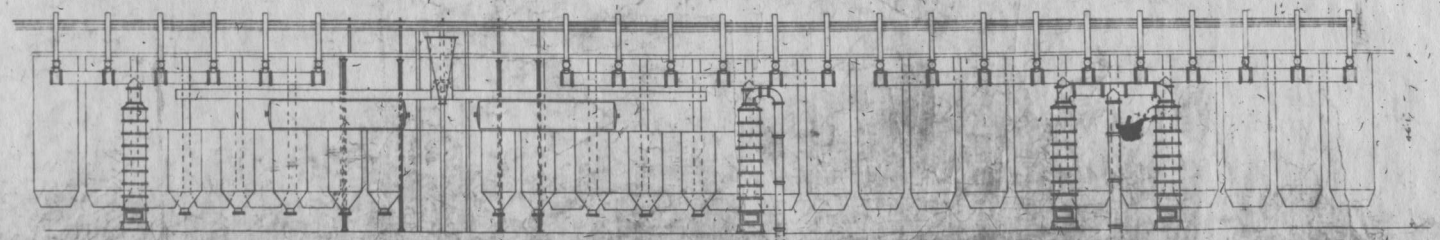
Section through single row of kilns



Elevation of north side



Section through double row of kilns



Elevation of Kilns-M.L.S.-&C.

General Plan of Lime Kiln Plant
Scale 1"
The Solvay Process Co. Syracuse N.Y.
Oct. 27 1893
L 2316

47-2316-11-4-89