UNIVERSITY OF NEVADA

THE MECHANICAL PLACER PLANT
of the
NEVADA PORPHYRY GOLD MINES, INCORPORATED

A THESIS

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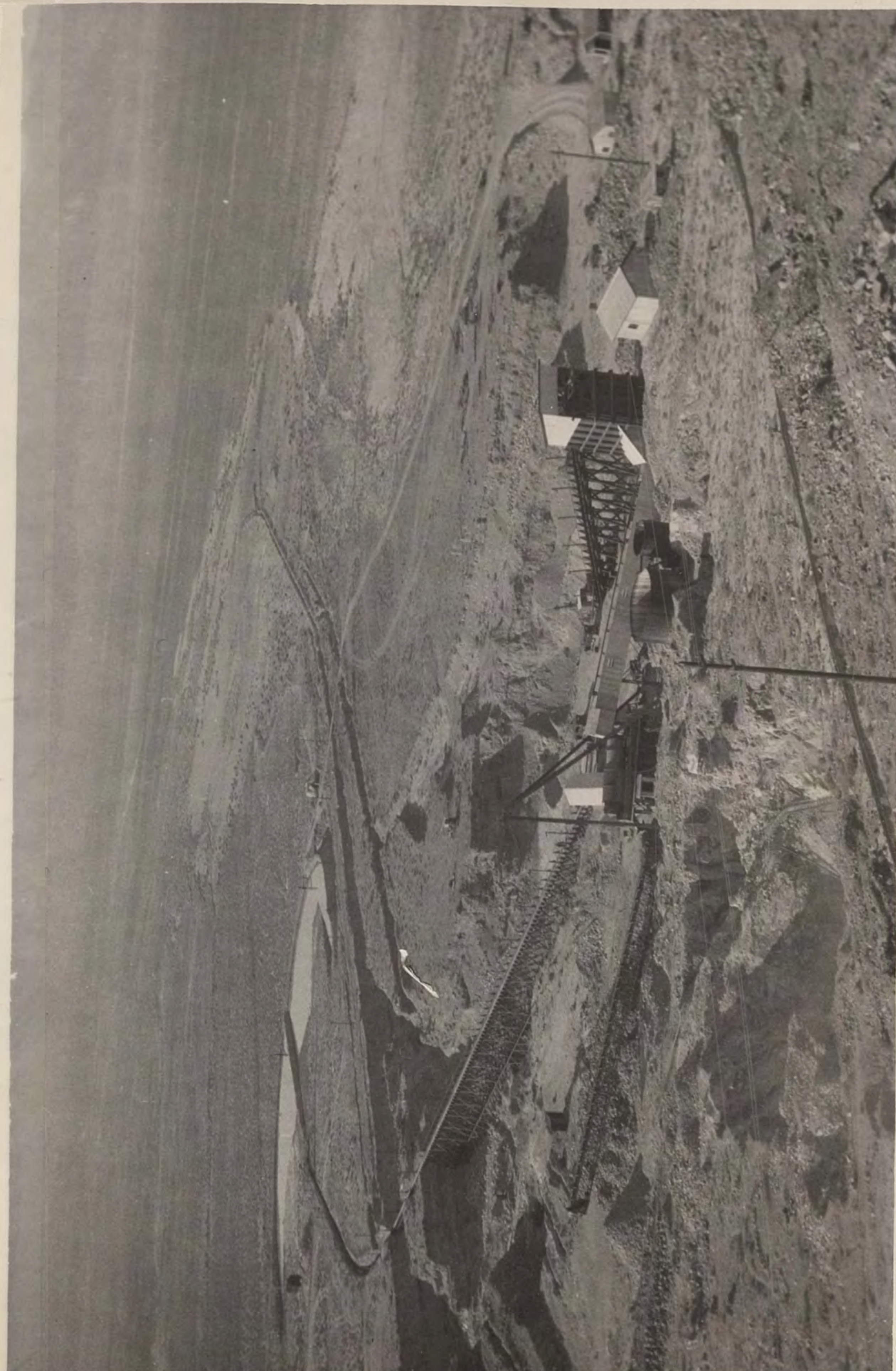

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FOREWORD

The mechanical placer plant of the Nevada Porphyry Gold Mines, Incorporated, was conceived in a search for some economical method of gaining the gold known to exist in a certain gravel deposit. Dredging was precluded by the steep pitch of the bedrock. Hydraulicking was frowned upon as a long, expensive flume would be required, besides this method is seasonal and requires large quantities of water, which is often very dear. Tests showed that the values occurred in the "fines"; why not screen out the "fines" dry, for treatment and reject the coarse? Roughly, that is the principle of this plant. In practice the ramifications of the various units required induce problems taxing the ability of an engineer far more than did the original problem.

This thesis is primarily an essay on the design, construction and operation of the mechanical placer plant of the Nevada Porphyry Gold Mines, Incorporated. However, in order to be comprehensive it goes outside of these fields and also gives briefly a description of the country in which the plant is located; tells of the presence or lack of artificial and natural resources, as power and water; describes and evaluates the orebody to be mined; and gives various costs and expected returns. Orthodox equipment and methods are passed over quickly and stress laid on the unusual throughout. With very few exceptions the entire plant was assembled with no other equipment than that already owned by the mining company. Naturally this necessitated some freakish riggings and methods, but considering the isolated location they actually effected a large cash saving.

For the sake of clarity the design and erection of each unit of this plant is treated separately, although the construction work often progressed simultaneously.

Most of the machinery used in this plant was built on contract by the Mutual Engineering Company of South San-Francisco, California. Certain specifications written in this contract and special mechanical features are discussed, but the actual designing and fabricating done in San Fran cisco are not mentioned hereafter in this paper.

In order to appreciate properly the construction problems and costs, the relation between the lode mine and this construction work must be mentioned. The Sphinx Glory Hole, as can be seen by plate 7, lies about fifty feet east of the plant site. This Glory Hole was worked during the construction period and the blasting, sometimes as many as four in a day, caused considerable annoyance and delay. Each blast meant the covering of certain castings, and the removal of instruments, such as welding gauges, to places of safety. However, the Glory Hole was directly responsible for much of the revenue used to construct this plant.

The regular mine compressed air lines were tapped and used for drilling, riveting, and painting. This air was available only between 9 A. M. and 3:30 P. M. as the black-smith was allowed the air before 9 A. M. for steel sharpen-ing, and the miners after 3:30 P. M. opened the air valves to clear the underground workings of blasting fumes, so reducing the pressure that air tools could not be used at the plant site. Break-downs in the mill and mine plants also played their part in disturbing the organization, as this latter equipment was kept in repair by the same men that constructed the placer plant.

Owing to the water shortage of the summer of 1934, an early completion of the plant was not deemed imperative. This made many indulgences possible, as utilizing smaller picked crews over longer periods, testing and changing of certain equipment, and in general, more time to cogitate.

With the lone exception of a shovel runner, the plant was erected by artisans who were in the regular employment of the company and had been for months prior to the starting of this project.

This essay does not delve into alternate solutions. It describes the problems as they arose, and the solution adopted. Were this company to erect a similar plant to work a similar deposit there no doubt would be innumerable improvements, but for the present that is irrelevant.

Acknowledgment is hereby made of useful information obtained from U. S. G. S. Bulletin 725-I, "The Round Mountain District Nevada" by H. G. Ferguson, from "Placer Mining in Nevada" by Alfred Merritt Smith, E. M., and Wm. O. Vanderburg, Associate Mining Engineer, and from various reports and data furnished by L. D. Gordon, President and General Manager of Nevada Porphyry Gold Mines, Incorporated.

HISTORY

LOCATION

The principal properties of the Nevada Porphyry Gold Mines, Incorporated, consisting of 500 odd acres of patented lode mining claims and 2,500 acres of placer claims, are located in the Round Mountain Mining District, Nye County, Nevada, about 45 miles north of Tonopah, the nearest available railroad point. The district is reached daily, except Sundays, by automobile stage from Tonopah by way of Manhattan, a distance of sixty, rough miles. Thrice weekly another auto stage makes round trips to Austin, 70 miles by road north of Round Mountain. The camp is also connected by telephone and telegraph with Tonopah on the south and Austin on the north.

The Round Mountain Mining District is situated on the western flank of the Toquima Range, which slopes gently towards the waste-filled Big Smoky Valley. Smoky Valley varies between eight and ten miles in width, runs a little east of true north, and is bounded on the east by the Toquima Range and on the west by the Toyabe Range. Here and there prominent hills, of which Round Mountain is the most conspicuous, rise boldly through the valley-fill near its margin. The summit of Round Mountain is about 700 feet above the level of the valley at its base; a northern spur, known as Stebbins Hill, is about 100 feet lower. The town of Round Mountain occupies a flat on the north-east side of the peak. The elevation of this townsite above sea level is 6,380 feet.

RESOURCES

Electric power is furnished by the Nevada California

Power Company over high tension lines from their hydroelectric plants near Bishop, California.

Nevada Porphyry Gold Mines, Incorporated, owns water rights and dam sites in Jefferson and Jett Canyons. Jefferson Canyon is in the Toquima Range east of Round Mountain, while Jett Canyon is in the Toyabe Range directly across the valley from the mining district. The combined flow is about 800 miner's inches or 16 cu. ft. per second, although it may be considerably less during certain summer periods. The Jett water is brought to the property by a pipe line 45,336 feet long, varying in diameter from 30 inches at the intake to 15 inches. This pipe line and the water rights cost $178,967.27. Jefferson water is brought from Jefferson and Shoshone Creeks through a pipe line 20,160 feet long of various diameters ranging from 15 to 12 inches.

Round Mountain itself is nearly bare of vegetation, but the higher hills to the east are sparsely timbered with cedars, junipers and pinon pines. Willows and cottonwoods line the lower courses of the creeks. The temperature ranges from zero in the winter to 90 degrees Fahrenheit during the summer. There is only a slight snowfall at the mine and occasional showers during the summer. The prevailing wind is from the south.

DISCOVERY

The ore deposits of Round Mountain were discovered in February, 1906. Credit for the discovery of placer possibilities of the district is due to Thomas F. Wilson, (Dry Wash Wilson) who came to the camp during the first year of its discovery. During a three month's period he recovered $33,344.85 by means of three crude dry washers. A similar dry washing machine was recovered during 1934 from a high-grader operating on company property. The total placer production to date, Jan. 1, 1935, both dry washing and subsequent hydraulicking, totals $1,412,701.37.

GEOLOGY

Granitic rocks, probably of Cretaceous age, occupy a large part of the Toquima Range and are intrusive into the Paleozoic sediments. The Paleozoic rocks are, for the most part, dark limestones, which are interbedded with black jasper and dark slatey schists, chiefly of Ordovician age. Round Mountain and Stebbins Hill are formed of porphyritic rhyolite of the Tertiary age. A fine-grained tuffaceous sandstone, intruded by this rhyolite, occurs in a small patch on the summit of Round Mountain. The profitable lode gold deposits are confined to the rhyolite and occur irregularly in very narrow quartz veins following previous faults and fissures. The average tenor of these veins is not high, though here and there they contain small but extremely rich shoots. As compared with other districts, Round Mountain has little vein quartz, and the mineralizing solutions have not appreciably altered the enclosing rock. Later this formation was again fissured, which, for the most part, did not follow the original veins, and secondary gold, manganese, and limonite were deposited in these later fissures by supergene waters. The large amount of limonite in these fissures suggests that the secondary gold originally occurred in pyrite.

which has now been oxidized, and actual solution of the free gold of the primary veins probably took place only on a very small scale, if at all.

The detrital desert wash of Big Smoky Valley laps against the spurs of the range. The boundary between rock and valley fill is irregular and there is no evidence of any recent faulting on the east side of the valley. On the west side, however, the bold front of the Toyabe Range is clearly formed by a large fault of comparatively recent date.

PLACER DEPOSIT

GEOLOGY

The placer deposits of Round Mountain are of the residual type, none of the gold having traveled over several hundred feet. The placer gravel is composed of coarse, angular rhyolitic wash without definite bedding. Out in the valley, however, the rhyolitic talus is covered by roughly stratified material containing an admixture of granite pebbles, and boulders of unsorted size. This material carries far less gold than the angular, unstratified rhyolitic material beneath it. The angular material, particularly near bedrock, is, in places, cemented by a limy deposit into a hard conglomerate. Large angular boulders are present, being less common on bedrock than a few feet higher. Nearly all the lower, unstratified material consists of rhyolite, mixed with pieces of tuffaceous sandstone similar to that found on top of Round Mountain. The proportion of this material in the placers seems to be in excess of the present relative volumes of the two rocks and indicates that formerly the tuff had a greater extent above the intrusive. The gold is angular and coarse and about equally represented by two types, that which occurs in quartz veins, and that of the limonite fissures. The placer gold averages about 635 fine, being alloyed with silver. This purity, only slightly higher than that of the lodes, is due perhaps to a larger percentage of secondary gold or a slight solution of a portion of the silver. The oxidation of the pyrite and redeposition of the gold probably took place during a period of comparatively humid climate, for the process was apparently complete before the deposition of the fanglomerate, which constitutes the upper part of the placer ground surrounding the mountain. Indications of such climate in Pleistocene time are found in the presence of lakes in Big Smoky Valley. Increasing aridity of climate permitted the formation of the long flat talus slope carrying the greater part of the placer gold mined to-day, and this talus slope in turn, as the hills wore back from the desert valley, was partly buried under the roughly stratified fanglomerate, which forms, in some places, the upper part of the placer ground.

The principal placer mining of the district has been done on the south and west slopes of Round Mountain. At the northern end of these workings there is a relatively rich unworked section known in the records of the company as Area Number One. This deposit lies at the foot of Round Mountain and Stebbins Hill, directly in line with a small draw dividing the two hills, and is very likely the result of repeated cloudbursts which washed the rock as it disintegrated, from the hills to its present delta-like position. Only the higher portion of this area has been hydraulicked as the balance lies at an elevation too low for operations with the present flume. Lessees operating in this vicinity moved some of the gravel by means of teams and scrapers to a flume at a higher elevation, and realized a profit on the operation. Paradoxically, the semi-stratified fanglomerate formation is not extensive in this area, which may be due to the protected location of the deposit. The natural drainage of the valley near Round Mountain is north-west and Area No. 1, being at the north-west end of the mountain, did not receive as much detritus from the Toquima Range as did the placer deposits further south.

At the end of this paper there is a topographical map (Plate 7) of Area No. 1, showing bedrock contours. It will be noted part of this deposit lies in a rough shelf, or on a relatively flat bedrock, which may have had an impounding effect on the rhyolitic wash.

VALUE

In 1929 the company decided to determine the value and tonnage of a certain part of this deposit. The area chosen was divided into squares 200 feet on the side. Depending upon the depth of gravel, either a pit or churn drill hole was sunk at each corner. The face of a steep bank left by hydraulic operations was sampled by vertical channel cuts. Samples averaging fifty to sixty pounds were taken for each ten feet of hole or cut and fire assayed. By referring to Plate No. 1, which shows the location, depth and value of each hole and cut, it will be seen from the computations this work proved that within the boundaries shown there are roughly one million tons of gravel averaging $1.00 per ton. These figures are based on gold at $20.67 an ounce, and gravel 20 cubic feet to the ton. At the time of writing, gold is quoted at $34.80 per ounce. Tests conducted recently show that this gravel runs 16½ cubic feet in place per ton including moisture. Moisture content varies from 4% to 10%.

These sample holes do not define limits, the deposit will be worked in all directions until the detrital desert wash of Big Smoky Valley dilutes the ore beyond profitable operations.

PLANT

LIMITING FACTORS

Having proved a valuable placer deposit, the Nevada Porphyry Gold Mines, Incorporated, during the fall of 1933, decided to design and erect a mechanical plant for recovering the values. Certain major features of this plant were considered indubitable; namely, the gravel had to be elevated, as all available storage areas are on higher elevations than the deposit, any water used had to be circulated as the regular supply is too limited for year around operations, and the cemented gravel must be disintegrated in order to release the values. For obvious commercial reasons it was desired to work the richest part of the deposit first, a feature partially governing the plant site selection. The management also desired to impound the undersize or tailings, in case sampling should show they carried values not recoverable by amalgamation. In addition there were natural limiting factors due mostly to topography, which to an extent controlled the selection and location of certain equipment as the oversize stacker and the flume.

PROBLEMS AND SOLUTIONS

Many ingenious schemes were suggested as possible solutions of these problems. Some required drag lines, extensive conveyor belts in the pit, dewatering devices, and bucket conveyors. Out of the maize it was decided that a power shovel, cars, and dry screening were most adaptable to the needs. Belt conveyors in the pit would be cumbersome, hard to move on rough bedrock, and more conducive to trouble when blasting than tracks, nor do they readily allow for the use of grizzlies for sorting out extremely large boulders. Wet screening was not favored as it was considered cheaper to break up the cemented gravel dry, values would not be so apt to be carried away stuck to the oversize material, and in winter, dry rock cannot freeze to the stacking belt.

In order to make the operation of the pit and trommel more independent, a large ore bin was placed between these units.

The stacking of oversize could be done either by cars or conveyor belts. Owing to topography, this material had to be elevated, also it is discharged from the trommel at a fairly constant rate, thus this problem lends itself to a belt conveyor. Besides cars require more operators and attention than belts. The gold-saving device for treating fines is discussed later. Settling ponds answered the circulating water and tailings impounding problems.

As can be seen from plate No. 7, the plant itself is laid out in a U shape, the excavating equipment being at the top of the right arm, biting into the choicest part of the gravel bank. A trestle runs along the right arm of the U leading to the ore bin. Material is fed from the ore bin to a conveyor belt which runs along the bottom of the U to the trommel. The oversize continues directly through the trommel to a swinging stacker belt. Undersize follows the left arm of the U passing through the gold-saver and flume to settling ponds. This arrangement centralizes the units about a yard, placing all machines within short range of an auto truck, a great item when making repairs. It also lends itself to good operation as the men on shift are seldom far from any vital part of the plant.

The first ground for this plant was broken March 7th, 1934; the first concrete was poured April 22; the first machinery arrived June 15 and the first trial run made October 20, however, the construction of buildings ran into November.

<u>EXCAVATING EQUIPMENT</u>

The excavating equipment consists of a six horse power gasoline Star churn drill rig, and a three-quarter yard Bay City Electric shovel.

Five inch holes are drilled, without the use of casing, to bedrock, 15 feet from the rim of the bank, 18 feet between holes. These holes are then loaded half a pound to the cubic yard of gravel, with 5% Canyon Bag Powder, a Giant Powder Company product. Usually a hole will hold more than the required charge, so the powder column is broken into four or more sections, of about 50 pounds each, the last charge being placed 15 feet below the collar. Three or more holes are detonated simultaneously by means of Cordeau Bickford fuse. To date the blasting has been satisfactory, however, the present tendency is to use greater spacing of holes with a corresponding increase in the powder charge.

The shovel, a reconditioned machine, was purchased, through Garfield & Company of San Francisco, from the Bay City Shovels, Incorporated, of Bay City, Michigan. This machine can swing completely around, 360 degrees; it is powered with a 50 horse power constant speed motor, and all vital parts are protected by sheet iron. As a crane it was of great assistance during the construction of the plant.

TRANSPORTATION AND ORE BIN

The transportation system consists of two gable bottom, five-ton cars, tracks, a trestle, and a hundred horse power, double drum Lidgerwood type hoist. The cars and the hoist were furnished on contract by the Mutual Engineering Company. Skips were not favored mainly because later these units will have to be trammed, then bails and dump wheels would be a nuisance. Besides a skip body must be narrower than the rails, which would mean a smaller, harder target for the shovel operator when loading, or an excessively wide gauge track.

The ore bin, though not part of the transportation system, will be treated with the trestle as their construction was too intervolved for separation. This bin is a flat bottomed, square, timber structure as can be seen from plates 3 and 4. In order to minimize the dead or useless space in this bin, the ore is drawn from the center of the bottom. The odd angle, 71 degrees, at which the conveyor leaves the bin was necessitated by the trommel site, which had to be on bedrock, between fill and the Sphinx Glory Hole.

First the exact location of all trestle bent foundations, the ore bin foundation and hoist foundation were accurately staked with a transit. After completing the necessary excavating which was done by the use of jack hammers and wheelbarrows, the position of forms were marked by strings strung from nails set in stakes driven in drill holes. Bent foundation forms of 2 in. x 12 in. plank were made 16 in. wide, and 2 feet longer than the sill dimensions shown on plate No. 2. Two ⅝ in. pipes were placed crosswise in each form, four feet from the end, so that a U-bolt or clevis can be installed should a bent sill ever start to move. In some cases these forms were moved and with alterations reused. The first concrete block at the lower end of the trestle is extremely heavy, reinforced with steel bars and carries the trestle stringers direct. It is designed to keep the entire structure from creeping (see picture No. 1). A six cubic foot gasoline driven concrete mixer was set between bent sites No. 5 and No. 6, and suitable plaques laid for stock-piles of sand and gravel. A 1 : 3 : 5 mix, one part cement, three parts sand, five parts gravel, was used in all these foundations and, with the exception of certain finishing batches, all concrete was mixed very wet. Forms below the mixer were filled by means of wheelbarrows. A temporary trestle, whimsically named the "Angel Flight", was built extending from the mixer over the trestle and ore bin sites to the hoist foundation site. A fifteen horse power electric hoist was set at the end of this flight (see picture 10), and 2,500 feet of 3/8 inch cable wound on the drum. A cement car was designed from abandoned skip parts and an aerial tram car as shown in picture No. 2. This car was arranged to be loaded direct from the mixer, drawn by the hoist to positions over the foundation sites, and by means of chutes the concrete, upon dumping, was directed to all parts of the various forms. By this method the ore bin foundation, picture No. 4, containing 1,215 cubic feet of concrete was poured in two eight-hour shifts. This form was built of 2 in. x 12 in. plank, and heavily braced with 6 in. x 6 in. timbers. Dimensional detail may be had from plate No. 3. Two men wearing rubber boots tamped and worked the concrete constantly during the pouring. The structure is reinforced with ⅝ in. square mild steel reinforcing bars running lengthwise, crosswise and vertically. Five inches below the top of the foundation three of these bars run lengthwise of the block, corresponding bars are set four feet below. The southwest corner of the bin contains six vertical rods, linked by short horizontal rods, at four foot intervals.

Detail is not given on the hoist foundation block, however, it is a massive block 9 x 13 feet, containing 425 cubic feet of concrete. The hoist building is set on a four inch concrete floor, carried, in turn, partially by a dry rock wall. This wall was later faced with mortar, see picture No.10.

The trestle is designed to handle a ten-ton car, no allowance being made for its double feature, see plate No. 2. The timber required for the trestle and ore bin was figured and ordered. No. 1 Common Douglas Fir was selected. The order amounted to 44,984 board feet costing $1,754.36, exclusive of freight. Upon its arrival it was segregated according to cross-section and length, during construction the timber distribution list (see table No. 2) was adhered to rigidly. Some timber was borrowed, the temporary trestle was built of 6 x 6 x 18 which later became ties on the main trestle. The timber was stacked on level ground outside the plant site. There all framing was done by means of a portable, electric saw and adzes. The first five bents were assembled, hauled to the pit and erected. Here the trestle work stopped for a time to permit the trommel to pass before building across the road. Subsequent events proved this precaution unnecessary.

All ore bin timber after framing, except the 3 in. x 12 in. lining and that required for the superstructure, was transported via the temporary flight and stacked on the ore bin foundation. The improvised device shown in picture 5 expedited the handling of these heavy timbers eliminating the necessity of loading and unloading by man power. The rig was run astraddle a timber and one end hooked, then the other end was over balanced and hooked. After removing the temporary trestle from the ore bin foundation, a 35 ft. gin pole was erected and rigged with the 3/8 in. cable of the aforementioned hoist. By moving and leaning the gin pole, members of the bin were placed and held in position while bolt holes were drilled with an electric drill. Often a timber was braced or toenailed to insure rigidity while drilling. After all posts, purlins and caps had been bolted, and the 3 in. x 12 in. planks spiked in place, a relatively inexperienced crew lined the bin with used 12-pound rails placed at 2½ in. centers. Three inches of one end of each rail was turned at 90 degrees and the balance spliced out to 17 feet for the ends and 20 ft. for the sides of the ore bin, couplings being made by a ½ in. round rod hooked in the rail web. These rails are hooked over the 3 in. x 12 in. plank and hang vertically. They are spiked every four feet. Since the ore near the bin bottom is never removed, the rails do not extend far into this dead area. The bin bottom, over the feeder room, is supported by seven 10-inch I-beams placed fan shape on a recess left for this purpose in the concrete. These beams carry 4 in. x 12 in. plank which in turn carries another set of 4 in. x 12 in. plank placed crosswise of the first. Allowing for the floor, this bin has a capacity of 265 cu. yds., about 400 tons, when filled to the 12 x 18 stringers.

No. 10 bent was framed, and assembled on its site and raised by means of the hoist. Picture 8 shows No. 9 bent going into position. Stringers were extended to each bent before the following bent was erected. In this manner, building from the bin the trestle was connected to the part previously completed. The ore bin superstructure was then built. Second-hand, 50-pound rails, obtained from a standard railroad siding at Millers, Nevada, are used on this trestle. The surface bend at the lower end was made with the aid of the shovel, which forced the rails into position with its dipper.

In order to prevent checking which, in this climate, is excessive, the timber was painted as soon as possible with red Oronite Shingle Stain, a product of Standard Oil Company of California. All painting was done with a compressed air painter. Although it saved little if any paint, it did expedite the job saving wages, and it forced paint deep into checks which is not possible with brushes. One gallon of paint used in this manner on rough timber covered between 75 and 100 square feet, depending, among other things, on how strong the wind was blowing. All bolts in the timber structure were tightened a month after erection and again three months later.

The hoist, the duty of which is to move the cars from the pit up the inclined trestle at 400 feet per minute, is a double drum friction type, powered with a 100 H. P. motor. Cast iron drums,20 in. diameter, 24 in. face, take 2,208 feet of ¾ in. cable. It has a double reduction of cut gearing, the friction is of the V type with maple blocks, screw operated. The entire unit is mounted on a wrought steel frame, and weighs 15 tons. This unit arrived assembled as shown in picture No. 9. The shovel, although weighing only 27 tons, lifted the hoist from a truck and set it down on a cribbing built over the lower end of the "Angel Flight" which had been moved to a location clearing the ore bin and trestle. The 3/8 in. cable was then rigged by means of snatch blocks and after lowering the hoist by use of jacks onto the car, which had now lost its bucket, the hoist was moved up the trestle towards its permanent location. The hoist was then moved by means of timbers and heavy rollers over the foundation prepared for it, and lowered over the anchor bolts into position.

At the end of the trestle the cable is supported by knuckle rolls cantered at an angle of 22 degrees in order to make the cable ride center. Back of the ore bin, picture 7, two vertical rolls supported by a steel framework bring the cables into a useable fleet angle, 2 degrees, 14 minutes.

The gable bottom cars are made of ¼ in. steel plate braced with angle iron. They have a water level capacity of four cubic yards, or by test, 3.22 bank yards, or 5½ tons. However, due to partial loading, surveys indicate the average car hoisted contains 2.7 bank yards. Side doors, hung longitudinally, trip open automatically at a point over the ore bin.

The signal system consists of a buzzer and flasher in the hoist room controlled by a push button in the pit.

Mine signals are used except for a preliminary signal to indicate the car to which the signal applies. The cars are numbered one and two and given the corresponding mine station call.

APRON FEEDER

In order to obtain a steady, controllable feed for the trommel, an apron feeder was installed centrally located under the ore bin, ore resting directly on the feeder plates. These plates are 3 ft. wide and carry a 2 ft. bed of material, greater than standard practice but used here to minimize hang-ups or jams caused by large boulders. The plates are motivated by a double reduction of spur gearing, belt-driven by a 3 H.P. U. S. Varidrive Motor, an ingenious device allowing the driving pulley rate to be varied at will between 197 and 590 R. P. M's. This unit is purely mechanical, a V belt works over a special set of pulleys, the belt contact diameters of which are varied inversely simultaneously by a movement parallel to the axis, closing or opening the beveled disk sets that form the pulleys. Owing to the large hopper opening, 2 ft., the R. P. M. had to be further reduced to obtain a tonnage the trommel could handle. This was accomplished by driving the belt directly off the 2 in. shaft. The flat, 4-in. belt gives partial insurance against breakage of the feeder parts as it either slips or is thrown off the pulleys in case of jams.

INTERMEDIATE CONVEYOR

For the purpose of gaining elevation and advancing the material towards the oversize waste dump site, the feeder and trommel are connected with an intermediate conveyor. The trommel could have been set nearer the ore bin, however, the oversize stacking conveyor would have been longer by the amount the intermediate conveyor was shortened, the tailings flume would have been longer with less grade, and the installation would have been costlier by the excavation involved.

Prior to this installation, the Nevada Porphyry Gold Mines, Incorporated, bought all the structural steel as it stood, in the famous Belmont Mill of Tonopah. Hence steel was to be had for the taking and was used in many instances where it would not have been used were new material being purchased. Seven sections of the Belmont conveyor structure, leading from the crushing plant to the mill, were removed as units, together with their supporting bents. The bents and sections are connected by means of a bent 3/8 in. plate set perpendicular crosswise of the structure. The angle of the plate bend determines the pitch of the structure. It was altered cold to fit a template, a few bent legs were shortened, others lengthened and the structure was reassembled and riveted in its new position, supported by timbers. Small concrete footing blocks with anchor bolts were then poured under the bent legs, see picture No.26. The structure is about 120 feet long, built on a 13.6% grade. The machinery for this conveyor was not included in the contract signed with the Mutual Engineering people. Upon asking for bids, it was found that very little money could be saved by departing from the oversize stacking equipment specification which, if adhered to, would lessen the number and types of repair parts necessary to stock. Therefore, practically identical set-ups are used, 6 in. Timken bearing 3-roll troughing rolls at 4 ft. centers, a 30-in., 8.16 pound, 8-ply conveyor belt, 11/16 in. thick reputed to be the heaviest made, 24 in. diameter tail pulley, and a 30-in. diameter lined head pulley, geared direct to a 20 H.P. gear motor unit which drives the belt 220 feet per minute. Material from the feeder is loaded onto the conveyor belt by means of a short steel plate chute with metal skirt boards. As a safety measure a hinged plate is hung 14 in. from the conveyor belt, six feet from the apron feeder; any rock large enough to touch this plate swings it opening electric switches which shut down the feeder and conveyor. The conveyor discharges into a hopper which feeds the trommel. Such a quantity of fines were carried by the return belt a wiper had to be installed, however, the fines then fell on the far side of the wiper. Since the wiper position could not be changed, a smaller hopper was made and bolted to the main hopper such that it catches these fines and directs them back into the main chute.

TROMMEL

The trommel site was picked with great care, as the settling of its foundation would incur untold expense. By the process of elimination the problem resolved itself into one feasible site. The machine could not be set too close to the Sphinx Glory Hole, plate 7, as this area might slough or cave, were it set to the west of the location chosen, it would either have to sit on fill or on bedrock at a loss of elevation.

Excavation for the site, including that for the Vibrating Riffle, amounted to 17,400 cubic feet and was done almost entirely by jack hammers and wheelbarrows, partly as a philanthropic move towards those needing employment. At the time of this work the power shovel had not arrived. Waste was thrown over the bank to the west, thus building a yard for the plant. The trommel and derrick foundation forms were constructed according to the dimensions shown on plate No. 6. Combined, they entailed excavation amounting to 3,000 cu. ft. including the derrick pit which fell partially in old trenching, and concrete totalling 2,750 cu. ft. Since this foundation was to be subjected to excessive strains and vibration, a mix of one part cement, two parts sand and four parts gravel by volume was used on all work except the derrick pit retaining wall and floor which was poured of a 1 : 3 : 5 mix. Anchor bolts were given a pig tail, and a $\frac{5}{8}$ in. reinforcing rod passed through them tying together all parts of the foundation. The actual pouring was done by wheelbarrows as shown in picture No. 11, this part of the work requiring two days. The two western derrick piers were not poured until after the trommel was installed in order not to obstruct the passing of heavy trucks.

The framework supporting the trommel is made of six sets of steel bents 8 ft. 11 in. high made of X-braced, 12-in. I-beams which formerly supported the mill bins of the Belmont mill. The same foot plates were used with the addition of a 6 in. clip riveted to the I-beam flange.

These bents were further stiffened by X-bracing of 8 in. channel iron set crosswise of the structure, and 12 in. diagonal I-beams at each corner and side centers. See picture No. 15. During construction a power hack-saw was moved to the site for cutting steel members, $\frac{3}{4}$ in. rivets were used throughout this work.

The main trommel shell is 3/8 in. plate, 6 ft. in diameter inside, 28 ft. long, divided into two sections 12 ft. long, and a third 4 ft. long necessary only to carry the lower riding ring. The first section is blank of perforations, and contains nine lifting veins, three sets of three each, each vein being slightly over 4 ft. in length and 13-5/8 in. in width. This section is lined with 36 high-carbon steel bars 1 x $3\frac{1}{2}$ in. The veins are made of high carbon steel bars $\frac{3}{4}$ in. x $3\frac{1}{2}$ in. The first three veins are placed so as to create a screw action clearing this end of the trommel of material. The second section is perforated with 1 in. round holes, 1 in. bridge, covered by an outer $\frac{1}{4}$ mesh, No. 6 gauge wire screen 8 ft. in diameter, supported from the main shell. Riding rings of cast steel with 6 in. faces ride on semi-steel carrying rolls $18\frac{1}{2}$ in. in diameter, pressed on steel axles which ride in cast iron bearings half bushed with bronze. End thrust is taken by roller bearing rolls, 14 in. diameter, 3 in. face, set vertically, one on each side of the first riding ring. The trommel is revolved $10\frac{1}{2}$ times per minute by a semi-steel cast gear with a 7 in. face, driven direct by a 40 H. P. gear motor unit. The driving unit and bearings are mounted on a main frame of heavy reinforced 12 in. I-beams, which, in addition, carries the feed and discharge hoppers. This is supported from the main steel structure by metal wedges which are made to control the pitch of the trommel. It was installed with a slope of ¼ in. per foot. The trommel, fully assembled, weighs 16½ tons; the framework carrying the trunnions and drive, 10 tons.

This trommel had a stormy early history. It was constructed in San Francisco during the Longshoremen's strike, arrived in Mina, Nevada, to be held up by the only cloudburst of the year. From Tonopah it was taken to Goldfield for unloading by the railroad crane, only to find the crane out on the road. However, the frame work finally arrived June 15, 1934, and was rolled onto a cribbing, raised to the proper elevation and rolled into position. See picture No. 13.

The trommel proper came in on a trailer as shown in picture No. 14 and was parked along side its foundation. Cribbing was placed practically burying the trailer and three heavy timbers placed on an incline leading from the trailer bed to the steel framework. See picture No. 15. Two ½ in. cables were securely fastened to the steelwork, passed over the frame, one under either end of the trommel, over the top of the trommel, through blocks set at the proper locations, whence these cables were led toward a common point in line with the blocks, and clamped together. A double block was now fastened to these cables and a similar block made secure to the hoist foundation, and the two were rigged with the 3/8 in. cable of the temporary hoist. In this manner the hoist rolled the trommel into position. As a precautionary measure the trommel was followed in its ascent by wood blocks and two $\frac{5}{8}$ in. cables passed over the trommel, held taut by chain blocks. All ground anchorings for blocks were made of 1 in. steel driven in drill holes. Each such stake was guyed from a point above the chain or cable it held, to the base of a similar sloping stake set behind.

OVERSIZE STACKING EQUIPMENT

The oversize stacking equipment is comprised essentially of a large A-frame derrick supporting an inclined, swinging, steel structure 150 feet long which carries a 30 in. conveyor belt identical with that of the intermediate conveyor except this belt is driven faster, 259 ft. per minute, by a similar power unit connected to the head pulley by a chain and sprocket drive.

The derrick is made of selected structural Douglas Fir, rough, 14 x 14 in., and consists of an A-frame set vertically over the discharge end of the trommel, further supported by two back legs. The four derrick foundations are set at the four corners of a 50-foot square. After the trommel had been rolled into place, the two western derrick foundation piers were poured. The timbers, two 80 ft. long, two 62 ft. long and one 42 ft. long, totalling 5,324 bd. ft. valued at $319.44, reported to be the largest ever used in mining in Nevada, arrived, tied together, riding on two bolsters, one on a truck, the other on a trailer whose tongue had been lengthened. The shovel unloaded first the truck end, then the trailer. The A-frame was laid out in actual relation on the ground, gusset plates and castings were set on the timber and bolt holes drilled. All iron work possible was bolted to the timber before erection. As can be seen from picture No. 16, these timbers are all pin connected by means of side plates to the foundation foot plates. The first timber, the southeast member, was set into its foot plate and the pin driven through. It was then raised by the shovel to a position similar to that shown in picture No. 16. The 3/8 in. cable was now led through a snatch block fastened near the Sphinx Glory Hole, necessary guys were attached, and the timber raised and anchored in the position shown in picture No. 20. The southwest member was raised in a similar manner except it was taken over center (picture No. 17), the shovel taking the weight after passing center. After raising and bolting the horizontal A-frame members in place, a 10 ft. 6 in. x 6 in. gin pole, whose erection proved more troublesome than that of the 14 x 14's, was set and guyed on top of the A-frame. By means of the 3/8 in. cable, this gin pole, and snatch blocks, the back legs were raised and held in position while being bolted. All bolt holes were drilled before raising. It was necessary to back off the nuts holding the fourth foot plate 1½ in. before the bolts could be fit at the top of the structure. After fitting the anchor bolts were again tightened. The A-frame members measure 60 ft., 1-13/16 in.; the stiff legs, 76 ft., 6½ in. These timbers were delivered on July 27 and were fully erected on August 2 including a day lost, or rather given the members in order that a coat of paint applied on their arrival might dry, easing their handling.

The stacker frame consists of five 30-ft. steel sections, 6 ft. high, 8 ft. wide, overall, each weighing 3,200 pounds, fastened to each other by 5/8 in. bolts. The first section was set in position by the shovel; the second and third by the aid of a trolley cable fastened between the A-frame and a concrete bulk head installed at the Gordon shaft. This awkward procedure was made necessary by the rock dump (see plate No. 7) on which this work had to be performed. The fourth section was run out as far as possible on the trolley, the shovel was moved to the other side of the dump, "walking" the fifth section as it went, and the fourth and fifth sections were assembled.

This steel structure is supported by a bridle 45 ft. from the outer end, to which is fastened a double block. This block is rigged with a similar block at the top of the A-frame, in all there are five supporting strands of 5/8 in. cable and the unit may be raised or lowered by means of a hand operated winch at the base of the derrick. This stacker was designed to work at angles up to 20 degrees. Oversize and material plus 1 in. minus ½ in. is discharged from the trommel into a hopper which discharges into a second hopper which loads the stacking belt. The lower end of the stacker rests on a vertical pin or boss which is held by a bearing in a cast iron foot plate, allowing the stacker to be swung.

VIBRATING RIFFLE

The material passing through the ½ mesh screen falls into a hopper discharging onto an 18-in. conveyor belt which leads to the Gold Saver. Parts for this conveyor were obtained from the Jefferson Mill, a few miles distant, and from our own scrap pile.

The main gold-saving equipment is a vibrating riffle consisting of a 1/16 in. steel plate trough 60 ft. long, 30 in. wide, 12 in. deep, set at a pitch of 4 in. in 12 ft., supported by 6 in. wheels every 10 ft. These wheels ride on 40-lb. rails, bump against a bumper block and settle back on the rails which are supported by springs, giving the machine a quivering effect (see picture No. 22). The bumping blocks and rails are carried on a series of concrete blocks set on the proper grade. The machine is made to vibrate by means of two arms fastened, on on either side of the head end of the machine. These arms are driven by an eccentric having 3/8 in. throw, turning 200 R.P.M. This eccentric shaft is driven by seven V belts from a 7½ H. P. gear motor unit. The riffles proper consist of 2 in., 120 degree angle iron set crosswise of the body or box, every three inches. The angles are set bottom flange flat, the other flange leaning downstream. These riffles are made in 42 in. sections. Every fifth angle has a ½ in. rubber strip fastened to the bottom flange, running full length. This raises the riffle off the gold-saver bottom and forms a trap for quicksilver.

TAILINGS DISPOSAL EQUIPMENT

Tailings from the Gold Saver are carried away by means of a 1000 foot flume, 20 in. wide inside, 14 in. deep, built on a grade 4-5/8 in. per 12 ft. or 3.21%. The flume is built of 2 in. x 12 in. x 16 ft. plank, with yokes of 4 in. x 4 in. braced with 1 in. x 6 in., yokes being spaced at four foot centers. Where necessary, alternate yokes are supported by bents of 4 in. x 4 in. posts braced with rough 1 in.x6 in. pieces. Part of this flume crosses an area previously hydraulicked and is supported 30 ft. above the ground by a system of double bents, one set on top another, tied and sway braced to the following bent-like towers (see picture No. 23). In addition to the flume, on the north side this trestle carries a boxed nine inch return water line, the cover of which forms a walkway. This flume, having a minimum grade, was built to exact lines, curves were staked by means of transit surveys and given the proper banking or outside elevation. The 2 x 12's were tongue and grooved, a fatal error as tongue and grooved flumes apparently hardly ever become water tight. Baffles of one inch boards were used every eight feet while soaking this flume. Horse manure was found to be of great service in stopping leaks retaining the water that it might have a chance to soak the boards.

To prevent wear and in order to make a further recovery, the flume bottom is lined its entire distance with 8-pound rails. Six foot sections of five parallel rails are used on the trestle section. On curves and occasionally in other places riffles of cross rails are used, as they cannot be washed clean by clear water, and will retain any wary nuggets. Near the discharge end of the flume some full length rails are used. The trestle and outside of the flume only are painted with red shingle stain.

SETTLING RESERVOIRS

The settling dams as can be seen from the frontispiece are arranged semi-circular, divided by a straight dam, resembling the spoke of a wheel. These spoil banks, containing 2,850 cu. yds., were built in 13 days by means of the electric shovel. Picture No. 12 shows the machine at work on the dam. Some of the dirt, at the highest parts of the embankment had to be moved twice, as the shovel could not reach sufficient dirt from certain settings and still maintain an elevation so as to reach the top of the dam. The dams measure 820 ft. total arc length, 380 ft. across, point to point, 270 ft. greatest width. The maximum height is about 14 ft. Two dams were built so that the water could settle and be drawn from one while the other was being filled. A 15 in. overflow pipe at the west end protects them against overfilling. After construction the dams were filled with mill tailings pulp in order to seal the bottom reducing the seepage loss.

CICRULATING WATER SYSTEM

The first circulating water system consisted of a 12,000 gal. tank, filled by 8 in. pipe lines from dams one and two. From this tank a 3 in., 5 H. P. centrifugal pump forced the water through a four inch pipe line to a 38,000 gal. tank above the trommel site. This latter tank was connected with an 8 in. pipe through control valves to a header consisting of five 3 in. nipples that discharged water into the head end of the gold-saver. This pump, delivering 176 gals. per minute was found entirely too small so an 8 in. single stage, 1,600 gal. per minute, double suction type, 40 H.P., direct connected pump was purchased from the Byron Jackson Company on November 14, 1934. An overhead 15 in. pipe line was run direct from a head gate at the dam to the 12,000 gallon tank, and the two dams were connected. A 12 in. suction line was laid from a point 2 ft. from the tank bottom to the pump house reducing to 8 in. where entering the pump station.

The pump house is fully equipped, with gate valves on both suction and discharge lines, a 4 in. and a 2 in. drain, one on either side of the pump, a compound gauge on the suction line, pressure gauge on the discharge line, electric heater, and a telephone. The house itself is built of 4 in. x 4 in. studding, galvanized iron on the outside, lined on the inside with tar paper and 1 in. rough fir boards as insurance against freezing.

The pump is mounted on wood, however, the wood in turn is bolted to a concrete block. This was done in order to support the pipe lines on the same stringers that support the pump, thus relieving strains on the pump flanges. An extensive piece of concrete work was not desired at this cold period of the year.

The pressure line consists of 12 in. soil-proofed, drive-joint pipe extending 1,000 ft. after leaving the pump station. It is then reduced to 9 in. while crossing the flume trestle, a distance of 418 ft. This latter pipe was driven inside a 12 in. box or trough which had previously been intended to hold sawdust insulation for the 4 in. pipe line. A galvanized sheet was passed under the joint to be driven, a sack soaked in kerosene was placed inside the pipe end and set afire. The loose pipe was heated outside the box, then set in place and driven with a heavy hammer. The pipe is reduced to 8 in. after crossing the trestle, a valve is installed in the northwest corner of the riffle house and the pipe continued and connected to the 8 in. line leading from the 38,000 gallon tank. This tank had served in a former location, and had been permitted to dry. It leaked badly upon filling, finally soaking the ground until a blind stope caved damaging the tank. Then the 8 in. tank line was connected direct to the high pressure line.

With a clean runner and open valves, the gauges at the pump house show 85 ft. head when no primary water is being used and a 91 or 92 ft. head when two or more 2 in. primary water valves are open. The static head on the discharge line is 52.85 ft., the suction line has a positive head of about 10 ft., the pump being set at this elevation so that it could be connected to a lower dam to be built in the future, without resetting.

PRIMARY WATER SUPPLY EQUIPMENT

The primary water system consists of an 11 in. pipe line, partly drive, partly Dayton coupled, leading from the main Jett Canyon line, to the plant site as shown on plate No. 7. Eleven inch pipe from former hydraulic operations was used as economy, as it saved the purchase price of additional pipe. The company could not afford to drain the Jett line, as that might force a shut-down of the lode mine and mill, so the pipe connections had to be made under pressure, a matter of 300 pounds per square inch. A saddle with a 2 in. pipe sleeve welded to it was fastened with U bolts to the main Jett line. A nipple and gate valve were screwed to the saddle, then a special device consisting of a 2 in. pipe containing a 1-15/16 in. drill, the stem of which passed through a stuffing box at the pipe end, was screwed to the gate valve. The instrument tapped the Jett line by drilling through the open gate valve, then the drill was pulled until it cleared the valve, the valve was closed and the mechanism removed. In this manner three 2 inch taps were put on the main line, all connecting to the 11 in. mechanical placer line. They are used as control valves, the 11 in. line has never and perhaps would not stand a static head of 300 pounds, nor would it be good practice to leave such a pressure on such a line. Should anything break, the pit would fill with water incurring great expense and loss. The line is reduced to 4 in. before entering the plant site, to facilitate the placing of fittings. At first this line supplied only the fire plugs and small (10,000 gal.) tank. This tank was set on a higher elevation than the 38,000 gal. tank and so arranged that the water would overflow from the smaller to the larger tank. Later when the large tank was lost, the high pressure line was connected direct to the 8 in. riffle header line, connection being made at the tank sites. The small tank supplies service lines about the plant. All fire plugs, risers, or any of the water pipes exposed to freezing temperatures are provided with drains. Main lines are amply supplied with air relief valves.

POWER INSTALLATIONS

A high tension, 11,000 volt transmission line doubles back from the mine substation to the mechanical placer substation, as the company found its power rate would be in a lower bracket if all electric current used were measured by one meter. The substation, picture No. 24, consists of three 100 K. V. A. transformers, 6600-440 volt, Y connected and one 5 K. V. A. 440-220-110 volt transformer, together with lightning arrester, breakers and fuses. A small building on the site houses three 100 amp., 440 volt fused switches, a main lighting switch and a meter. The station is so located that the three 440 lines leaving it are, at present, of nearly equal length, the first consisting of three strands of 2-0 double braid, rubber covered wire pulled through a buried 2 in. pipe, supplies the hoist, the second line of similar construction supplies the trommel plant, the third a heavy insulated cable supplies the shovel. With the exceptions of the ore bin, trestle and flume lights, all wiring is either in metallic conduit or is well insulated cable. Wherever possible lines are buried. The control room, just west of the trommel, contains magnetic line starters with push buttons controlling the Apron Feeder, Intermediate Conveyor, Trommel, Stacker, Riffle Feeder and Riffle Vibrator. The circulating water pump may be stopped from this room. In addition, this room is equipped with a pilot light, two wired copper strips for testing fuses and lighting switches. The apron feeder and intermediate conveyor can also be controlled by buttons placed in the feeder room under the ore bin.

Westinghouse furnished most of the electrical equipment. The gear motors mentioned are integral units consisting of a motor driving an encased gear reduction system working in oil. They are particularly adapted for use in dusty locations.

GENERAL

Compressed air lines connecting with the mine supply, lead to the pit, ore bin, trommel, riffle building and intermediate conveyor motor, and are used for drilling, blowing dirt out of machinery, to cool hot bearings, and for air tools. The hoist, intermediate conveyor, ore bin, warehouse and vibrating riffle are housed with buildings constructed of 4 in. x 4 in. and 2 in. x 4 in. timber covered with 24 gauge galvanized, corrugated iron. The windows of the riffle house are heavily screened and the doors equipped with heavy locking devices. Incidental equipment of the control room includes a set of tools, tool locker, report forms, quicksilver balance, panning tub, a stove and telephone. A well-constructed, insulated house set northeast of the trommel, equipped with a metal covered shelf, stores all the lubricating supplies for the plant. An electric hot plate, or rather warm plate, insures soft grease and useable oil at all times.

The position of the original mill flume is shown on Plate No. 7. This flume often froze during the winter overflowing and as a result, filled the pit, left by scraper operations, with as much as fifteen feet of tailings. This waste material had to be moved before the rails could be laid to the gravel bank, so a temporary hopper was built half way up the trestle, trips installed and the tailings were moved by means of the regular gravel handling equipment in conjunction with a hired, dump truck. See picture No. 25. The material was put over the west bank thus building up the plant yard. A new mill flume, 1,010 feet long, running south instead of north was built in order to eliminate further flume overflow trouble.

The entire construction of this plant was effected with only one accident serious enough for a doctor's attention. A riveting hammer slipped, allowing the chuck to fly, striking the rivet bucker just below the nose.

OPERATION

LABOR

The plant is operated 24 hours by means of two hoisting shifts and three plant shifts. The hoisting shift consists of four men, a shovel runner, a pitman, a car dumper and a hoisting engineer. It is the duty of the pitman to signal the hoisting engineer, watch car latches and carry the electric shovel cable when the machine is moved. The car dumper works over the ore bin and it is his duty to see that the cars return clean, with latched doors. When necessary, the entire crew extend the tramming rails. One hoisting shift reports at 8 A. M. and works until 4:30 P. M. with a half hour off at noon; the other shift reports at 8 P. M.

and works until 4:30 A. M. the following morning. The crews change shifts bi-monthly, day shift taking long change.

A plant shift consists of a trommel operator and a riffle operator. The trommel operator watches the apron feeder, conveyors and trommel, tends to all lubrication and minor repairs of these units, in addition to watching constantly for clogged chutes or screens caused by damp gravel or large rocks. The riffle operator watches the riffle feeder, vibrating riffle and tailings flume. It is his duty to see that these units function properly and that the gold-saver is worked to full capacity. Trommel operators change shifts bi-monthly, day shift taking long change.

The head riffle operator works only day shift, 8 A. M. to 4 P. M. He feeds all quicksilver, conducts the clean-ups on the 15th and last day of each month and advises the other shifts as to best practice. The afternoon shift, 4 P. M. to 12 P. M., and night shift, 12 P. M. to 4 A. M., change shifts bi-monthly, afternoon shift taking long change.

The churn drill operator works only day shift, there being only one shift.

When necessary, a common laborer is hired to supplement drilling operations with coyote holes, to distribute tailings in the settling ponds or to perform any of the multitudinous tasks contingent to the undertaking. Repair work is done by the regular mine repair crew, the size of which varies greatly according to the work to be done.

SCALE OF WAGES

Shovel Operator. . . . . $5.50 per day

SCALE OF WAGES, CON.

Hoistman.	$5.00 per day
Riffle Operator	$5.00 per day
Trommel Operator.	$5.00 per day
Pitman.	$4.00 per day
Car Dumper.	$4.00 per day
Driller	$4.50 per day
Common Labor.	$3.50 per day

DIFFICULTIES ENCOUNTERED AND PLANT ALTERATIONS

As previously stated, the pit left by former operations had become filled with tailings, dry on top but gumbo-like below. These tailings had so dampened the adjoining gravel bank that the material was very difficult to handle. It "hung up" in the cars and ore bin and clogged the trommel ¼ mesh screens. For a while these screens were cleaned by means of a compressed air jet; finally, on November 18, they were removed entirely. An opening 9 in. x 12 in. was made in the front of the hopper over the apron feeder. By means of a compressed air blow-pipe, the ore in the bin was undermined, causing it to cave and feed. A man, the car dumper, had to be hired to solve the car problem.

The second purlin from the bottom of the ore bin soon showed excessive deflection, 4 in. in 22 ft. so the bin was reinforced by means of four 12 in. I-beams set horizontally, flange to the bin, one foot above the second purlin. The beams were connected at the corners by double plates bolted, one on either side of the beam webs.

The cross arm on the stacking conveyor bridle was found to be too close to the belt, as it interfered with the passage of large rocks. Links of steel 1 in. x 8 in. x 2 ft., 6 in. were ordered which, when installed, gave ample clearance at this point.

This stacking conveyor belt was found to move too fast. Round boulders, upon loading, would roll and eventually leave the belt instead of riding out to the end. This was remedied by substituting a nine tooth drive sprocket for a thirteen tooth sprocket with which the gear motor unit was equipped, cutting the belt rate from 259 to 179 feet per minute.

Up to the present time the gold-saver has proven to be the "bottle-neck" of the plant. In an effort to increase its capacity, 6 in. x 6 in. timbers were placed lengthwise inside the vibrating riffle, narrowing the width of the stream. This helped, however, on the following clean-up day, these timbers were removed and, by inserting blocks of proper depth, the grade of the gold-saver was increased from 4 in. per 12 ft. to 6 in. per 12 ft. This apparently balances the capacities of the vibrating riffle and flume. The bumper blocks of the gold-saver began to show movement, a difficulty which was overcome by bolting 8 in. channel iron lengthwise to the blocks, tying all blocks together. Next, gravel showed a tendency to pack in the bottom of the vibrating riffle, a difficulty solved by raising the riffles two inches off the bottom by means of 2 in. x 4 in. wood strips. Also alternate riffle sections were turned upside down which helps keep the gravel loose. As a saver of free gold, this machine has done very well. During one clean-up, 97% of the amalgam was taken from the first forty feet of the sixty foot machine.

Certain 1 in. perforations in the trommel shell were too close to the sides of the undersize hopper. Material spilled here constantly so these holes were covered or blinded with light steel plate.

SUMMARY

The plant was designed to treat 1,200 yards of bank gravel every 24 hours, or a yard a minute, on the basis of 20 operating hours per day, the gravel being 30% minus ¼ mesh. To date no opportunity has been had to prove or disprove these figures as the only available parts of the gravel bank vary from 80% to 90% minus ¼ mesh, a rather unique feature as the bulk of the deposit consists of a much higher percentage of coarse material. By actual measurement, the gold-saver was found to be treating a maximum of 35 tons, or 21.4 bank yards per hour which, on the basis of 30% minus ¼ mesh, would give a plant capacity of 71.3 cubic yards an hour. The capacity was further reduced by the removal of the ¼ mesh screens which allowed all material minus 1 inch to go to the gold-saver. No actual yardage per hour figures are available as the making of the mechanical changes enumerated, shortage of primary water and the damp muck have all been contributing factors to erratic operations. However, surveys indicate that the plant has been averaging about 22 bank yards per hour, including minor shut-downs.

The apron feeder, intermediate conveyor, trommel and stacker have never worked to capacity. The excavation and hoisting departments might require a third shift in order to furnish the increased tonnage when the percentage of gravel fines is lowered.

For smooth operation, tram lines should be so placed that the shovel could load at two or more points so that the track could be extended without stopping the hoisting. This could not be done at the beginning because the track had to be laid on bedrock, 15 feet below tailings, about 45 feet below the rim of the gravel and, obviously, the track had to progress with the excavation work. As a result the shovel, during the first two months, did considerable casting, handling of material twice, which is not conducive to low costs.

The operation of this plant, up to the present time, has been so interposed with unusual conditions caused first, by the nature of the gravel first excavated; second, by mechanical changes made within the plant and lastly, by the shortage of primary water, that the practice and costs as described should not be construed necessarily as those to be expected in the future. The costs to be expected can only be estimated but they will be at figures much lower than those shown on the following pages.

This thesis has been an attempt to cover the construction and operation of the mechanical placer plant up to the present date, January 1, 1935. Since the practice has not been perfected, it must necessarily be incomplete. In this connection, some problems just appearing might be mentioned. A black sand carrying values is beginning to appear in the flume riffles which might show an additional profit if recoverable by an undertow or some similar device. Large boulders are proving troublesome. Soon a grizzly will be installed over the ore bin and provision made for their rejection.

CONCLUSION

The merits of an honest gold mine during the Nation's present dilemma need hardly be lauded. As an industry, it consumes directly and indirectly practically every known product of other industries and in return produces gold bullion, a commodity acceptable any where in the world, a product with which no market is glutted. Gold mines are non-competitive. The exceptional success of one or several mines does not reduce the increment of profit being made by mines not so fortunate. The industry employs men and pays honest wages without passing the bill to the taxpayers of the present or future generations. In truth it is a short cut to recovery, devoid of many of the ills found in other plans. It is said a gold mining boom follows every depression.

The treatment of placer deposits mechanically, may in truth, be called a new branch of mining. Why so many deposits, unadaptable to dredging, have remained virgin is a question for conjecture. Perhaps trained men and capitalists up to the present time, have always been able to see larger profits elsewhere. In any event there are many such deposits in the West, especially in Nevada, and the problem of extracting their values in most instances is yet to be solved. Any step taken by an operator towards working these deposits is, under present neoteric conditions, of value to all other actual and potential operators. If a certain phase of a practice is successful, it may be adopted; if not, it may save another management from making a similar mistake, together with the inevitable financial loss.

To Nevada this plant is a contribution to her artificial resources, giving employment, paying taxes, and stimulating other industries. To the mining world it contributes valuable information on the treatment of an almost virgin type of gold deposit.

Table No. 1

Foundation	Excavation Cu. Ft.	Concrete Cu. Ft.
Block at end of Trestle	696	405
Bent Blocks	384	395
Ore Bin	3,020	1,215
Hoist	602	425
Intermediate Conveyor	4,800	144
Trommel and Riffle Site	17,400	
Trommel and Derrick Pit	3,000	2,786
Derrick	965	980
Vibrating Riffle		200
Derrick Winch	50	55
Substation	55	160
Circulating Water Tank Sites	9,400	
Pump		40
Gordon Shaft Bulk Head		200
Miscellaneous, Approximately	200	110
Total:-	40,572	7,115

Timber Distribution

Pieces	Size	Purpose
2	14 in. x 14 in. x 80 ft.	Derrick Stiff legs
2	14 in. x 14 in. x 62 ft.	Derrick A-Frame
1	14 in. x 14 in. x 42 ft.	Derrick A-Frame, Horizontal Members.
5	12 in. x 18 in. x 24 ft.	4 Stringers over Bin 1 Spare
50	8 in. x 14 in. x 16 ft.	44 Stringers 6 Spare
11	10 in. x 10 in. x 24 ft.	4 Post, #9 Bent 4 Post, #10 Bent Sills for #8, 9 & 10 Bents
15	10 in. x 10 in. x 22 ft.	4 Posts, #8 Bent 2 Bin Sills Sills for #6 and #7 Bents 7 Spare
13	10 in. x 10 in. x 20 ft.	2 Bin Sills 4 Bin Corner Posts 2 Bin Sills at top of Bin Sills for #4 and #5 Bents 3 Spare
10	10 in. x 10 in. x 18 ft.	2 #11 Bent over Ore Bin 4 Posts, #7 Bent Sills for #2 and #3 Bents 2 Diagonal Braces over Bin
7	10 in. x 10 in. x 16 ft.	2 #3 Bent Posts 4 Posts, #5 Bent Sill #1.
25	10 in. x 10 in. x 14 ft.	10 Caps 2 Posts, #2 Bent 4 Posts, #6 Bent 9 Spare
5	10 in. x 10 in. x 12 ft.	4 Posts, #4 Bent 1 Spare
17	8 in. x 10 in. x 22 ft.	16 Horizontal Bin Members, 1 Spare.

Pieces	Size	Purpose
23	8 in. x 10 in. x 20 ft.	14 Ore Bin Members, vertical Others may be ripped for vertical members.
12	8 in. x 10 in. x 20 ft.	11 Corbels, 1 Spare
		All Diagonal Bracing
6	3 in. x 10 in. x 28 ft.	2 #8 Bent 2 #9 Bent 2 Spare
5	3 in. x 10 in. x 24 ft.	2 #7 Bent 2 #10 Bent 1 Spare
3	3 in. x 10 in. x 22 ft.	2 #6 Bent, 1 Spare
2	3 in. x 10 in. x 20 ft.	2 #5 Bent
4	3 in. x 10 in. x 18 ft.	2 #2 Bent 2 #4 Bent
4	3 in. x 10 in. x 16 ft.	2 #3 Bent, 2 Spare
100	3 in. x 12 in. x 18 ft.	Bin Lining and Flooring
120	6 in. x 6 in. x 14 ft.	Ties
50	6 in. x 6 in. x 18 ft.	Ties
4	10 in. x 12 in. x 18 ft.	1 Corbel over Bin 3 Spare
2	4 in. x 8 in. x 16 ft.	2 Spare

CAPITAL COSTS

Buildings and Structures	$3,235.69
Excavating Equipment	10,075.98
Tram Lines and Trestle	4,478.96
Storage Bin	3,752.88
Hoisting Equipment	6,324.34
Feeder Equipment	2,553.21
Intermediate Belt Conveyor	4,169.52
Trommel	10,835.03
Oversize Stacking Equipment	10,076.16
Gold-Saving Equipment	2,865.82
Tailings Disposal Equipment	3,460.72
Settling Reservoirs	999.71
Mill Tailings Flume	1,502.20
Circulating Water Equipment	709.87
Circulating Water Piping	1,286.41
Circulating Water Equipment (8" pump)	1,302.62
Circulating Water Piping (9 in. and 12 in. pipe)	2,771.48
Water Supply Equipment	56.71
Water Supply Piping	1,948.18
Water Supply Storage Tanks	1,062.44
Air Lines	374.74
Substation Structures	705.61
Substation Equipment	1,129.56
Electric Distribution	1,540.96
Miscellaneous Equipment	30.05
Engineering and Miscellaneous Capital Costs	5,582.21
Total:-	$82,841.06

PRODUCTION RECORD

Period	Cubic Yards	Recovered Value	Value Per Yard
November 1-15	908	$1,666.48	$1.8353
November 16-30	867	1,522.34	1.7559
December 1-15	1,192	2,109.76	1.7699
December 17-31	3,728	4,476.97	1.2009

Operating Cost Data for Month of November, 1934.

		Per Cubic Yard
Yards Washed	1,775	
Production Gold @ \$20.67 per fine ounce	\$1,894.01	\$1.0670
Operation and Maintenance	1,150.14	0.6480
Normal Operating Profit:-	\$743.87	\$0.4190
Deferred Maintenance and Extraordinary Costs	———	———
Actual Operating Profit:-	\$743.87	\$0.4190
General Administration San Francisco	106.77	0.0601
Net Profit:-	\$637.10	\$0.3589
Premium	1,294.81	0.7295
Total Profit:-	\$1,931.91	\$1.0884
Total Production	\$3,188.82	\$1.7965
Total Costs:	1,256.91	0.7081
Total Profit:-	\$1,931.91	\$1.0884

NOTE:- A similar sheet for the month of December has not yet been prepared. However, the following is an approximation:

Yards Washed	4,920	
Total Production	\$6,586.75	\$1.3388
Operation and Maintenance	2,827.56	0.5757
Operating Profit:-	\$3,759.19	\$0.7631

Operating Costs for Month of November, 1934.

	Labor	Supplies	Power	Miscel
Electric Shovel Operations	$139.66		$54.82	$4.01
Drilling and Blasting	30.34	$32.34		1.86
Hoisting	45.69	3.16	29.88	1.31
Operating Trommel	147.48	20.35	82.82	4.23
Stacking Oversize			33.24	
Tailings Disposal	1.99			0.06
Operating Gold-Saver	104.64	6.67	28.07	3.00
Circulating Water Costs	1.96		14.50	0.06
Cleaning up	15.79			0.45
Lighting Miscellaneous Costs		18.80	26.09	
Blacksmith Shop				20.77
Engineering and Surveying	1.08			0.03
Retort and Melt				1.49
Marketing Expense				19.40
Mine Office				128.95
Total:-	$488.63	$81.32	$269.12	$185.62
Total Operating:-	$1,024.69			

Maintenance for Month of November, 1934.

	Labor	Supplies	Miscel
Excavating Equipment	$32.93	$25.41	$11.82
Hoisting Equipment	5.87		4.13
Feeder Equipment	4.24		5.07
Trommel	0.58		2.99
Oversize Stacker	8.54		0.24
Gold-Saving Equipment	1.76	2.34	0.05
Tailings Disposal Equipment		0.55	2.97
Circulating Water Equipment	2.35	9.71	2.05
Circulating Water Piping	1.75		0.10
Total:-	$58.02	$38.01	$29.42

Total Ordinary Maintenance:- $125.45

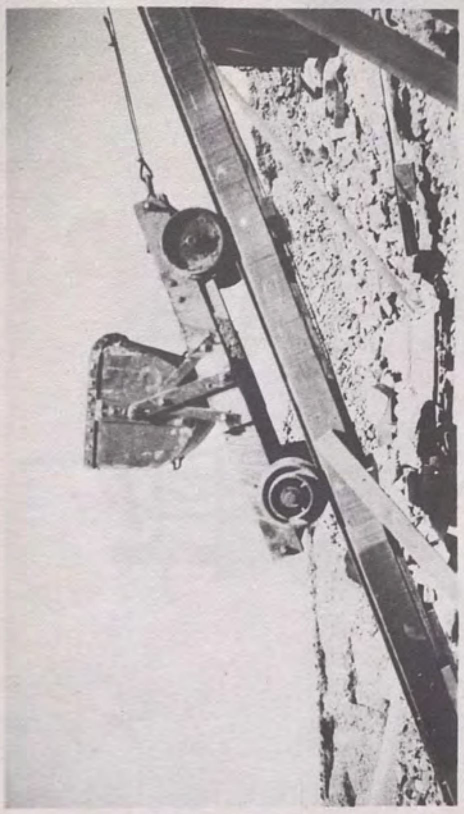
Operating Costs for Month of December, 1934.

	Labor	Supplies	Power	Miscel
Electric Shovel Operations	$311.85	$14.57	$122.95	$9.05
Moving Track, Air Lines, etc.	41.54	12.52		1.21
Drilling and Blasting	63.35	135.73		31.70
Hoisting	207.43	0.95	97.34	6.02
Operating Trommel	153.96	21.13	211.30	4.47
Stacking Oversize	44.66	0.20	84.23	1.30
Tailings Disposal	28.13	153.58		0.82
Operating Gold-Saver	300.71	0.82	68.71	8.73
Circulating Water Costs		1.49	138.84	
Cleaning up	19.52			0.56
Lighting Miscellaneous Costs		24.41	25.62	
Engineering and Surveying	36.51			1.06
Retort and Melt				3.29
Marketing Expense				35.72
Total:-	$1,207.66	$365.40	$748.99	$103.93
Total Operating:-	$2,425.98			

Maintenance for Month of December, 1934.

	Labor	Supplies	Miscel
Excavating Equipment	$8.79	$3.74	$ 6.79
Tram Lines and Trestle	17.42	1.54	0.50
Storage Bins	1.75		0.05
Hoisting Equipment	88.83	7.40	49.23
Feeder Equipment			3.73
Trommel	3.70		0.11
Oversize Stacker	33.78	20.35	23.37
Gold-Saving Equipment	9.61	4.34	5.87
Tailings Disposal Equipment	24.71	0.16	0.71
Settling Reservoir		3.14	
Circulating Water Equipment	9.02		0.26
Water Supply Piping	9.51		0.27
Air Lines	2.90		0.09
Substation Buildings and Structures	2.25		0.06
Electric Distribution and Service Lines	1.95		0.14
Drilling Equipment	16.10	38.94	0.47
Total:-	$230.32	$79.61	$91.65
Total Maintenance:-	$401.58		

No. 1



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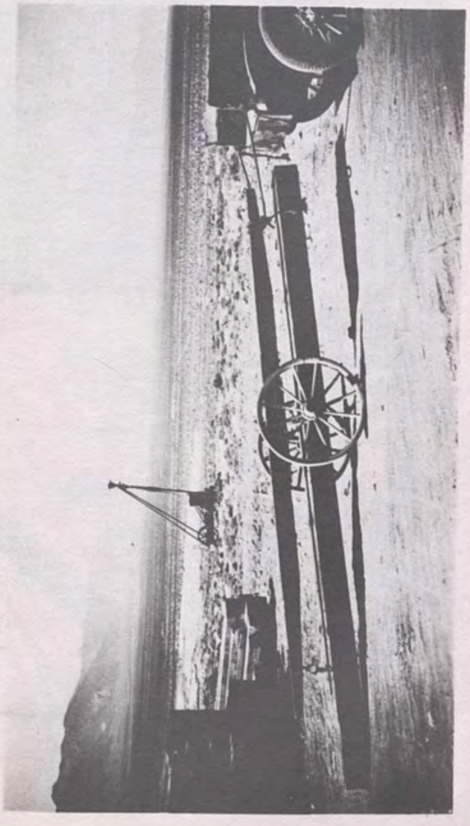

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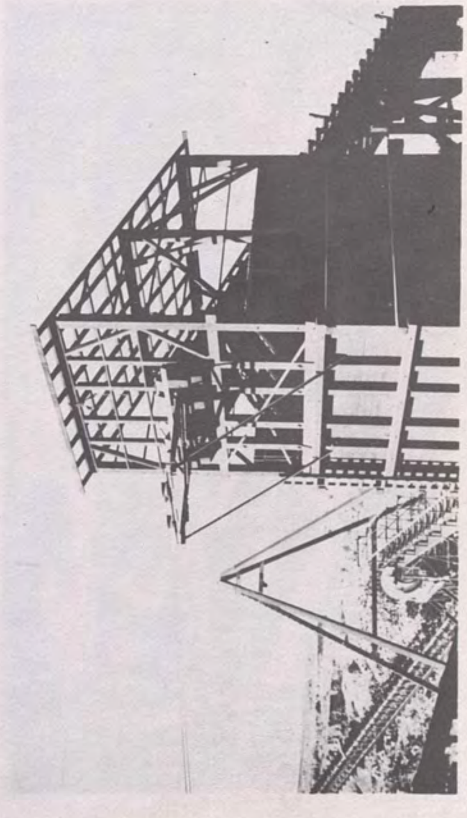

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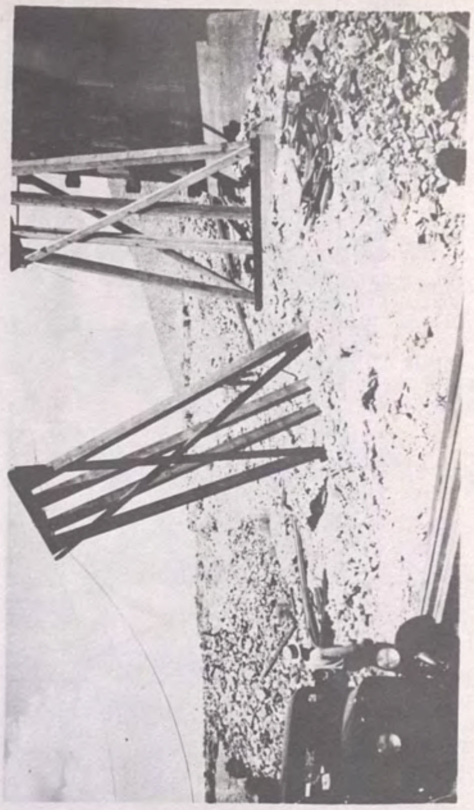

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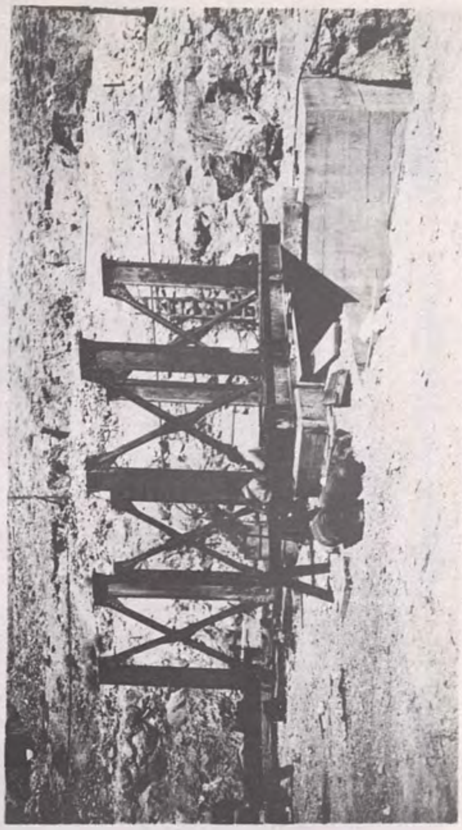
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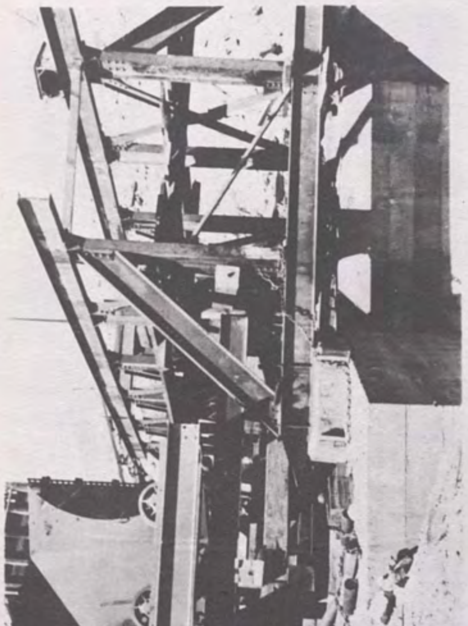

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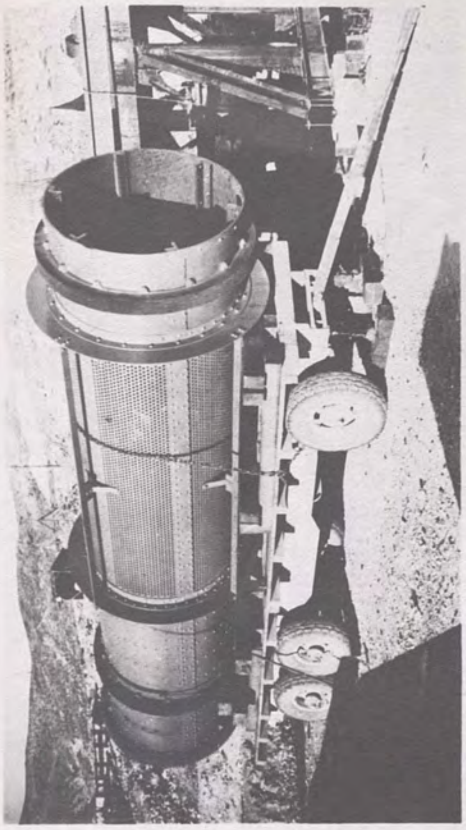

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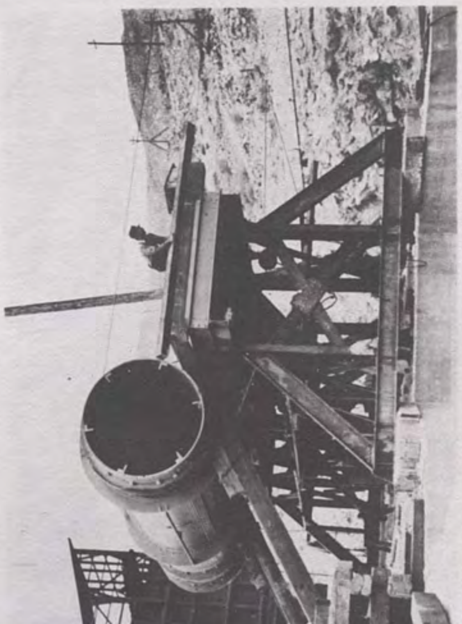

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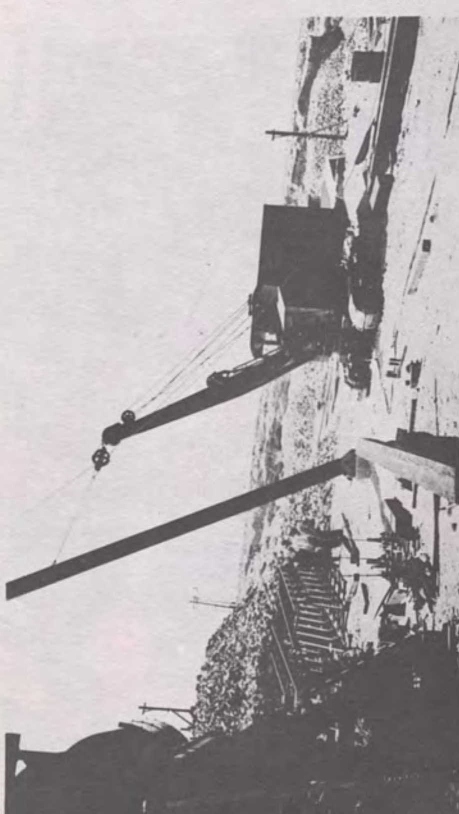

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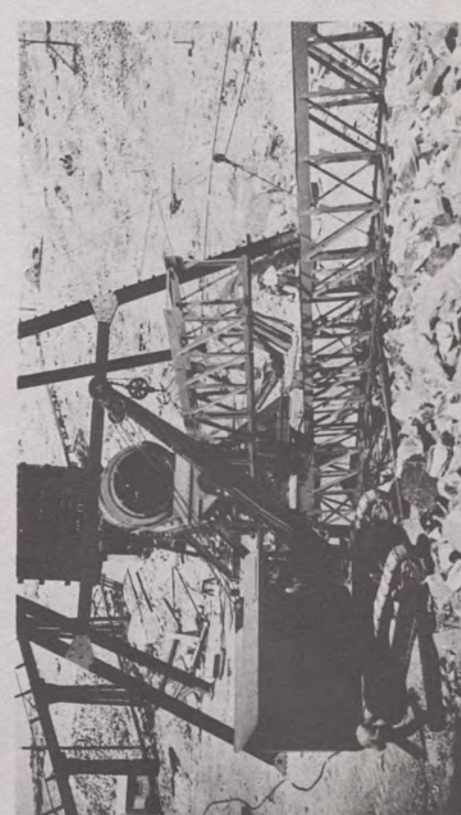

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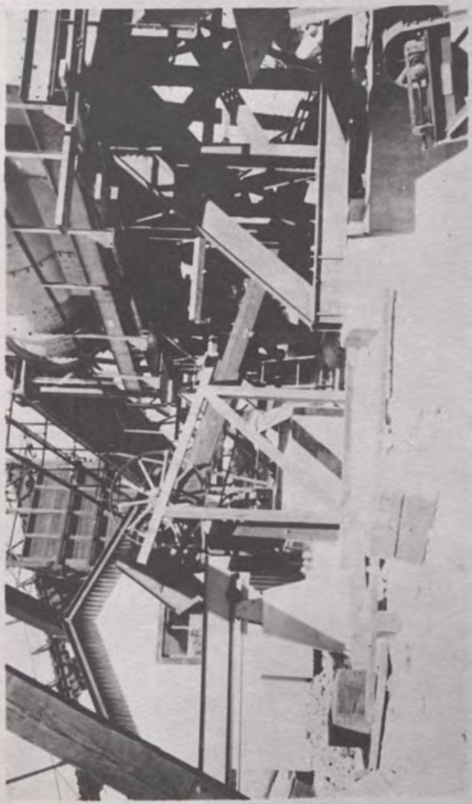

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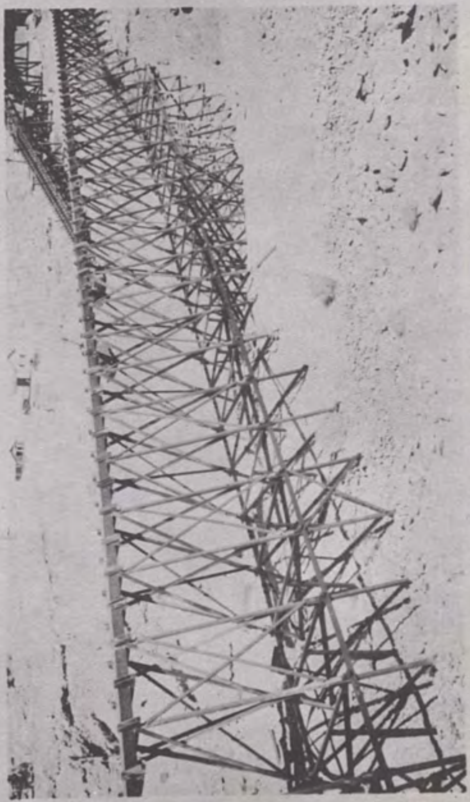

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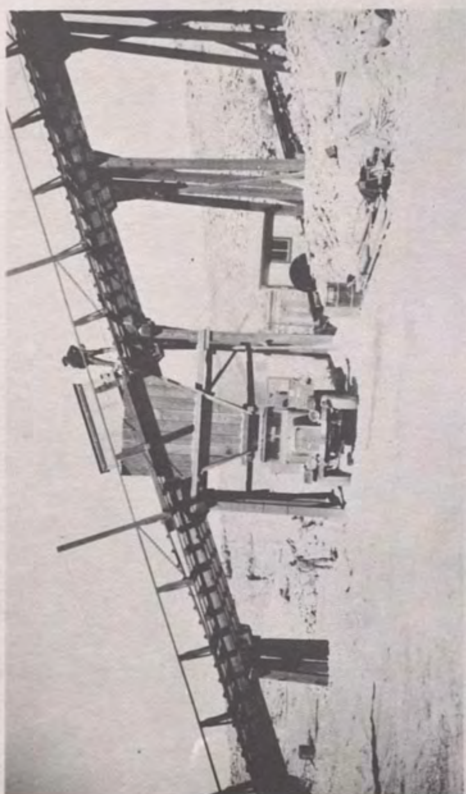

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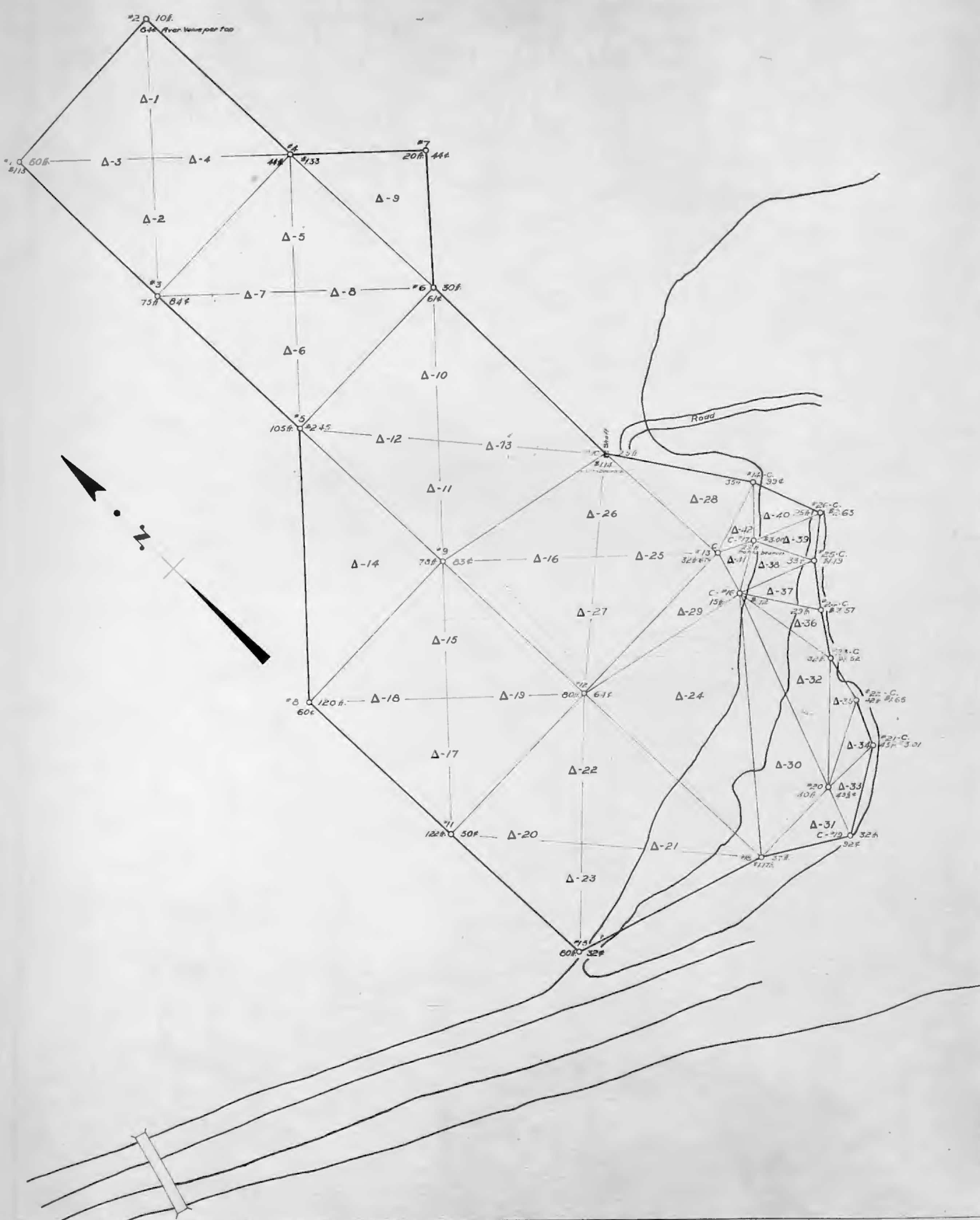


VALUES and SAMPLE HOLES.

Triangle No.	Corner Holes: Hole No.	Depth: Ft.	Depth: Aver. ÷ 3 Cor. Holes	Aver. Value per Ton	Product Value by depth	Aver. Value Triangle per Ton
1	1 2 4 Total & Aver.	50.00 10.00 44.00 104.00	---- ---- ---- 35.00	$1.13 0.84 1.33 ----	$56.50 8.40 58.52 123.42	---- ---- ---- $1.19
2	1 3 4	50.00 75.00 44.00 169.00	---- ---- ---- 56.33	1.13 .84 1.33 ----	56.50 63.00 58.52 178.02	---- ---- ---- 1.05
3	1 2 3	50.00 10.00 75.00 135.00	---- ---- ---- 45.00	1.13 0.84 0.84 ----	56.50 8.40 63.00 127.90	---- ---- ---- 0.95
4	2 3 4	10.00 75.00 44.00 129.00	---- ---- ---- 43.00	0.84 0.84 1.33 ----	8.40 63.00 58.52 129.92	---- ---- ---- 1.00
5	3 4 6	75.00 44.00 30.00 149.00	---- ---- ---- 49.66	0.84 1.33 0.61 ----	63.00 58.52 18.30 139.82	---- ---- ---- 0.94
6	3 5 6	75.00 105.00 30.00 210.00	---- ---- ---- 70.00	0.84 2.45 0.61 ----	63.00 257.25 18.30 338.55	---- ---- ---- 1.61
7	3 4 5	75.00 44.00 105.00 224.00	---- ---- ---- 74.66	0.84 1.33 2.45 ----	63.00 58.52 257.25 378.77	---- ---- ---- 1.69
8	4 5 6	44.00 105.00 30.00 179.00	---- ---- ---- 59.66	1.33 2.45 0.61 ----	58.52 257.25 18.30 334.07	---- ---- ---- 1.86
9	4 6 7	44.00 30.00 20.00 94.00	---- ---- ---- 31.33	1.33 0.61 0.84 ----	58.52 18.30 6.80 83.62	---- ---- ---- 0.91
10	5 6 10	105.00 30.00 25.00 [illegible]	---- ---- ---- 53.33	2.45 0.61 1.14 ----	257.25 18.30 28.50 304.05	---- ---- ---- 1.90
11	5 9 10	105.00 78.00 25.00 208.00	---- ---- ---- 69.33	2.45 0.83 1.14 ----	257.25 64.74 28.50 350.49	---- ---- ---- 1.68
12	5 6 9	105.00 30.00 78.00 213.00	---- ---- ---- 71.00	2.45 0.61 0.83 ----	257.25 18.30 64.74 340.29	---- ---- ---- 1.59
13–42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

VALUES and VOLUMES

Triangle No.	Dimensions ft. Base	Dimensions ft. Alt.	Base by half alt = Area sq. ft.	Aver. depth 3 Corner Holes	Area by aver. depth = Vol. in cu. ft.	Vol. in cu. ft. ÷ 20 = Tons	Aver. Value Triangle per Ton	Aver. Value in $ per T. by Vol. in Tons Total Value in Triangle $	Area
1	282.84	141.42	20000	35.00	700000	35000	$1.19	$41650.00	
2	" "	" "	20000	56.33	1126600	56330	1.05	59146.50	
3	" "	" "	20000	45.00	900000	45000	0.95	42750.00	
4	" "	" "	20000	43.00	860000	43000	1.00	43000.00	
5	" "	" "	20000	49.66	993200	49660	0.94	46680.40	
6	" "	" "	20000	70.00	1400000	70000	1.61	112700.00	
7	" "	" "	20000	74.66	1493200	74660	1.69	126175.40	
8	" "	" "	20000	59.66	1193200	59660	1.86	110967.60	
						398310		541409.90	
Total	÷ 2 =	actual	Tonnage +	Value		199155		270704.95	A
9	200.00	100.00	10000	31.33	313333	15666	0.91	14256.06	B
10	243.00	200.00	24300	53.33	1306666	65333	1.90	124132.70	
11	312.00	122.00	19032	69.33	1319452	65972	1.685	111162.82	
12	200.00	200.00	20000	71.00	1420000	71000	1.595	113245.00	
13	280.00	77.00	23800	44.33	1055133	52756	0.84	44315.06	
						255061		392855.58	
Total	÷ 2 =	actual	Tonnage +	Value		127530		196447.79	C
14	282.84	141.42	20000	101.00	2020000	101000	1.30	131300.00	D
15	282.84	141.42	20000	92.66	1853200	92660	0.66	60008.00	
17	" "	" "	20000	107.33	2146600	107330	0.57	61178.10	
18	" "	" "	20000	106.66	2133200	106660	0.62	66129.20	
19	" "	" "	20000	93.33	1866600	93330	0.63	58797.90	
						399980		254114.00	
Total	÷ 2 =	actual	Tonnage +	Value		199990		127057.00	E
16	215.00	153.00	16387	71.00	1158207	57910	0.79	45748.90	
25	245.00	122.00	14945	45.66	680418	34021	0.74	25176.54	
26	280.00	105.00	14700	45.00	661500	33075	0.85	28113.75	
27	280.00	140.00	19600	63.33	1241333	62066	0.72	44687.52	
						187072		143725.71	
Total	÷ 2 =	actual	Tonnage +	Value		93536		71862.85	F
20	265.00	134.00	17755	94.00	1668970	83448	0.49	40889.52	
21	265.00	186.00	24645	65.66	1618355	80918	0.61	[illegible]	
22	320.00	155.00	24800	79.66	1975335	98767	0.65	[illegible]	
23	320.00	112.00	17920	79.66	[illegible]	70881	0.54	38275.74	
						334034		172736.87	
Total	÷ 2 =	actual	Tonnage	+ Value		167017		86368.40	G
24	272.00	166.00	22576	44.00	993344	49667	0.84	41720.28	
28	152.00	78.00	5920	30.66	181752	9087	0.92	8359.34	
29	130.00	48.00	4360	42.33	193040	9652	0.70	[illegible]	
30	270.00	78.00	10530	30.66	322849	16142	0.84	13559.28	
31	92.00	54.00	2484	[illegible]	150232	7512	0.83	[illegible]	
32	220.00	56.00	6160	29.00	178640	8932	0.95	8485.40	
33	96.00	34.00	1632	39.00	[illegible]	3182	1.56	4963.92	
34	94.00	30.00	1410	42.33	59690	2984	1.75	[illegible]	
35	[illegible]	[illegible]	1712	38.00	65208	3260	1.18	3846.80	
36	[illegible]	35.00	1930	25.33	49096	2455	2.22	5450.10	
37	84.00	41.00	1374	25.46	50650	2532	2.07	[illegible]	
38	82.00	44.00	1804	23.66	42695	2135	1.78	3757.60	
39	65.00	48.00	1560	27.00	42120	2106	2.15	[illegible]	
40	74.00	56.00	2072	27.66	57325	2866	2.04	5846.64	
41	55.00	34.00	935	23.66	22128	1106	1.33	[illegible]	
42	80.00	28.00	1120	30.00	[illegible]	1680	1.39	2335.20	
					Total +	123738		120471.33	H

SUMMARY.

Area	Tons	Value
A	199155	$27070495
B	15666	1425606
C	127530	19644779
D	101000	13130000
E	199990	12705700
F	93536	7186285
G	167017	8636840
H	123738	[illegible]
Total	1029632	[illegible]
Aver. Value per Ton $1.006		

MAP OF PORTION OF PLACER AREA No. 1

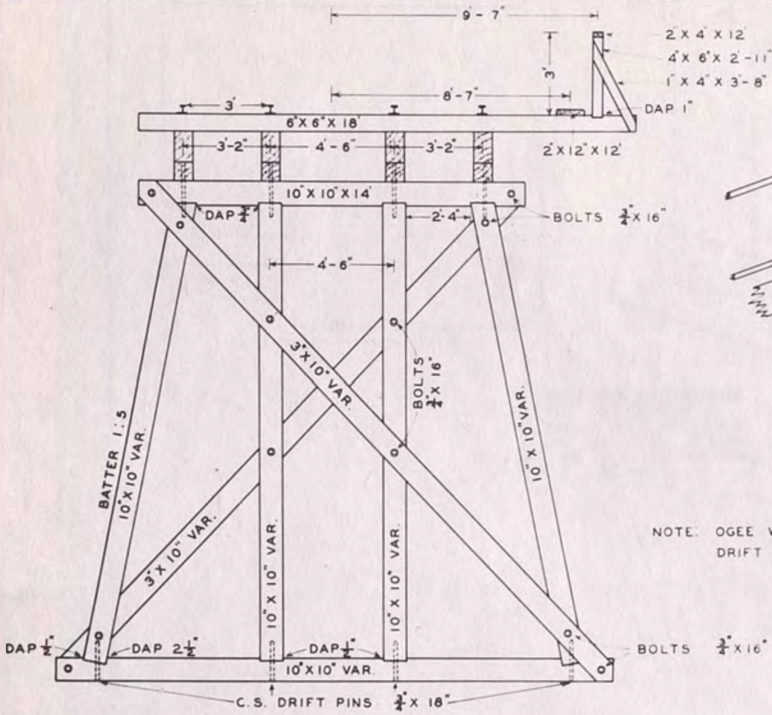
NEVADA PORPHYRY GOLD MINES INC.

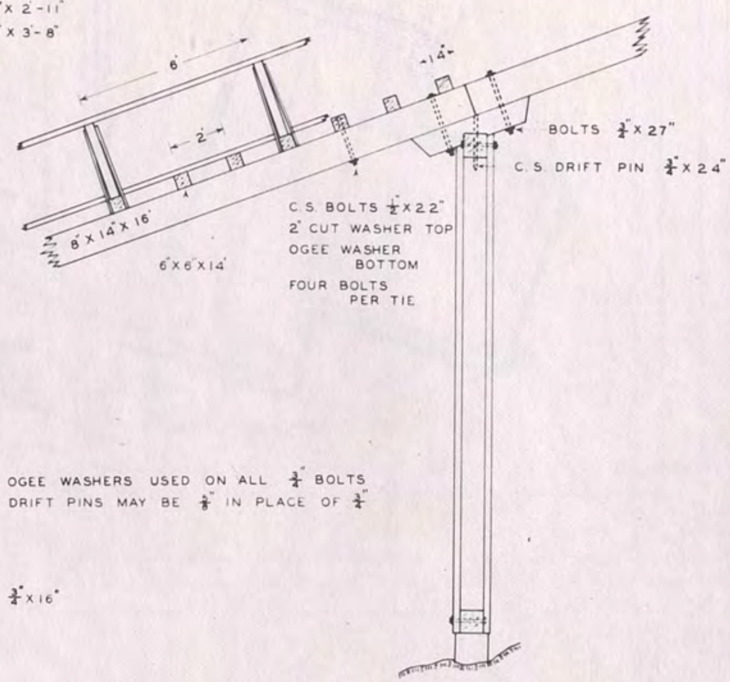
ROUND MOUNTAIN, NEVADA.

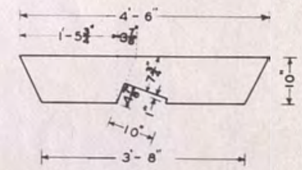
Scale 1 in = 50 Ft.

1929

Plate No. 1







CORBEL

NOTE: OGEE WASHERS USED ON ALL 3/4" BOLTS
DRIFT PINS MAY BE 5/8" IN PLACE OF 3/4"

TABLE OF VARIABLE LENGTHS

BENT	HEIGHT	PLUMB POST	BATTER POST	SILL	DIAG. BRACING
1	1'-6 7/16"	USE SILL	AND CAP ONLY	14'-00"	–
2	4'-5 1/16"	2'-10 5/16"	3'-1"	15'-1 11/16"	15'-2 3/4"
3	5'-1 5/16"	3'-6 9/16"	3'-9 1/2"	15'-5"	15'-6 7/8"
4	10'-5 13/16"	8'-1 1/16"	9'-3 3/16"	17'-6 13/16"	18'-11 3/4"
5	12'-8 3/8"	11'-1 5/8"	11'-6 1/4"	18'-5 3/8"	20'-7 7/32"
6	14'-1 1/8"	12'-6 3/8"	12'-1 5/16"	19'-0 1/8"	21'-8 7/16"
7	18'-5 5/16"	16'-10 9/16"	17'-4 9/16"	20'-8 15/16"	25'-4"
8	22'-8 9/16"	21'-1 13/16"	21'-8 7/8"	22'-5 7/16"	29'-1 1/2"
9	25'-0 3/4"	23'-6"	24'-1 9/16"	23'-4 11/16"	31'-3 1/4"
10	23'-4 1/2"	21'-9 3/4"	22'-4 15/16"	22'-8 5/8"	29'-8 11/16"

GRADE 38.59 PER CENT = 21°-06'-10"

LIST OF BOLTS

4	DRIFT	PINS	3/4" X 24"
4	"	"	3/4" X 18"
8	BOLTS		3/4" X 27"
12	"		3/4" X 16"
32	"		1/2" X 22"
40	OGEE	WASHERS	3/4"
32	"	"	1/2"
32	CUT	"	1/2"

TRESTLE

FOR

MECHANICAL PLACER PLANT

NEVADA PORPHYRY GOLD MINES INC.

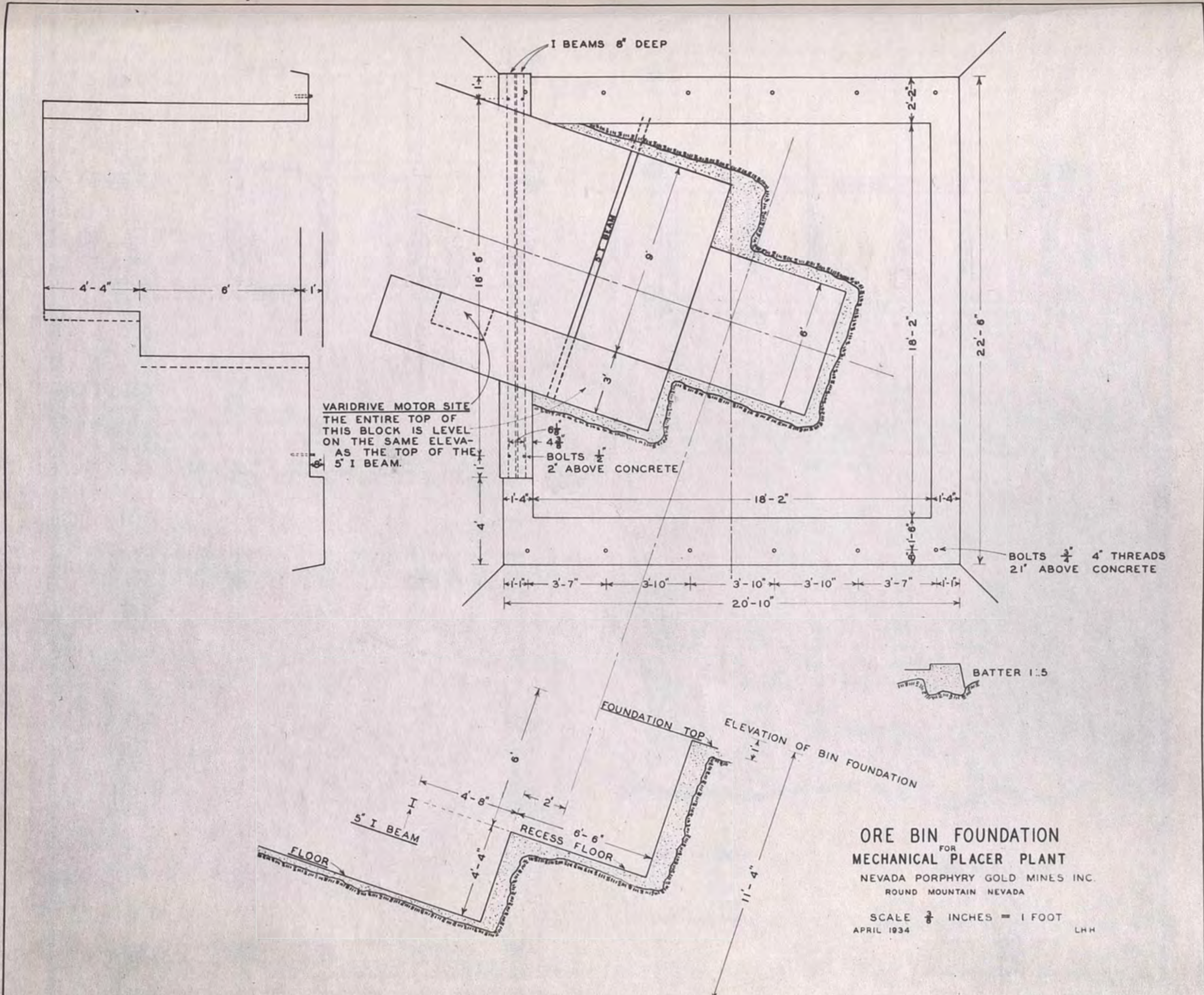
ROUND MOUNTAIN NEVADA

SCALES

3/8 & 1/2 INCHES = 1 FOOT

MARCH 1934 LHH

Plate No. 2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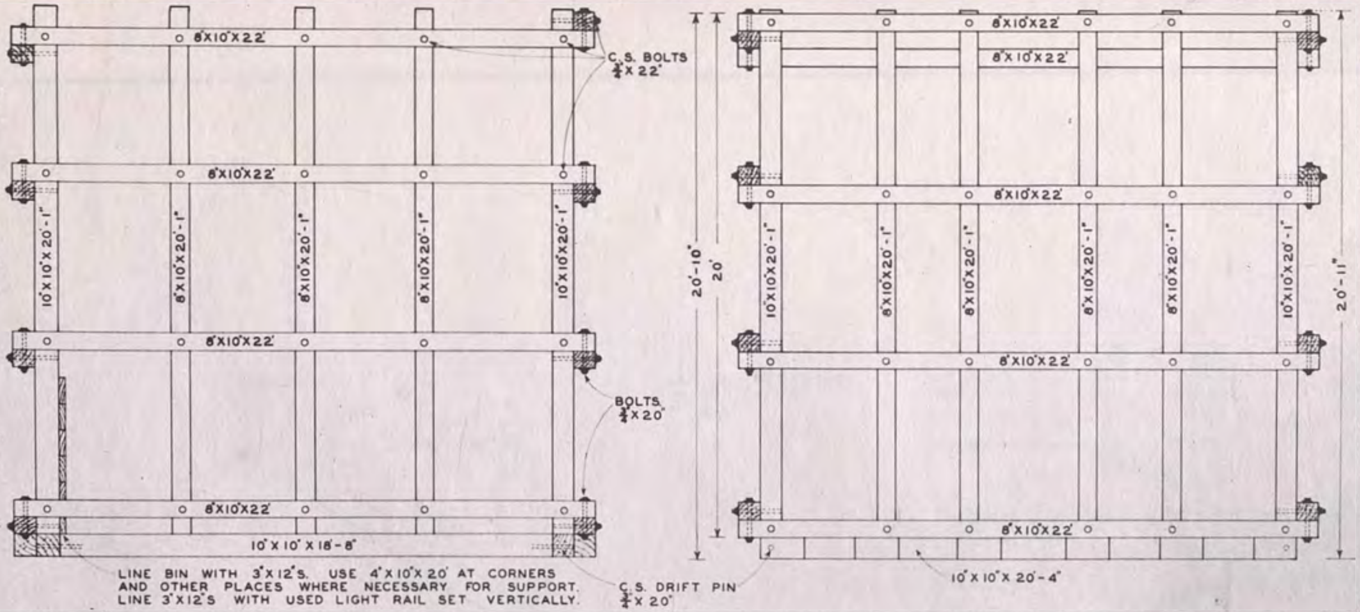
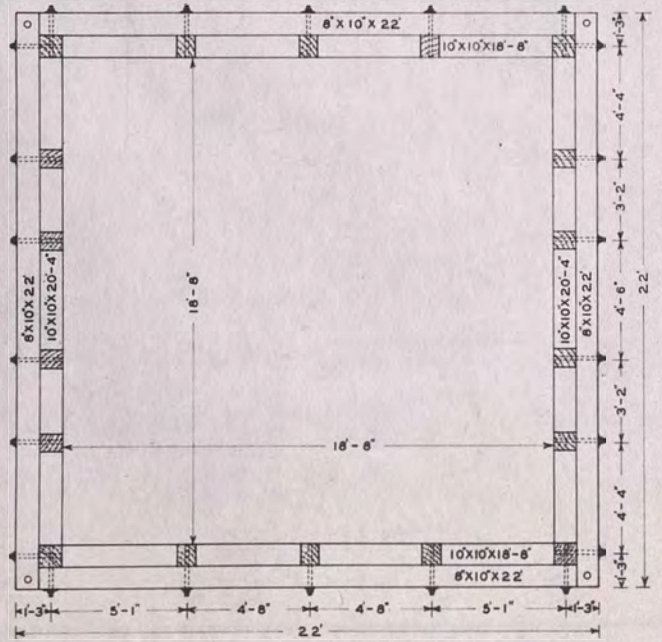
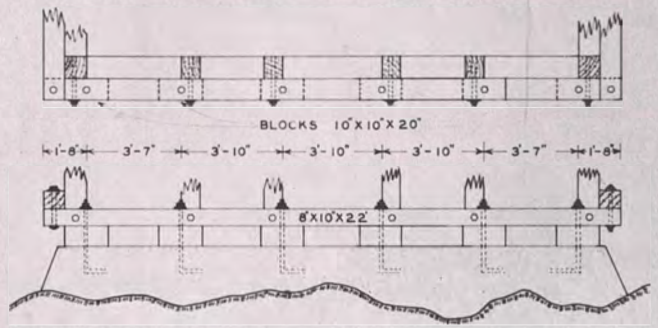
5" I BEAM
VARIDRIVE MOTOR SITE
THE ENTIRE TOP OF THIS BLOCK IS LEVEL ON THE SAME ELEVA- AS THE TOP OF THE 5" I BEAM.
BOLTS 1/2" 2" ABOVE CONCRETE
BOLTS 3/4" 4" THREADS 21" ABOVE CONCRETE
BATTER 1:5
FOUNDATION TOP
ELEVATION OF BIN FOUNDATION
5" I BEAM
RECESS FLOOR
FLOOR
ORE BIN FOUNDATION
FOR
MECHANICAL PLACER PLANT
NEVADA PORPHYRY GOLD MINES INC.
ROUND MOUNTAIN NEVADA
SCALE 3/8 INCHES = 1 FOOT
APRIL 1934
LHH

Plate No. 3







LIST OF BOLTS

4	DRIFT PINS	¾"X20"
88	BOLTS	¾"X22"
16	"	¾"X18"
120	OGEE WASHERS	¾"
88	CUT "	¾"

ORE BIN

FOR

MECHANICAL PLACER PLANT

NEVADA PORPHYRY GOLD MINES INC.

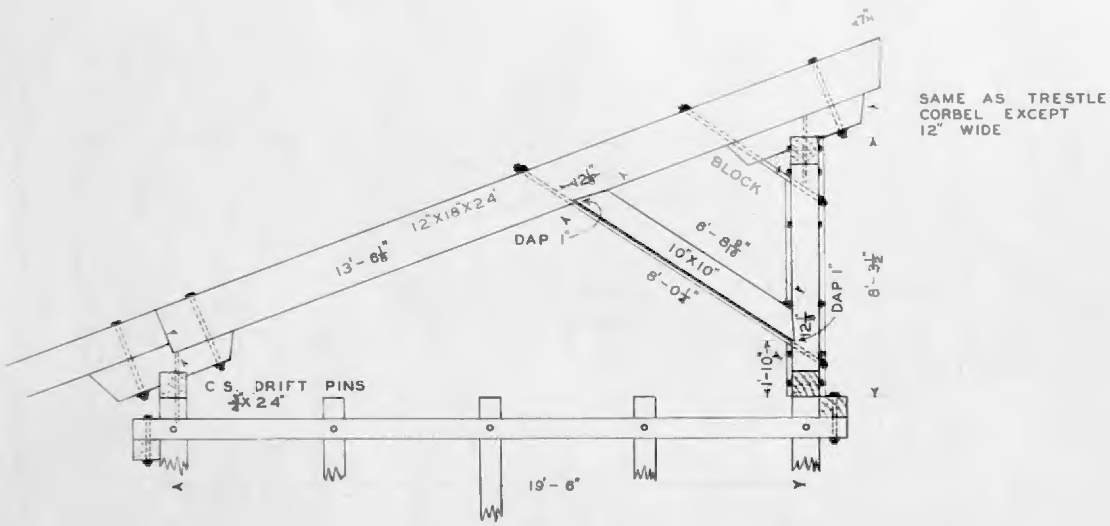
ROUND MOUNTAIN NEVADA

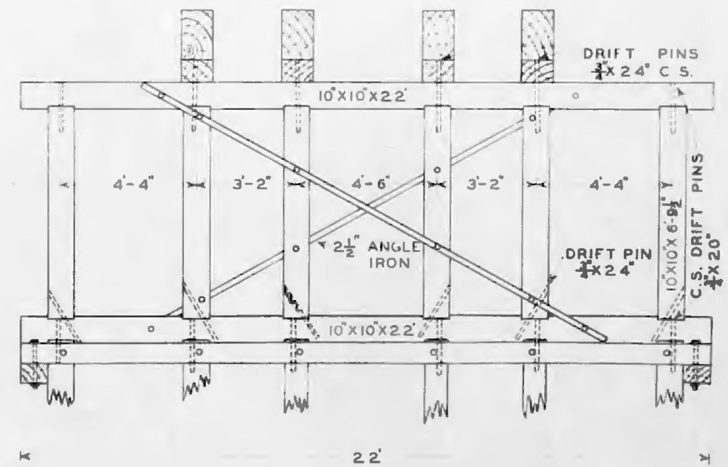
SCALE ⅛ INCHES = 1 FOOT

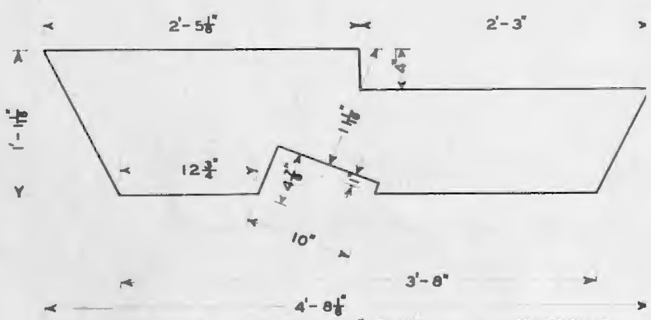
CAPACITY LEVEL 324 TONS

APRIL 1934 LHH

Plate No. 4







SPECIAL CORBEL 12" WIDE 4 REQUIRED

LIST OF BOLTS

4	RODS	[illegible]x 11'-4"
4	"	[illegible]x 5'-6"
12	BOLTS	[illegible]x 30"
12	"	[illegible]x 12"
14	DRIFT PINS	[illegible]x 24"
8	" "	[illegible]x 20"
16	BEVELED WASHERS	[illegible] 45°
36	MALLEABLE WASHERS	[illegible]

ORE BIN SUPER-STRUCTURE

FOR

MECHANICAL PLACER PLANT

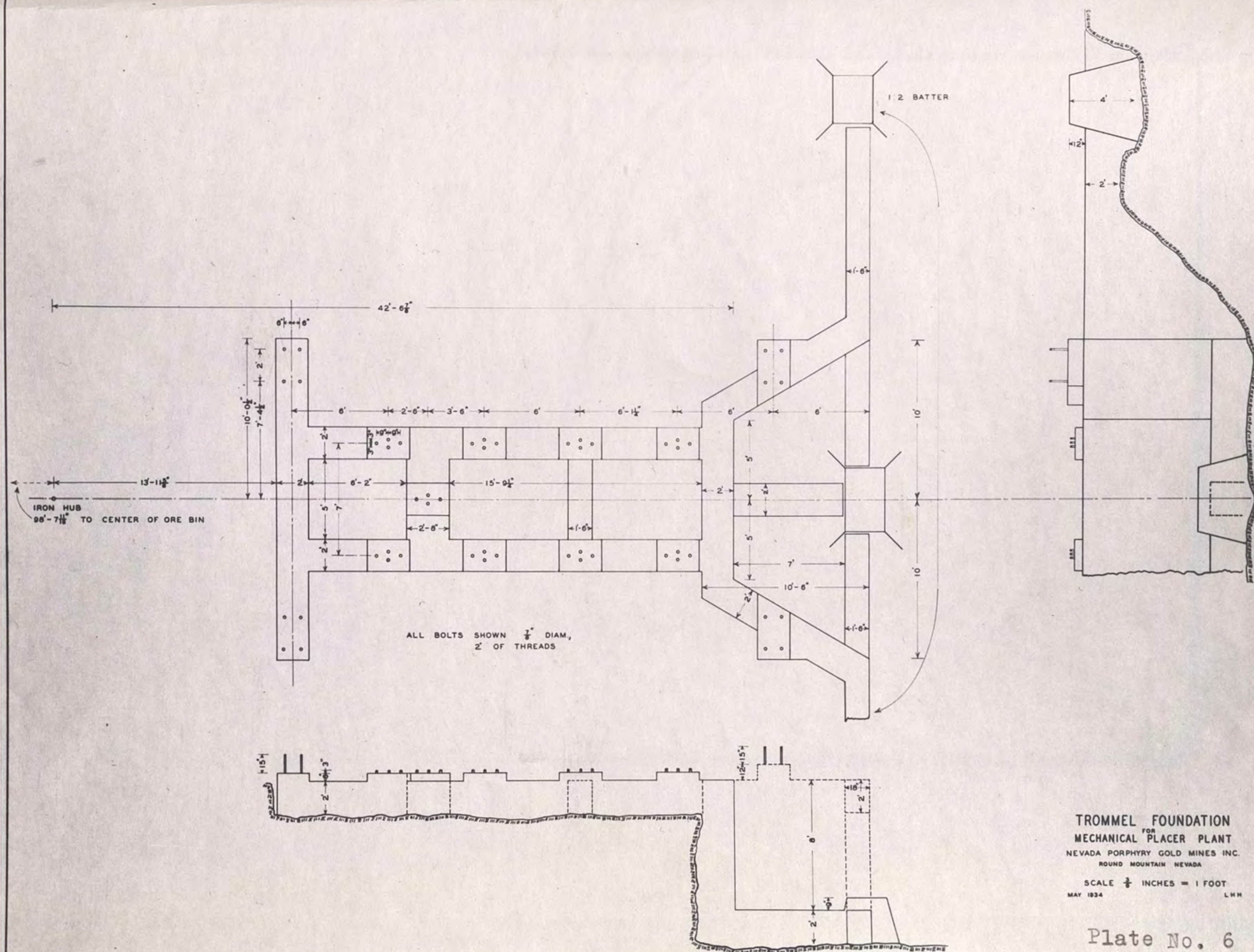
NEVADA PORPHYRY GOLD MINES INC.

ROUND MOUNTAIN NEVADA

SCALE [illegible] & 1½ INCHES = 1 FOOT

MAY 1934 LHH

Plate No. 5



TROMMEL FOUNDATION
FOR
MECHANICAL PLACER PLANT
NEVADA PORPHYRY GOLD MINES INC.
ROUND MOUNTAIN NEVADA

SCALE 3/8 INCHES = 1 FOOT
MAY 1934 LHH

Plate No. 6

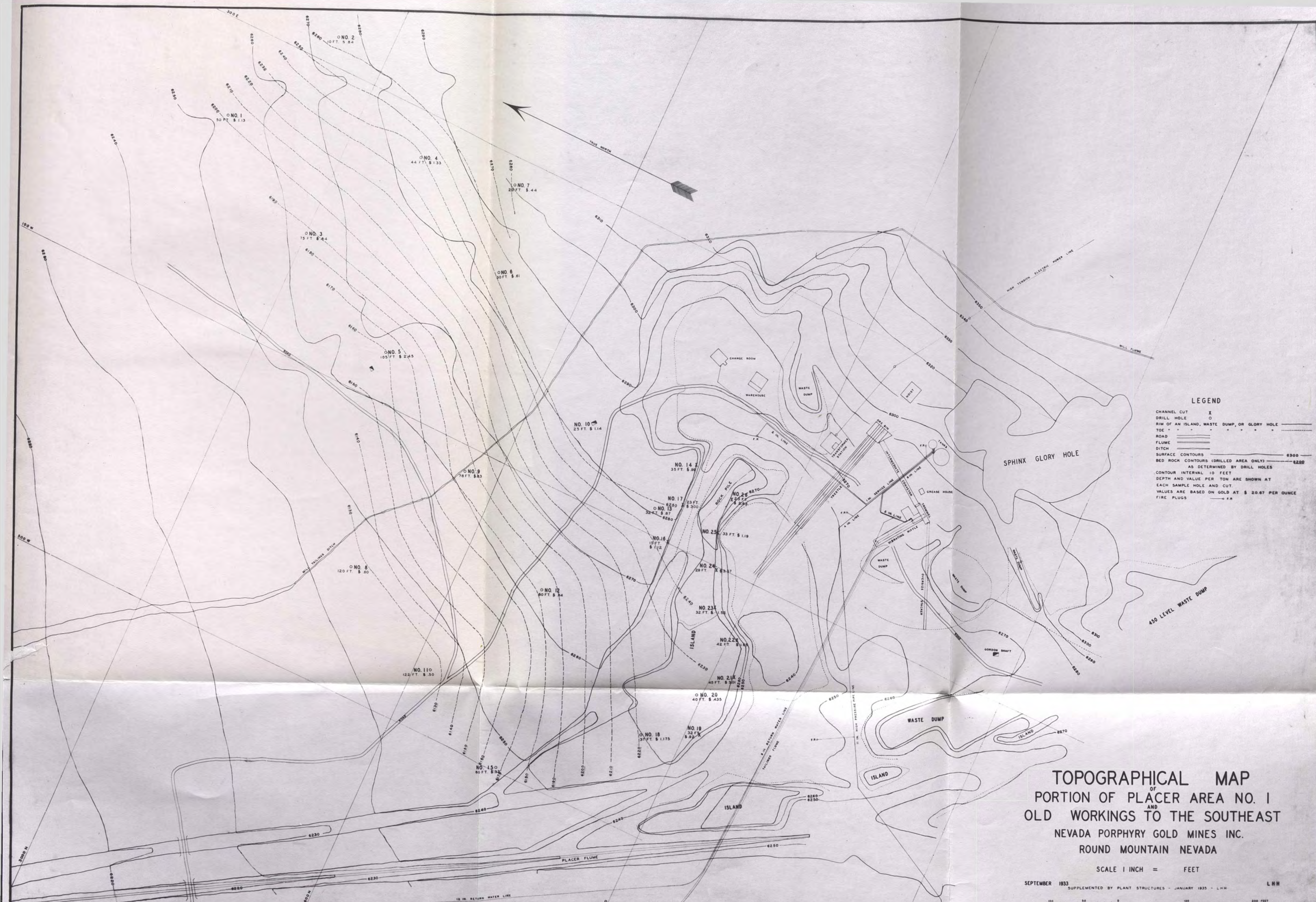

TOPOGRAPHICAL MAP
OF
PORTION OF PLACER AREA NO. I
AND
OLD WORKINGS TO THE SOUTHEAST
NEVADA PORPHYRY GOLD MINES INC.
ROUND MOUNTAIN NEVADA
SCALE I INCH = FEET
SEPTEMBER 1933
SUPPLEMENTED BY PLANT STRUCTURES - JANUARY 1935 - LHH
LHH
100 50 0 100 200 FEET
LEGEND
CHANNEL CUT X
DRILL HOLE O
RIM OF AN ISLAND, WASTE DUMP, OR GLORY HOLE
TOE " " " " " " " "
ROAD
FLUME
DITCH
SURFACE CONTOURS 6300
BED ROCK CONTOURS (DRILLED AREA ONLY) 6200
AS DETERMINED BY DRILL HOLES
CONTOUR INTERVAL 10 FEET
DEPTH AND VALUE PER TON ARE SHOWN AT
EACH SAMPLE HOLE AND CUT.
VALUES ARE BASED ON GOLD AT $ 20.67 PER OUNCE
FIRE PLUGS F.P.
TRUE NORTH
SPHINX GLORY HOLE
450 LEVEL WASTE DUMP
WASTE DUMP
ISLAND
PLACER FLUME
CHANGE ROOM
WAREHOUSE
GREASE HOUSE
GORDON SHAFT
HIGH TENSION ELECTRIC POWER LINE
MILL FLUME
ROCK PILE
NO. 1 30 FT. $ 1.13
NO. 2 10 FT. $ .84
NO. 3 75 FT. $ .64
NO. 4 44 FT. $ 1.33
NO. 5 105 FT. $ 2.45
NO. 6 30 FT. $ .61
NO. 7 20 FT. $ .44
NO. 8 120 FT. $ .60
NO. 9 76 FT. $.83
NO. 10 25 FT. $ 1.14
NO. 12 80 FT. $ .64
NO. 20 40 FT. $ .435

Plate No. 7