1907

Design, specifications and cost estimate of two hundred ton stamp mill and cyanide plant for treatment of gold ore

John Payne Sebree

William Peter Hatch

THESIS

FOR THE

Degree of Bachelor of Science

IN

MINE ENGINEERING.

JOHN PAYNE SEBREE.
WILLIAM PETER HATCH.

SUBJECT:

"Design, Specifications and Cost Estimate of Two Hundred Ton Stamp Mill and Cyanide Plant for Treatment of Gold Ore."

JUNE, 1907.

THE OBJECT OF THIS THESIS IS THE DESIGNING OF A MILL, WRITING SPECIFICATIONS FOR SAME, AND FURNISHING COMPLETE COST OF ENTIRE PLANT TO TREAT 200 TONS OF GOLD ORE.

JOHN.S.SEBREE.
WILLIAM P.HATCH.

CHARACTER OF ORE.

The ore is from a quartz **wein** containing pyrite. The gold is partly in the pyrite and partly in the quartz.

Laboratory tests gave the following results:

Assay of the ore 1.205 ounces of gold per ton.

Cyanide Process	76%
Amalgamation	60%
Banell Chlorination	25%
Platner Process	24%
Amalgamation Concentrating and cyaniding	96%

Amalgamation concentration and cyaniding gave the greatest extraction and showed this to be the best possible method of treating the ore.

EXCAVATIONS:-

Excavations shall be carried out as per accompanying plans.

Excavations for concrete shall be carried to such depths as may be necessary to secure a solid bearing for the concrete, and of which the engineer shall be judge.

Excavations in rock shall be of such depth and form as the accompanying plans require.

Excavation to be paid for as earth or solid rock. The engineer to be the judge of the classification.

CONCRETE:-

The concrete foundations and supports shall be put in as shown in accompanying plans.

The cement must be of the best quality of freshly ground hydraulic cement, and be equal to the best Iola Portland Cement.

The concrete shall be in the following proportions by bulk.

One part of above specified Portland cement
Three parts clean sharp sand
Six parts crushed stone to pass a 2" ring and free from fines and all earthy admixture.

The rock to come from the excavations, the crusher for the mill being temporarily installed for the work.

FRAME WORK.

All timber used in the frame work of the mill shall be of long leaf yellow pine or its equivalent in the opinion of the engineer in charge of the work.

Columns, Girders, Braces, Rafters and all other timbers shall be placed according to accompanying plans.

EXCAVATIONS:-

Excavations shall be carried out as per accompanying pla

GIRDERS:-

The girders shall consist of three 3" X 12" pieces bolted together to form a single girder and shall be placed and supported as per accompanying plans.

FRAMED TIMBERS:-

All timber shall be carefully framed on the ground before being placed in position and all girders shall rest squarely on their supports and make an angle of ninety degrees with same,as per accompanying plans.

ROOFING:-

The roofing shall consist of corrugated iron.

SIDING:-

Siding shall consist of corrugated iron and shall be supported by braces consisting of 2" X 4" pieces of sound wood placed horizontally between the columns and four feet apart in a vertical direction.

TANKS:-

There shall be two tanks. Each tank shall be built of 1/4" tank steel with double rows of rivets.

Each tank shall be 12' inside diameter and shall be 20' high.

CRUSHER BIN:-

The crusher bin shall be built as per accompanying plans. The bottom timbers shall be 12" X 12", of long leaf yellow pine. The side timbers shall be of same material and 6" X 6" and framed as shown in plans. The siding shall be 2" X 12" long leaf yellow pine and the bin shall be lined with #10 sheet iron. The ore gate shall be 36" X 36", with guides,hand wheel,pinion and rack.

GRIZZLEY:-

There shall be one grizzley six feet wide by twelve feet long. It shall be composed of bars four inches deep,one inch thick at the top and three-forths inches thick at the bottom

and held one inch apart at top, by washers. The whole to be held together by tie rods and nuts.

BOLTS AND WASHERS:-

All necessary bolts, washers and nails for ore bin and buildings.

CRUSHER:-

The Crusher or Rock Breaker shall be a Gates #3 Style D, as per catalogue.

BELT CONVEYOR:-

There shall be one belt conveyor of four ply rubber such as is made by the Robbins Belt Conveyor Co. It shall be three feet wide by one hundred and seventy-five feet long. It shall be supplied with carriers three feet apart under the top and five feet apart returning, and provided with an automatic distributor.

FEED BINS:-

There shall be a six compartment feed bin. One compartment to each set of ten stamps as per accompanying plan. They shall be built as per accompanying plan. Each compartment shall be provided with two ore gates 24" X 30" with girders, hand wheel, pinion and rack. They shall be lined with #10 sheet iron.

FEEDERS:-

Twelve Challenge Automatic Feeders, with wood frames and sheet iron hoppers. All necessary track iron for feeders to run upon with wood screws. To be placed as per accompanying plans.

STAMPS:-

Six sets of ten #800 stamps each, arranged in batteries of five stamps each as shown in accompanying plan. Each set arranged to be run from main shaft by belt and tightener.

Each set shall be complete, having high mortar boxes of latest improved design manufactured by Allis Chalmers.

All necessary parts,as shoes,dies,cams,cam shaft,stems,to be furnished and set up ready to run.

Batteries to be placed as per accompanying plans.

PLATES:-

Twelve plates of L.S. Copper 52" X 192" X 1/8" thick for tables in front of mortors.

Each sheet to be electro-plated on one side with one ounce of silver to the square foot of surface.

These sheets to be placed as shown on plans and provided with a mercury well at the lower end.

LAUNDERS:-

Each plate shall be provided with a board launder,as per accompanying plan. Launders to be made of 3/4" X 6" yellow pine.

FRUE VANNERS:-

There shall be twenty-four Frue Vanners made by Allis Chalmers,placed as per accomanying plans.

Each vanner shall be twelve feet long by four feet wide by four feet high. Each vanner to be furnished with a pulp distributor and a wash water distributor of latest improved pattern and all bolts,nuts and washers necessary for fitting it up. Boxes for catching the heads and washing the belt are also to be furnished as per our plans.

LAUNDERS:-

Two concrete launders twelve inches deep and twenty-four inches wide arranged under the ends of the vanners as per accompanying plans to convey the tailings to the tailings tank.

TAILINGS TANK:-

A concrete tailings tank three feet deep and fifteen feet wide and thirty-two feet long to be built as per plans just east of the mill building. All tailings to be conducted to this tank. Overflow to hillside down to creek below.

Pipe connections to be arranged at bottom for drawing off pulp as shown in plan.

CLEAN UP PAN:-

Two 48" clean up pans made by Allis Chalmers company and placed as per accompanying plan. All necessary parts and bolts, washers and nuts for same.

RETORT FURNACES:-

There shall be one pot furnace having an area of 26" X 18" so that two retorts can be placed in each. They shall also be provided with a one ton differential pulley for raising and lowering retorts and crux's

ASSAY FURNACE:-

The assay furnace shall have two 18" muffles and shall be built as per plans.

POWER TRANSMISSION:-

All shafting,pulleys,bearings and belting necessary for driving all of the above described machinery,in accordance with our plans.

All pulleys to be turned,bored,key seated and balanced. All pillow blocks to be lined with babbitt metal. All bolts to be furnished for bearings.

Shafting to be key seated to suit pulleys as per plans. All belts throughout the mill to be of best quality,and all necessary lace leather to be furnished.

An assortment of copper rivets and burrs.

WATER PIPE.

All water pipe shall be of the best block wrought iron pipe,Valves and fittings to be furnished for the complete mill also tank connections in accordance with accompanying plans.

Water pipe from tanks shall be 4" in diameter. A two inch pipe shall run in front of the stamps with reducing Tee's at each battery and each battery shall be provided with feed water from a one inch pipe suitably connected to the tees by means of valves,etc. Also a short section of hose shall be connected up for washing off the plates.

A 2" pipe shall be run over the vanners and 1" pipes with suitable valves shall lead to the water distributor of each vanner.

The tank shall be so connected that one will overflow into the other so that the head shall be constant on the vanner.

OVERHEAD CRAWL AND BLOCK.

Two overhead Craws complete

Two one ton differential pulleys

One crawl to be placed over stamps. The other to lift crucibles and retorts from pot furnace. All necessary track iron 1 1/2" X 1/4" punched and countersunk, with wooden screws for laying same.

SHAFTING: Main Stamp shaft.

FOR CRUSHER:-

Power for the breaker to be furnished by one thirty horse power three phase Westinghouse five hundred volt induction motor.

BELT CONVEYOR:-

Power for the belt conveyor to be furnished by a ten horse power three phase Westinghous five hundred volt Induction Motor.

STAMPS:-

Power to be furnished stamps by two forty horse power three phase Westinghouse five hundred volt Induction motors placed as per plans and belted to main shaft by endless leather belt.

VANNERS:-

Power for vanners to be furnished by two eight horse power three phase Westinghouse five hundred volt Induction Motors placed as per plans and belted to driving shaft by endless leather belt.

PANS:-

Power for the clean up pans shall be furnished by endless belt from vanner shaft to pan counter shaft as shown in accompanying plans.

Power to be brought from the Power Company, whose plant is situated on a water fall fifteen miles distant. Power is transmitted at 20,000 volts and stepped down to 500 volts for use on the motors.

(See plans for transformer house).

TRANSFORMER:-

The transformer shall have a capacity of 120 K.W. and shall not heat more than fifty degrees Fahrenheit when motors are running at full capacity.

It shall have an efficiency of at least 96%

CYANIDE PLANT.

EXCAVATION:-

Excavation shall be carried out as per accompanying plans.

Excavation for concrete shall be carried to such depths as may be necessary to secure a solid bearing for the concrete. The engineer shall be the judge of the depth necessary.

Excavation in rock shallbe of such depth and form as the accompanying plans require.

Excavation shall be paid for as earth or solid rock. The engineer to be the judge of the classification.

CONCRETE:-

The concrete foundations and supports shall be put in as per accompanying plans.

The cement shall be of the best quality of freshly ground hydraulic cement and be equal to the best of Iola Portland Cement.

The concrete shall be in the following proportions by bulk:

One part above specified Portland cement

Three parts clean sharp sand

Six parts crushed stone to pass a two inch ring and be free from fines and all earthy admixture.

The rocks to come from the excavations. The crusher for the mill to be temporarily installed for the work.

FRAME WORK:-

All timber used in the frame work of the mill shall be of long leaf yellow pine or its equivalent in the opinion of the engineer in charge of the work.

Columns,girders,joists,braces and all other timbers shall be placed according to the accompanying plans.

GIRDERS AND JOISTS:-

The Girders and Joists shallconsist of two 3" X 12" timbers bolted together to form a single girder and shall be placed and supported as per accompanying plans.

FRAMED TIMBERS:-

All timbers shall be carefully framed on the ground before being placed in position and all girders shall rest squarely on their support and make an angle of ninety degrees with the same as per accompanying plans.

ROOFING:-

The roofing shall consist of corrugated iron and shall be supported on purlins as shown in accompanying plans.

SIDING:-

The siding shall be of corrugated iron and be fastened to braces of 2" X 4" pieces of sound wood placed between the columns 4' apart in a vertical direction.

GOLD SOLUTION TANK:-

The gold solution tank shall be 15' in diameter by 8' high,built of 2" Redwood staves and banded with lug hoops.

SUMP TANK:-

There shall be two sump tanks connected to the zinc box as shown in accompanying plans. They shall be 30' in diameter by 12' high,built of 3" redwood staves and banded with lug hoops.

VACUUM TANK:--

The vacuum tank shall be 4' in diameter and 5' high. It shall be made of tank steel with double rows of rivets. It shall have the necessary connections for a Gould & Co's vacuum pump.

LEACHING VATS:-

There shall be eight leaching vats,placed as per accompanying plans. They shall be 30' in diameter by 9' high, built of 3" redwood staves and bonded with lug hoops.

ZINC BOXES:-

The zinc boxes shall be three in number placed as shown in accompanying plans.

They shall be 30" wide by 4" deep and 13' long. They shall be made of 2" plank and have six compartments. Each compartment

30" X 4' X 2 1/2'. They shall be provided with the proper screens and baffle boards as per plans.

CENTRIFUGAL PUMPS:-

There shallbbe a centrifugal pump having a 4 1/2" a suction and a 4" outlet to pump the tailings to the leaching vats.

There shall also be a 3" centrifugal pump placed above sump tanks for pumping solutions to vat.

DISTRIBUTORS:-

The pulp shall be charged to the leaching vats by two"Class W" Blaisdell Distributors. The necessary tracks for moving the distributor shall be put in as per plans.

LAUNDERS:-

There shall be a launder 12" deep and 24" wide under each row of leaching vats for carrying off the sand when vats are flushed out.

They shall be built of cypress and placed as shown in accompanying plans.

PIPE:-

There shallbbe a line of 4" pipe from the tailings tank to the leaching vats as per accompanying plans.

The pipe shall be of wrought iron and shall have the crosses and valves necessary placed as shown in accompanying plans.

The wash water pipe shall be 1 1/4" in diameter and shall be placed as shown in plans. All connections made as shown.

The gold solution pipe shall be 1 1/2" and shall be connected to each vat as shown in plans.

POWER:-

Each pump shall be direct connected to a ten horse power Westinghouse Three Phase Induction Motor.

VALVES:-

All valves on the tailings pipe line shall be of the "Gate" or "Straight Way" pattern. They shall be entirely of iron to prevent wearing by the sand.

All valves on Cyanide solution pipe line shall be of the "Globe" pattern and shall be entirely of iron. No brass shall be placed any where in this line.

All valves on gold solution pipe line shall be of the Globe pattern and shall be entirely of iron. No brass shall be placed anywhere in this line.

All valves on the water line shall be of the Globe pattern and shall have brass valves and seats.

COST ESTIMATE FOR STAMP MILL.

EXCAVATION:-

8216 cubic yards @ $1.50 per yard	=	$12324.00

CONCRETE:-

1455 cubic yards @ $5.00 per yard	=	7275.00

TIMBERS:-

12 X 12 X 16-39370 feet B.M.@ $29.00 per M	=	1141.73
6 X 6 X 16- 3288 " " " " $28.00	=	92.08
2 X 4 X 16- 2752 " " " " $22.75	=	62.96
4 X 4 X 14- 3570 " " " " $27.00	=	96.39
2 X 12 X 14-14428 " " " " $22.00	=	317.42
18 pieces 12 X 24 X 28-10656 @ $50.00 per M	=	532.80
24 " 24 X 24 X 5- 5660 " $50.00 " "	=	283.00

TANKS.

2- 12' X 20' high tanks 1/4" steel @ $240 each	=	480.00

CORRUGATED IRON:-

14310 sq ft Roofing @ $2.75 per 100 sq ft	=	107.32
10784 " " siding " $2.75 " " " " "	=	808.80

SHEET IRON LINING FOR BINS:-

4778 sq.ft of #10 Sheet iron @ 2.40 per hundred	=	466.71

ORE BIN GATES:-

One 36" X 36" Ore Bin Gate complete @ $29.75	=	29.75
Twelve 24" X 30" " " Gates " " $16.00	=	192.00

GRIZZLEY.

One	=	100.00

CRUSHER:-

One #3 Gates Breake Style D @ = $2400.00

FEEDERS:-

Twelve Challenge Feeders @ $50.00 = 600.00

STAMPS:--

Sixty #80 Allis-Chalmers Stamps @ $300. = ~~1800.00~~ 18000.00

AMALGAMATED PLATES:-

Twelve 1/8" X 52" X 192" Silver Plated Copper Plates @ $300.50 = 3606.00

VANNERS:-

Twenty-four 12' Frue Vanners.Belts 4' wide @ $400. = 9600.00

CLEAN UP PANS:-

Two 48" Allis Chalmers Clean Up Pans @ $450. = 900.00

FURNACES:-

One pot furnace 26" X 18" Grate @ $150. = 150.00

One Assay " Two muffles @ $200. = 200.00

BELT CONVEYORS:-

One 4 ply rubber belt 3' wide by 175' long @ $ 8.75 per ft. = 1531.25

28 carriers for same @ $3.00 each = 84.00

17 returns " " " 2.00 " = 34.00

PIPING:-

150' of 4" Wrot.Iron Pipe @	$34.56 per 100'	=	362.88
200' " 2" " " " "	$11.52 " "	=	23.04
610' " 1" " " " "	5.28 " "	=	32.13
80' " 3/4" " " " "	3.68 " "	=	2.95

PIPE FITTINGS:-

2 - 4" Flange Connections at Tank @	.84	=	1.68
2 - 2" Caps "	.104	=	.21
5 - 4" Elbows "	.48	=	2.40
1 - 2" " "	.11	=	.11
24 - 1" " "	.042	=	1.00
4 - 3/4" " "	.032	=	.13
2 - 4"-45 " "	.58	=	1.16
1 - 4 X 4 X 2 Tee "	.80	=	.80
1 - 4 X 2 X 4 " "	.80	=	.80
12 - 2 X 1 X 2 " "	.188	=	2.25
42 - 1 X 1 X 1 " "	.06	=	2.52
3 - 3/4 X 3/4 X 3/4 Tees "	.048	=	.14
1 - 4" to 3/4" Reducers "	1.00	=	1.00
3 - 4" Gate Valves "	8.00	=	24.00
36 - 1" Globe " "	.81	=	29.00
3 - 3/4" " " "	.567	=	1.70
12 - 2 X 2 X 1 X 1 Crosses "	1.25	=	14.80

100' of 1" 3 ply Garden Hose # .12 per ft.= 12.00

BELTING:-

290' of 14" Double Leather Belting	@	$6.16	=	$1786.40
88' " 12" " " " "		5.28	=	464.64
11' " 8" " " " "		3.52	=	38.72
50' " 6" " " " "		2.64	=	13.20
32' " 3" single " " "		.64	=	20.48
888' " 2" " " " "		.41	=	364.08
Bearings			=	200.00

SHAFTING.

88' of 4 1/8" shafting at		$2.85 per ft.	=	250.80
100' " 2 1/2" "	@	.795	=	79.50
12' " 2" " "		.51	=	6.12

PULLEYS:-

6-36" -17" face for stamps. Main Shaft	@	49.50	=	297.00
24 10" - 4" " " Vanner "	"	2.75	=	66.00
2 Motors to Stamp Shaft 72" -16" face	"	122.75	=	245.50
2 " " vanner " 12 - 14" "	"	13.25	=	27.50
2 Vanner shaft to Pan counter shaft 12"-8" face	@	4.55	=	9.10
2 Pan Counter shaft to Pans 10" - 12" face		7.55	=	15.10

MOTORS:-

1 - 30 H.P. 3 Phase Westinghouse Motor	@	$600.00	=	600.00
1 - 10 " " " " " "		$200.00	=	200.00
2 - 40 " " " " " "		$800.00	=	1600.00
2 - 8 " " " " " "		$160.00	=	320.00

TRANSFORMERS:-

One 120 K.W. Transformer	@	$960.00		$960.00

OVERHEAD CRAWLS AND BLOCKS.

2 Overhead Crawls with track iron	@ $20.00	= $40.00
2 -1 Ton Differential pulleys	" $22.00	= $44.00

ERECTION OF FRAME.

We estimate at $1000.00

INSTALLATION OF MACHINERY

We estimate at $1200.00

Total = ~~$71,772.21.~~ 87,972.21

COST OF 200 TON CYANIDE PLANT.

EXCAVATION:-

148 Cu. yards	@ $1.50 per yard	= $222.00

CONCRETE:-

296 Cu. yards	@ $5.00 " "	= $1480.00

LUMBER:-

12 X 12 X 16 - 47900 ft B.M.	@ $29.00 Per M.	= $1387.00
2 X 12 X 16 - 11904 " " " "	$22.00 " "	= 261.89
2 X 14 X 16 - 1017 " " " "	$22.75 " "	= 2813.68

CORRUGATED IRON.

13374 sq. ft. Roofing	@ $2.75	= $367.78
12370 " " Siding	" $2.75	= $340.16

TANKS.

Eight Leaching Vats	@ $212.00 each	= $1696.00
Two Sump Tanks	" $230.00 "	= 460.00
One Gold Solution Tank	" 90.00 "	= 90.00
One Vacuum Tank	" 60.00 "	= 60.00

ZINC BOXES:-

Three zinc boxes	@ $60.00	= $180.00

DISTRIBUTORS:-

Two "Class W" Blaiddell Distributors	@$100.= $200.00

PIPE:-

260' of 4" Wrot.Iron Pipe	@ $34.56 per ft.	= $89.86
270' " 3" " " "	@ $24.16 " "	= $89.39
212' " 1 1/2" " "	@ $ 8.64 " "	= $18.32
370' " 1 1/4" " "	@ $ 7.20 " "	= $26.54.

9.6828 2

PIPE FITTINGS:-

2 - 4"	Flanges	@ .84	= 1.66
2 - 3"	"	" .75	= 1.50
12 -1 1/2"	Tank Flanges	" .50	= 6.00
1 -1 1/4"	" "	" .40	= .40
12 - 4"	Eblows	" .48	= 5.76
12 - 3"	"	" .30	= 3.60
2 - 3" 45 Degrees	"	" .36	= .72
8 - 1 1/2" 45 "	"	" .096	= .77
2 - 1 1/4" 45 "	"	" .076	= .15
12 - 1 1/4" Eblows		" .064	= .77
1 - 3" Tee		" .44	= .44
12 - 1 1/2" Tee		" .116	= 1.39
4 - 4" Crosses		" 1.00	= 4.00
4 - 3"n "		" .75	= 3.00
4 - 1 1/4" "		" .70	= 2.80
1 - 4" Cap		" .348	= .35
1 - 3" "		" .216	= .22

VALVES:-

10 - 4" Iron Gate Valves	@ $8.00	= $80.00
10 - 3" " Globe "	" $4.41	= 44.10
18- 1 1/2 " " "	" $2.43	= 43.74
10 - 1 1/4 Brass " "	" $1.13	= 11.30

PUMPS:-

1 - 4" Centrifugal Pump	= $500.00
1 - 3" " "	= $400.00
1 Vacuum Pump	= $80.00

POWER:-

2- 10 H.P. Westinghous Motors	@ $200. each	= 400.00

CONSTRUCTING FRAME WORK

We estimate at = $900.00

TOTAL 11,195.39

INDEX

COST ESTIMATE OF STAMP MILL.

COST 200 TON CYANIDE PLANT.

TWO HUNDRED TON CYANIDE PLANT.

PLAN

SCALE 1 IN. = 4 FT.

SEBREE & HATCH

PULP DRAIN

WATER PIPE.
GOLD SOLUTION
CYANIDE PIPE

PULP DRAIN.

TANK.

VACUUM TANK.

GOLD SOLUTION TANK.

PUMP.

ZINC BOX.

SOLUTION TANK.

SOLUTION TANK.

RAIL

RAIL

RAIL

RAIL

TAILING'S TANK

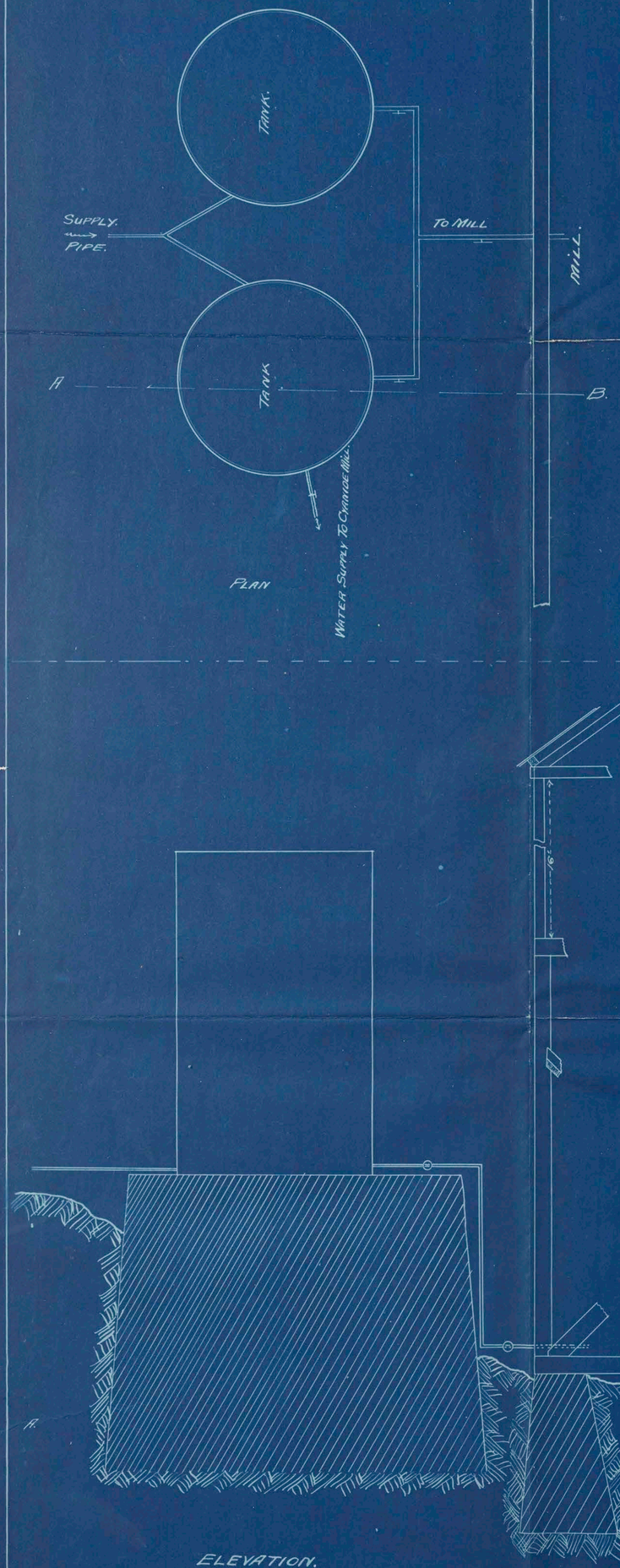
INTAKE.

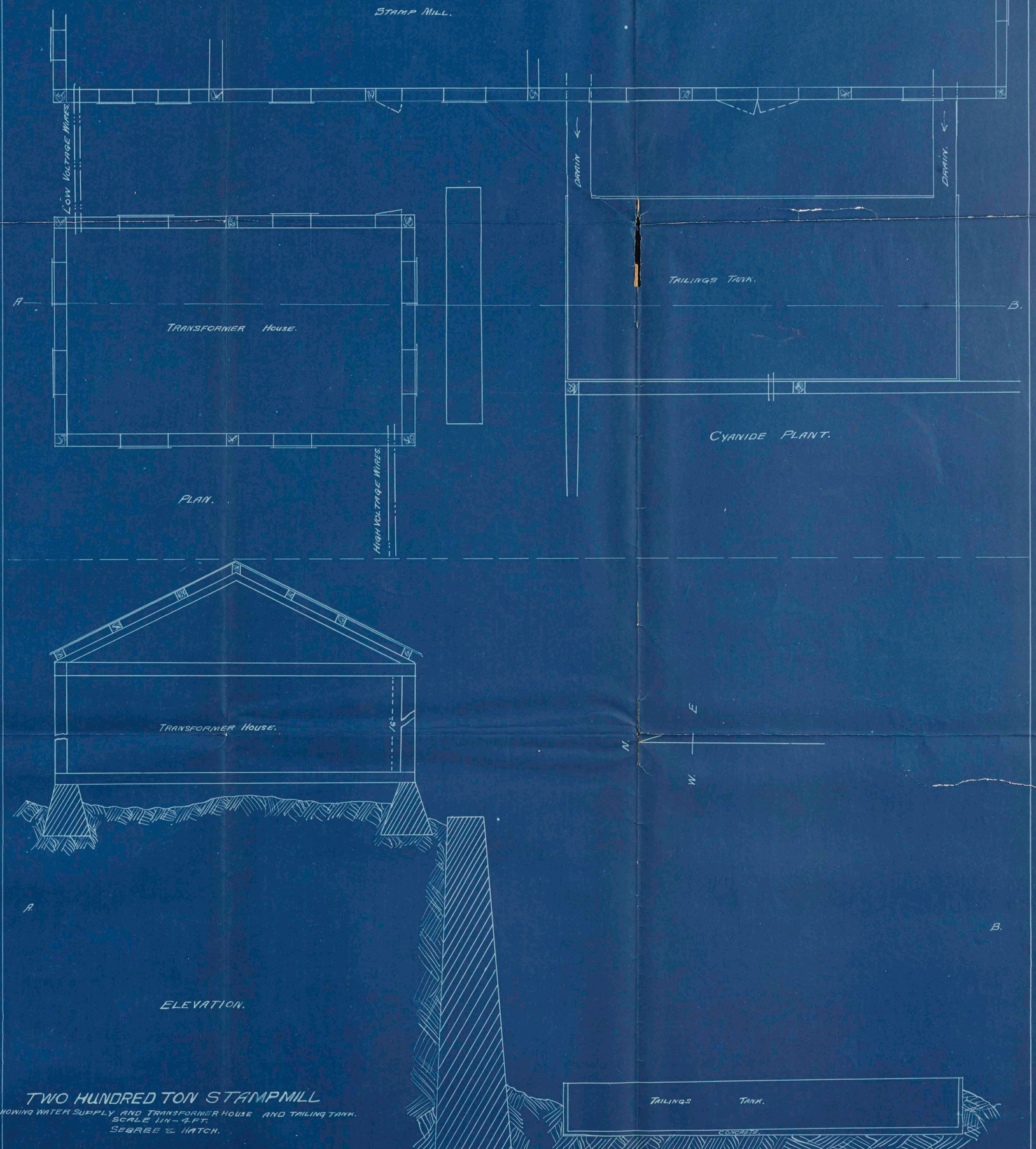
CENTRIFUGAL PUMP.

PULP PIPE

N

W E





TWO HUNDRED TON STAMPMILL

SHOWING WATER SUPPLY AND TRANSFORMER HOUSE AND TAILING TANK.
SCALE 1 IN - 4 FT.
SEBREE & HATCH.


WATER PIPE
M.
N.
ASSAY ROOM
LABORATORY
OFFICE
E
W
FROM TRANSFORMER HOUSE.
DRAIN
TO CYANIDE PLANT.
DRAIN
TWO HUNDRED TON STAMP MILL
PLAN
SCALE 1 IN - 4 FT.
SEBREE & HATCH.

N E W

FRONT ELEVATION OF ZINC BOX.

1" BOARD
2" SOLUTION PASSAGE
2" BOARD
IN TAKE
2"
2"
2" TIMBER
1" BOARD.
2'
1" SCABEN
2" DISCHARGE PIPE
2"

1" BOARD COVER
30"
2" BOARD
2" BOARD
1" BOARD COVER
2" X 4"
2" BOARD.
2" BOARD
1" PIPE.

END ELEVATION OF ZINC BOX.

FRONT AND END ELEVATIONS OF ZINC BOXES SHOWING DETAILS OF CONSTRUCTION. ZINC BOXES TO HAVE SIX COMPARTMENTS. SCALE 1 IN = 1 FT.

WATER SUPPLY TO CYANIDE PLANT
F. RAIL
PULP PIPE.
WATER PIPE
SOLUTION PIPE
DISTRIBUTER.
TANK
TANK.
PULP DRAIN
GOLD SOLUTION PIPE
PULP DRAIN
VACUM TANK.
ELECTRIC WIRE
GOLD SOLUTION TANK
PUMP MOTOR
ZINC BOX
SOLUTION TANK.
CONCRETE
WASTE.

ELEVATION THROUGH - EF.

TWO HUNDRED TON CYANIDE PLANT.

ELEVATION THROUGH SECTION EF. SCALE 1" = 4'.
SEBREE & HATCH.

TWO HUNDRED TON STAMP MILL

ELEVATION M-N

SCALE 1 IN - 4 FT.

SEBREE & HATCH.