

SPOKANE RIVER BRIDGE
AT SPOKANE, WASHINGTON

BY
C. U. SMITH

ARMOUR INSTITUTE OF TECHNOLOGY

1911

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Construction of the Spokane River Bridge
of the
Idaho & Western Railway
at
Spokane Bridge, Wash.
A THESIS
presented by
C. U. Smith
to the
President and Faculty
of
Armour Institute of Technology
for the degree of
Civil Engineer

Alfred E. Thuley
Prof. Civil Engineering

H. M. Raymond
Dean of Eng. Studies

L. C. Morin
Dean of Cultural Studies



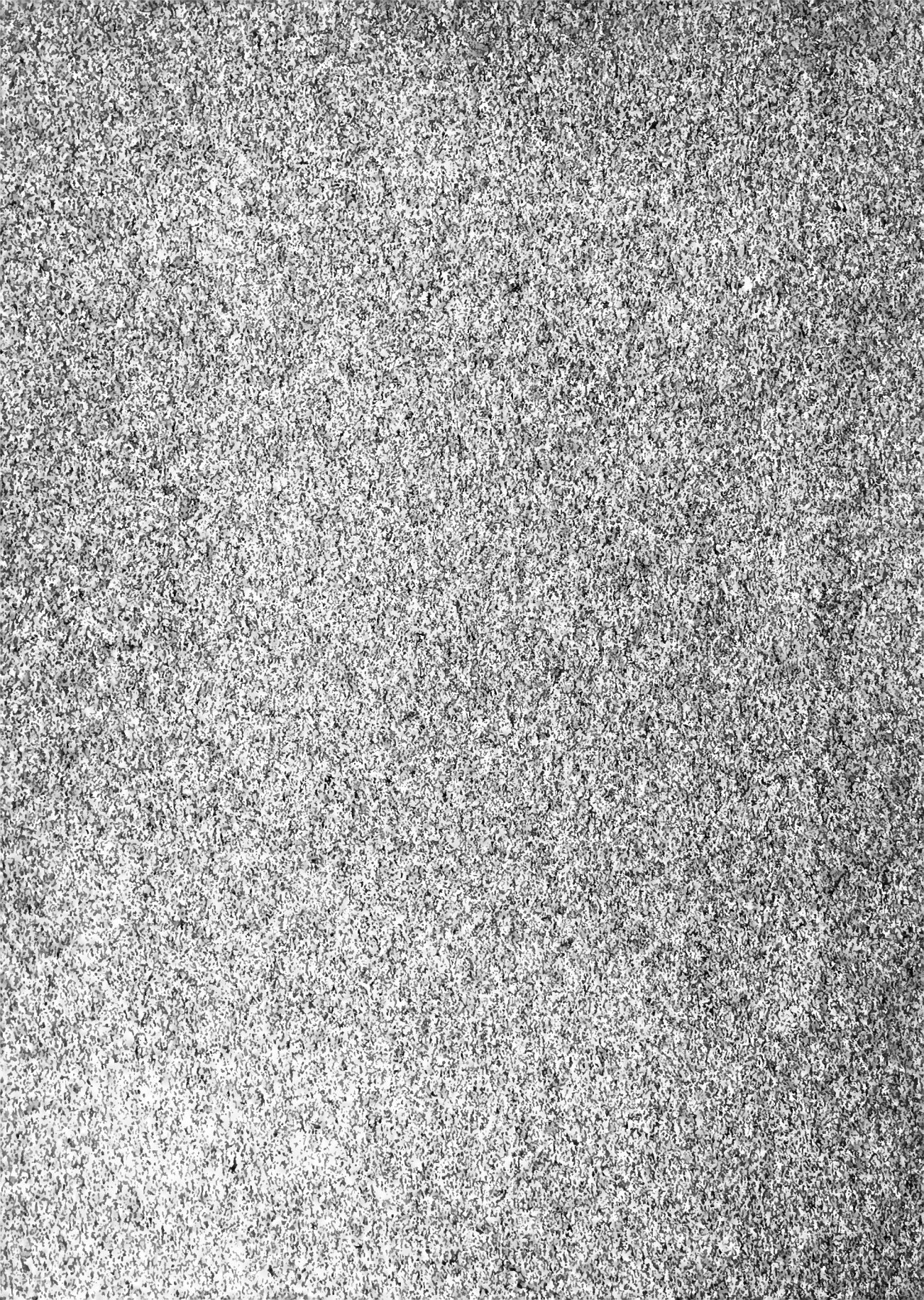


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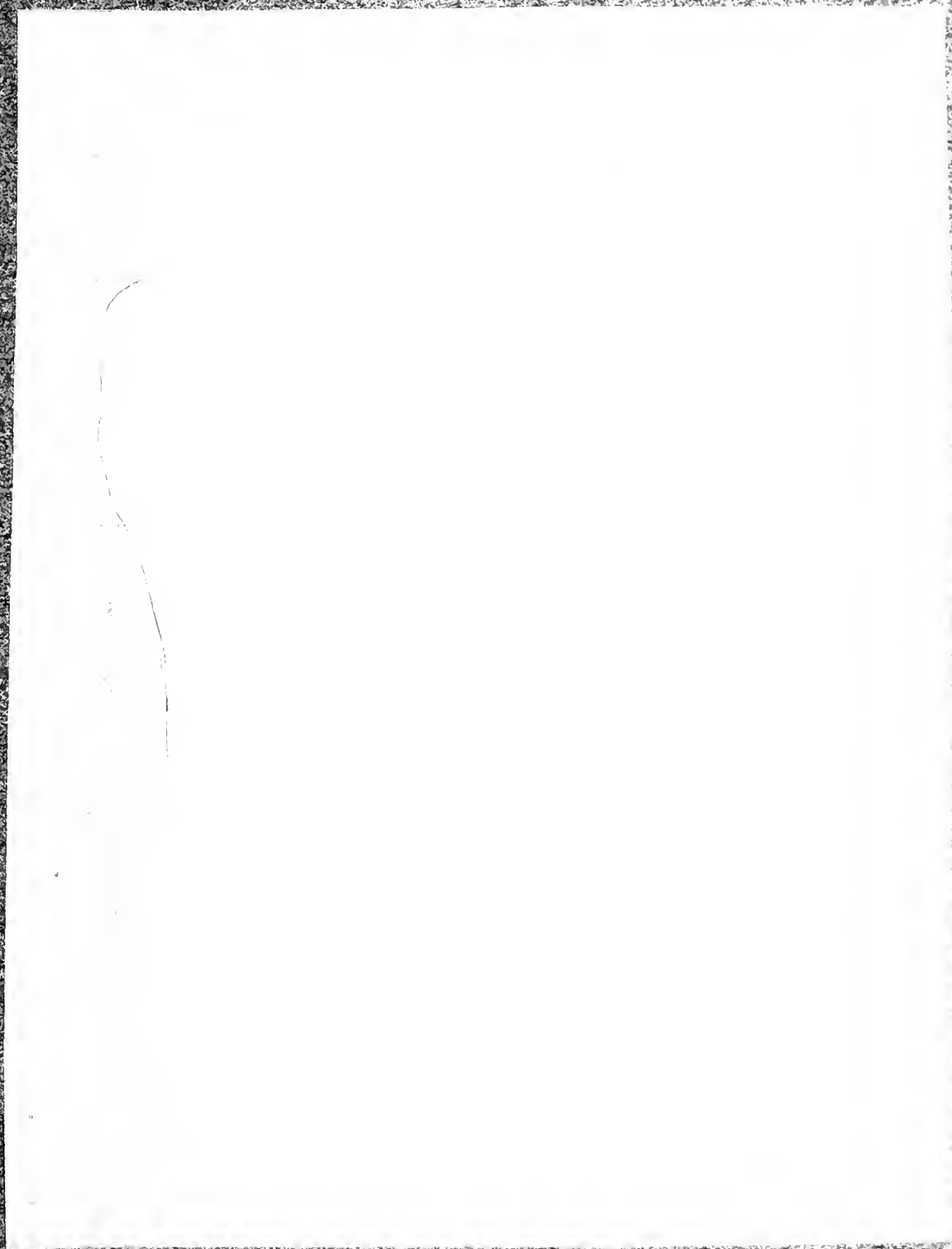
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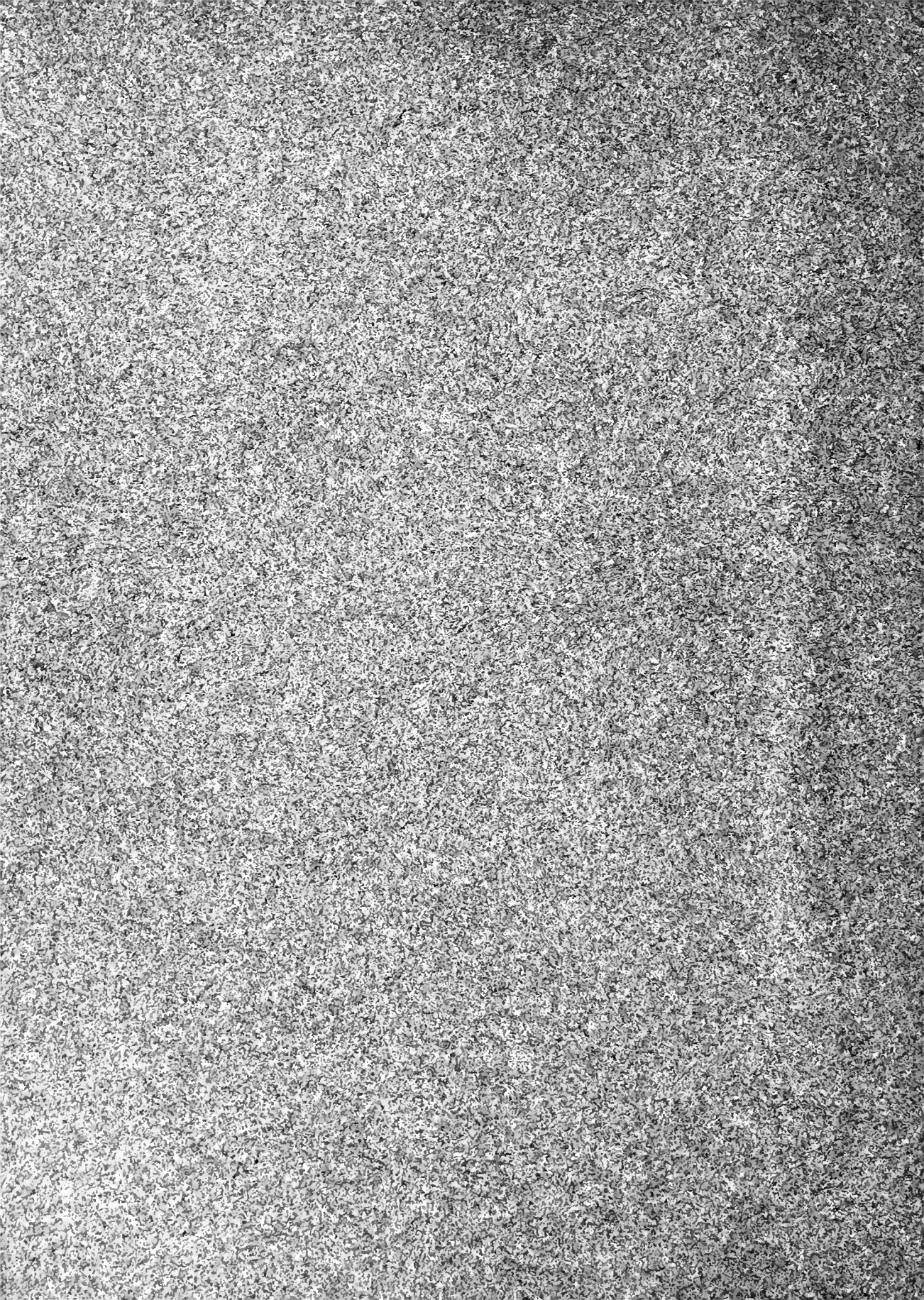
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CONSTRUCTION OF THE SPOKANE RIVER BRIDGE,
IDAHO & WESTERN RY.

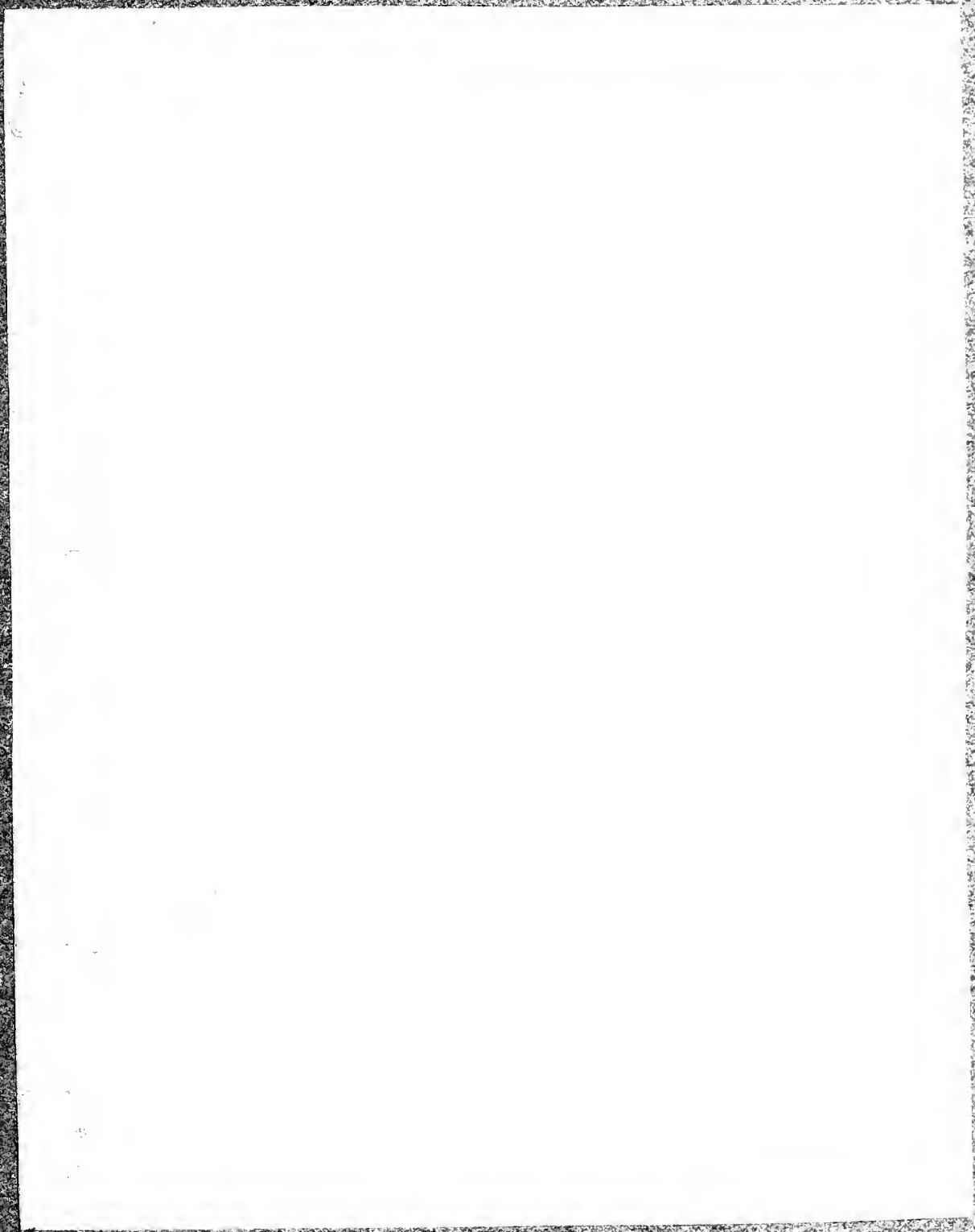
Object:- To describe the method of construction of the Spokane River Bridge at Spokane Bridge, Wash., on the Idaho & Western Ry.

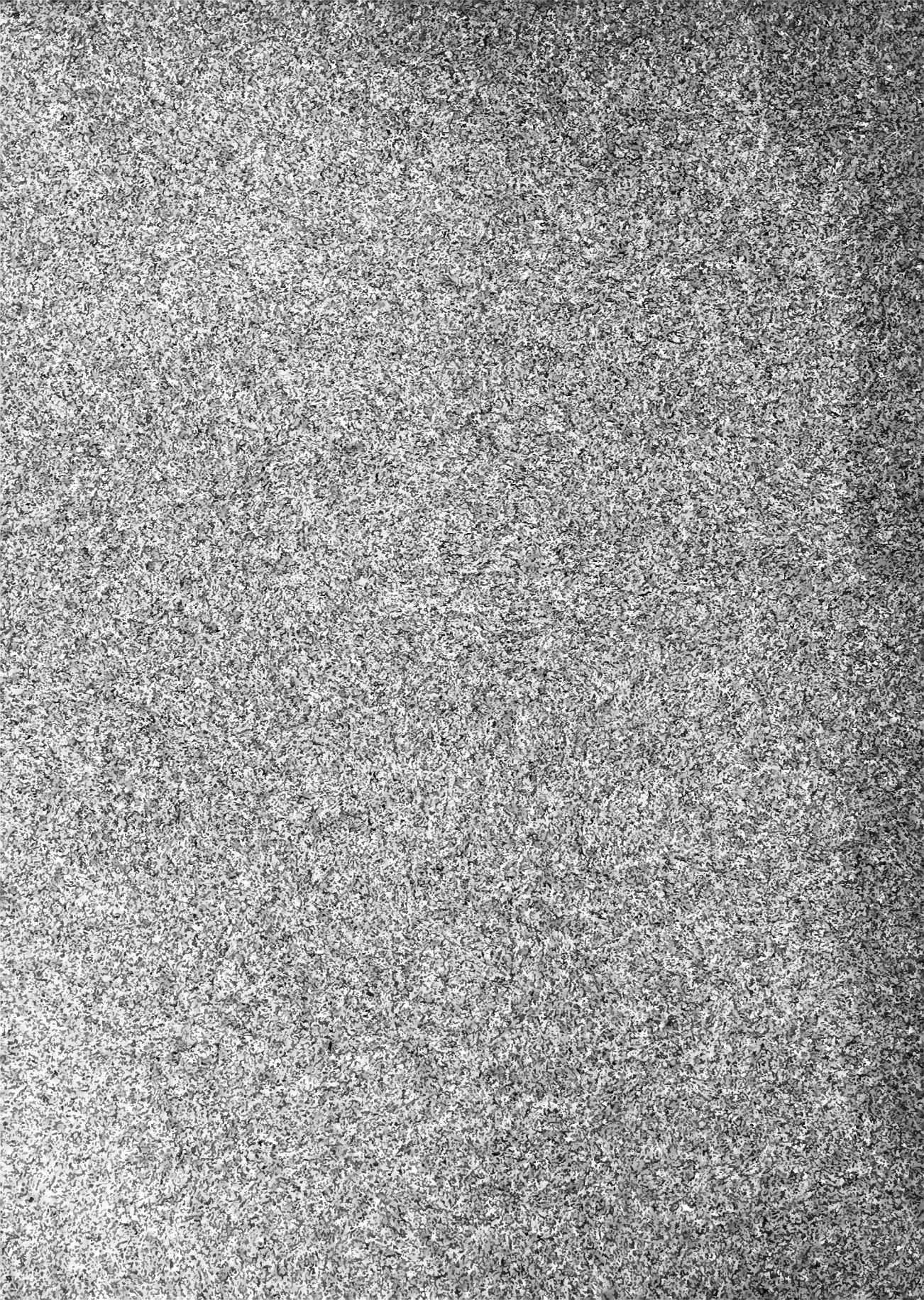
General Description:- The Idaho & Western Railway Co. recently completed a line from Dishman, Wash. to Coeur d'Alene, Idaho, a distance of 25.3 miles. At Dishman a connection with the Oregon-Washington Railroad & Navigation Co. gives access to Spokane on the west, and to the main line of the Chicago, Milwaukee & Puget Sound Ry. on the south, via Plummer, Idaho.

The Idaho & Western Ry. is a subsidiary company of the Chicago, Milwaukee & Puget Sound Ry., being more familiarly known as the Coeur d'Alene Branch. To the north of the line is the Spokane Valley, well known as productive of fruits and garden truck. To the south are the foot hills of the Coeur d'Alene mountains, having a good growth of pine and fir.

The small scale map on page 5 shows the new line colored red, the main line of the Chicago, Milwaukee & Puget Sound Ry. being shown dotted.

Immediately after passing the Washington-Idaho





State line the railway crosses the Spokane River, 18.5 miles from Spokane and 12.1 miles from Dishman. The entire structure, including the west approach, is in Idaho.

The Idaho & Western bridge crosses the river 400 feet up stream from the new crossing of the Inland Empire System. The old crossing of the Inland Empire System being about 300 feet down stream from the new, and is being considered as a crossing structure for the new state road. The town of Spokane Bridge, Wash. being within a quarter of a mile of all their structures is most appropriately named.

The Spokane River bridge consists of two reinforced concrete arch approaches and three concrete piers. Four 80 foot steel girders form the spans. The piers are constructed to accommodate a future second track to be constructed south of the present line. (See map on page 11) The approaches were constructed for single track, with the footings only for the future second track structure.

The concrete approaches are reinforced above the footings and are decked with reinforced concrete slabs, built on the ground and placed after setting.

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At present the deck on the steel girders is of timber, but this will be replaced by reinforced concrete slabs in the near future.

Under each of the approaches is a private roadway constructed by the railway company for adjacent property owners. These roads are gravel filled and have grades not exceeding 8 per cent.

The concrete construction and roadway work was done by the Bates & Rogers Construction Company of Chicago and Spokane. The following articles of the contract show its general nature:

(1) The contractors agree to furnish all the labor, superintendence, and to handle the work of construction, the employment of necessary labor and the purchase of material ordered by the engineer, is to be in accordance with the Chief Engineer's instructions or authority, which also covers the rates for labor and the terms and prices for purchases. The work is to be done in accordance with the plans, specifications, instructions and requirements of the Chief Engineer of the railway.

(2) Furnish all equipment, plant and tools required for the performance of the work.

(3) Provide and furnish the camp and to board the employes.

(4) Commence the work forthwith and to handle it at such a rate of progress as will secure completion prior to greater difficulty incident to the fall floods and unfavorable weather.

The Railway Company agrees to

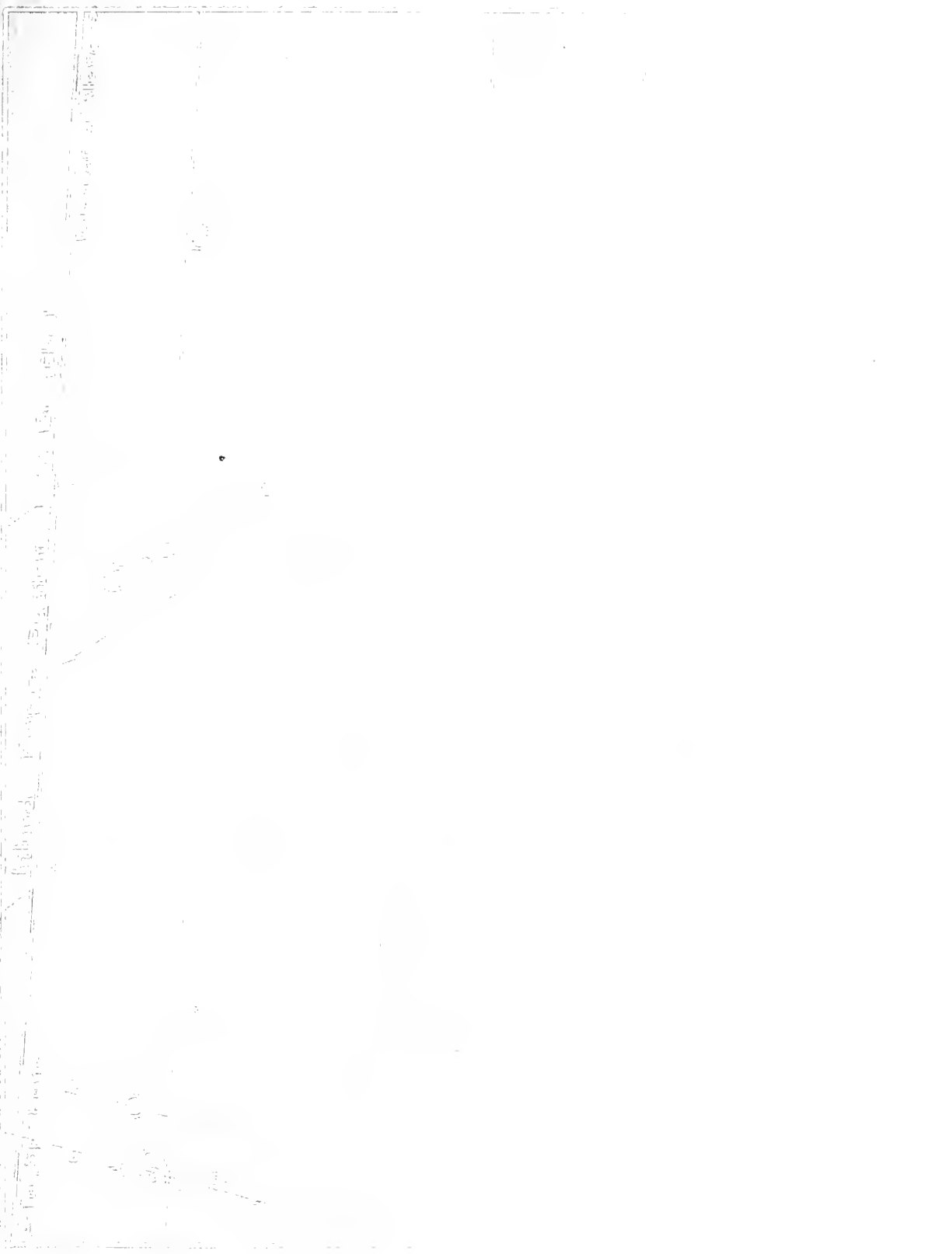
(1) Pay the contractors their pay roll for labor and for supervision employed on the work in the actual performance of the same.

(2) Pay the purchase cost of all material entering into the construction of the work.

(3) Pay the contractors the agreed per cent on items (1) and (2) as compensation for their tools, equipment, their services and their profits. (Freight charges are not included in the amounts on which percentage is paid.)

The steel work was built by the railway company and erected by company forces.

Camp:- The camp site for this work was located on the west side of the Spokane river, being within a short distance of Spokane Bridge, a station on the Inland Empire System, where all supplies and materials were shipped to. The topography of the country is very flat and a gradual down grade from the town to the work, over a good gravel road, made easy teaming.





Reference to the map on page 11 shows the location of the camp to good advantage. All the work was done on the south, or up stream side of the line. On this side the blacksmith shop, tool house, boiler, mixer and material yards were located. To the north of the line were the cement storage house, contractors office and commissary, cook shack and sleeping tents.

The camp being almost entirely off of the railway company's right of way, a small rental was paid to the owner for the use of the site. Although the land could have been used free, the payment of a small sum released the occupants from any damage claims which might have arisen during the course of construction.

As the contract states, the camp was run entirely by the contractors and they made all the profit derived from it. A price of 25 cents per meal was charged and deducted from the men's time. A commissary furnished the men with tobacco, gloves, clothing, etc., credit being given against the time checks.

The buildings for the camp were put up at the expense of the contractors, excepting those actually used in the performance of the work. Upon the completion of the work all buildings were removed and the site left as it originally was. The contractors sold the material in their camp build-

The first part of the work is devoted to a general history of the world, from the beginning of time to the present day. The author traces the progress of human civilization, from the earliest ages of barbarism to the height of modern society. He discusses the various stages of human development, from the first appearance of man on earth to the establishment of the great empires of antiquity. He then turns to the Middle Ages, and describes the rise and fall of the various kingdoms and states of that period. Finally, he comes to the modern world, and discusses the progress of science, art, and industry, and the state of the various nations of the world.

The second part of the work is devoted to a detailed history of the British Empire, from its first establishment in the West Indies to its present extent. The author describes the various stages of the empire's growth, from the first settlement in North America to the acquisition of India and the East Indies. He discusses the various wars and conflicts that have shaped the empire, and the various policies and measures that have been taken to maintain and extend its power. He also discusses the various institutions and laws that have been established in the different parts of the empire, and the progress of civilization and industry in those parts.

The third part of the work is devoted to a detailed history of the British monarchy, from the reign of King Alfred the Great to the present day. The author describes the various reigns of the British monarchs, and the various events and circumstances that have shaped the history of the monarchy. He discusses the various laws and customs that have been established in the monarchy, and the progress of the monarchy as a whole. He also discusses the various institutions and offices that have been established in the monarchy, and the progress of the monarchy as a whole.

ings for a lump sum, while that for the railway company's buildings was returned to the second hand stock.

Plant & Equipment:- The contractors plant for this work had an estimated value of approximately \$15,000 and consisted of the following equipment:

One 1/2 yard Smith concrete mixer, boiler and engine attached.

Five bottom dump Stuebner cone buckets.

Two 6 1/4 x 10 American hoisting engines complete.

One 50 ft. mast guy derrick complete.

One 30 ft. mast stiff leg derrick complete.

One 40 H.P. Nagle portable boiler with fittings.

One 5" Emerson pump.

One Gould centrifugal pump with engine attached.

(Used engine only.)

One 6 x 4 x 6 Fairbanks Morse force pump.

One 6 x 4 x 6 Laidlow & Dunn force pump.

One 5 1/2 x 7 Comstock upright engine.

One skid pile driver complete, 30 ft. leads.

One 2800 lb. pile hammer.

One 800 lb. pile cap.

Three concrete cars (One lost in river) complete.

Two push cars, complete with trucks.

One gravel car, complete with trucks.



One 40" circular saw.
One 36" circular saw.
One 2 1/2" shaft for saw.
Four #2 slip scrapers.
Sixteen steel tray wheel barrows, 2 ft. capacity.
Six cross cut saws.
Eighteen #2 shovels, D handle, round point.
Ten #2 shovels, D handle, square point.
Four long handle round point shovels.
Three spades.
700 ft. 1" dia. manilla rope.
600 ft. 1 1/4" dia. manilla rope.
300 ft. 5/8" dia. manilla rope.
4610 ft. 1/2" wire hoisting rope.
1840 ft. 5/8" wire guy rope.
60 picks with handles.
Six pike poles.
Three 8 lb. mauls.
Eight 10 lb. mauls.
One set blacksmith tools.
One forge complete with blower.
One grind stone, 2" face.
One Barren track jack.
One 150 lb. anvil.

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ARREST
BUREAU OF INVESTIGATION
RECORDS
SECTION

Five cant hooks.

Four carry hooks.

Seven axes.

Four pair of rubber boots, hip.

Five double blocks, wood.

Four double blocks, iron .

One snatch block, iron.

Six ship augers.

Three timber dollies.

Two Marshalltown trowels.

Two vises.

Five monkey wrenches.

Three pipe wrenches.

One pipe cutter.

One set Armstrong stock and dies.

One set Little Giant stock and dies.

One 10" x 12" split pulley.

One 2" and one 3" flue roller.

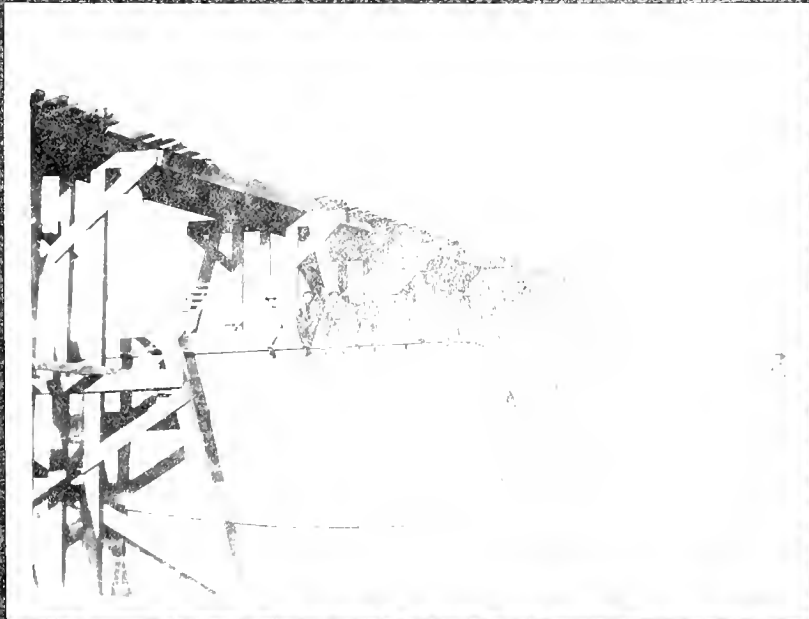
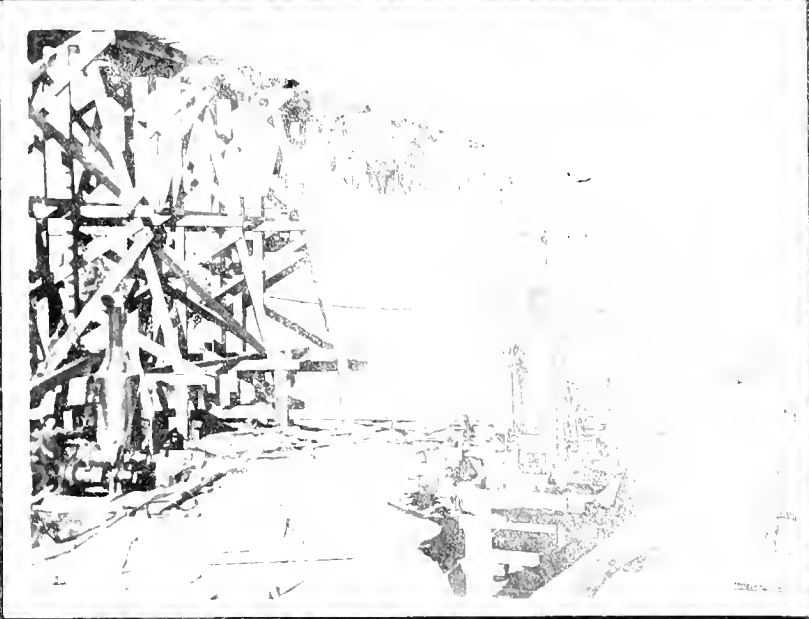
One small sand screen.

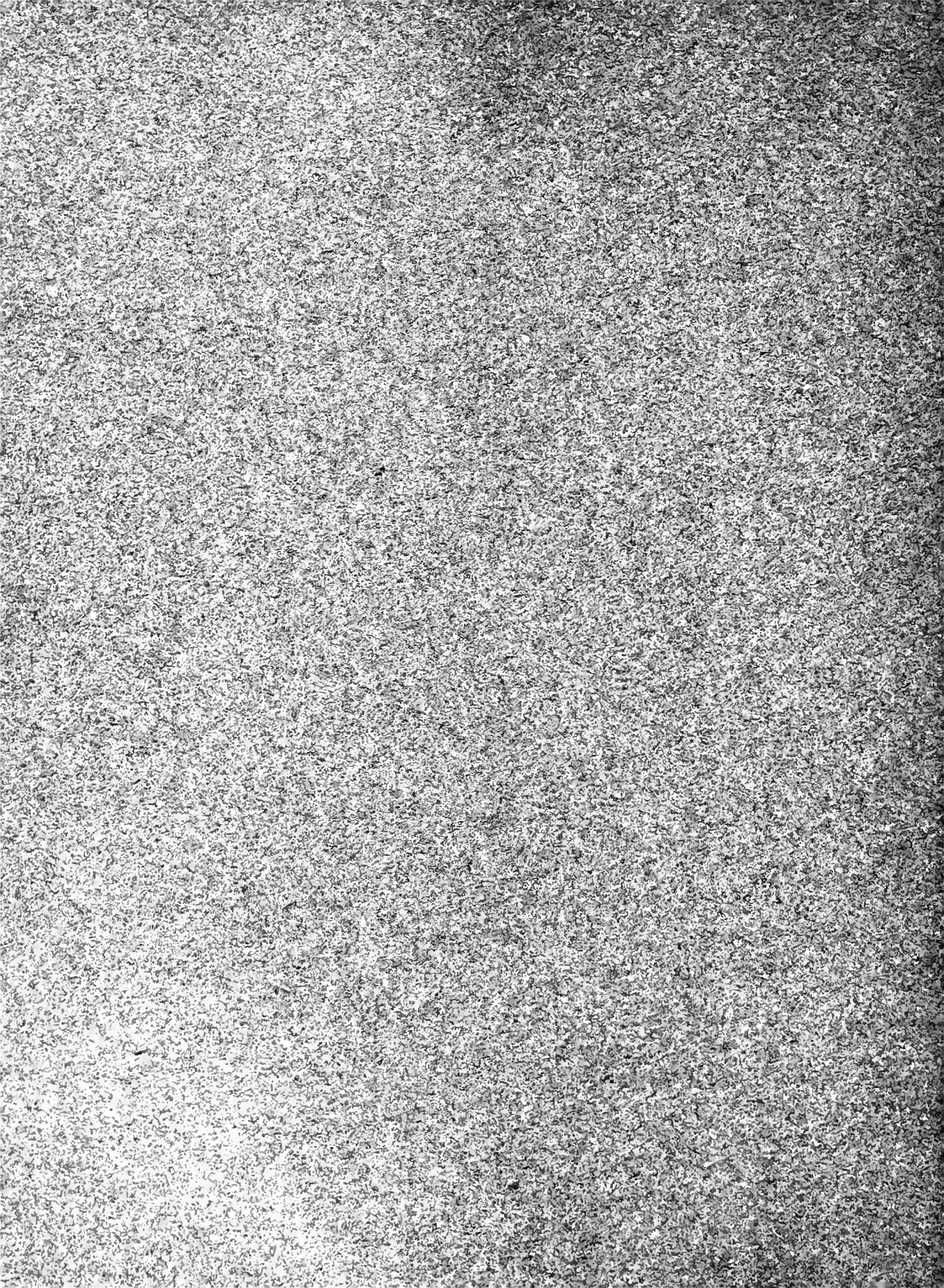
Six lanterns.

Crow bars, claw bars, pinch bars, chains, etc.

Other equipment on the work, but not actually used in construction consisted of:

One Clam shell bucket.





One orange peel bucket.

One 50' mast guy derrick complete.

The camp equipment consisted of four 16 x 18 tents, 12 oz., stoves, etc. with a cooking outfit for 150 men.

The engineers outfit consisted of one 14 x 16 tent, one 7 x 7 tent, drafting table, chairs, desk and the customary engineering instruments. All the tents were framed, floored and half walled covered with tarred paper.

Material:- Gravel:- The gravel for this work was a good coarse grade, that would mesh 90% through a 3/4" sieve, lying under a lava strata, was taken out of a pit on the railway company's right of way and washed there, it was then dumped into a car and carried down to the work on a gravity track and unloaded at the storage pile as indicated on the map page

The gravel was picked up in the pit with slips. It was then dumped through a trap and washed with a hose, as it went down a 30 degree incline to the storage hopper. The car was run under this hopper and filled. The outlet of the hopper being arranged with a trap door operated by a lever.

When a car was filled it was started down grade to the storage pile, where it was dumped and returned to the loading hopper with a horse.

1950

PHYSICS DEPARTMENT

RESEARCH REPORT

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2. Author(s): [Illegible]

3. Date: [Illegible]

4. Summary: [Illegible]

5. Abstract: [Illegible]

6. Introduction: [Illegible]

7. Theory: [Illegible]

8. Experiment: [Illegible]

9. Results: [Illegible]

10. Discussion: [Illegible]

11. Conclusions: [Illegible]

12. References: [Illegible]

13. Appendix: [Illegible]

14. Bibliography: [Illegible]

15. Index: [Illegible]

16. Acknowledgments: [Illegible]

17. Notes: [Illegible]

18. Distribution: [Illegible]

The force on this work averaged two slip teams with drivers, one horse with driver to pull back empty car, two men on car, two men on slips, one washerman and three men on the dump. About 100 yards a day were handled with one car, 2700 yards were hauled, the average haul being 500 to 550 feet.

Sand:- The sand was obtained from a local pit about one mile south of the work. It was loaded at the pit in 1 1/2 yard wagons and dumped on the work at the storage pile.

The sand was bought at a unit price per yard, engineer's measurement, and hauled at a contract price per yard. The average delivery per day was nine yard per team, three teams working only when the roads were in good condition.

Nine hundred and fifty-five and one half yards of this sand, which was sharp and of a fine grade, were delivered.

Cement:- The cement used was the Santa Cruz blue cross brand. It was shipped from Seattle via Plummer, Idaho and Spokane over the Chicago, Milwaukee & Puget Sound RY., Oregon-Washington Railroad and Navigation Co. and Inland Empire System to Spokane Bridge, Wash. It was unloaded there by the contractors and hauled to the store house, a distance of about 350 yards.

Year	Population	Area	Population Density
1950	100,000	100 sq. miles	1,000
1960	150,000	100 sq. miles	1,500
1970	200,000	100 sq. miles	2,000
1980	250,000	100 sq. miles	2,500
1990	300,000	100 sq. miles	3,000
2000	350,000	100 sq. miles	3,500
2010	400,000	100 sq. miles	4,000
2020	450,000	100 sq. miles	4,500

The average labor to unload and store was about four teams and two men with driver for each team. There were 30 sacks to a load and approximately 900 sacks in a car. 14 cars were received.

12067 sacks were delivered, 11902 sacks were used in the work, 157 sacks were sent away on rush work, 8 sacks remained to be returned to stock. The cement was shipped in sacks of four to a barrel.

The cement was sampled in the cars before shipment, only two cars being sampled at the work. The following are the figures of a test of one sample.

Tensile Strength

Lbs. per square inch

<u>1 day</u>	<u>7 days</u>	<u>28 days</u>
485	790	825

Time of Setting

<u>Initial Minutes</u>	<u>Final Hours</u>
110	4 1/2

Fineness

Per cent of residue on

#100 sieve #200 sieve

1.8

13.2

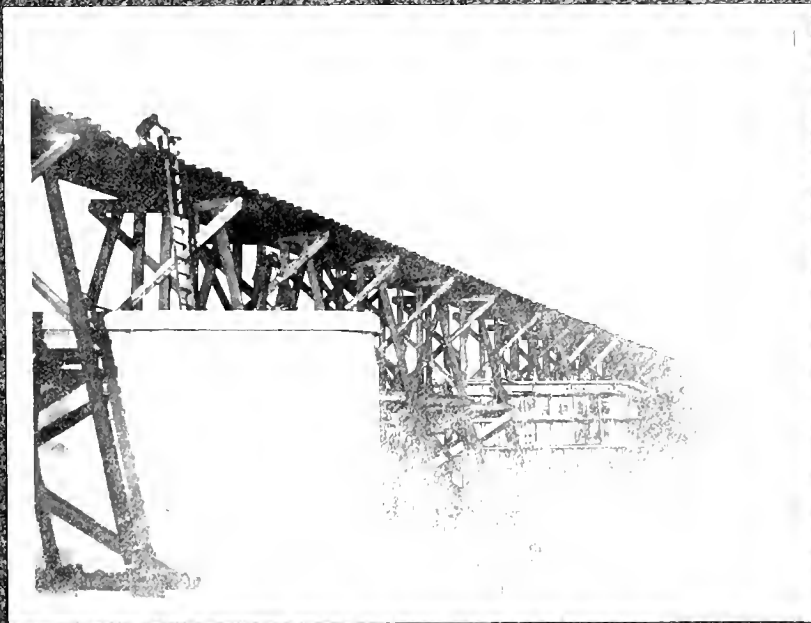
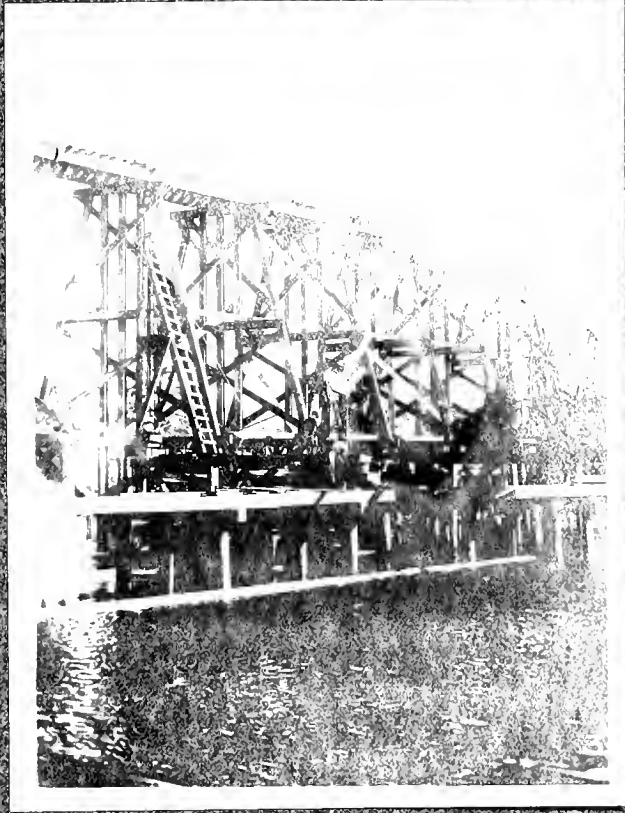
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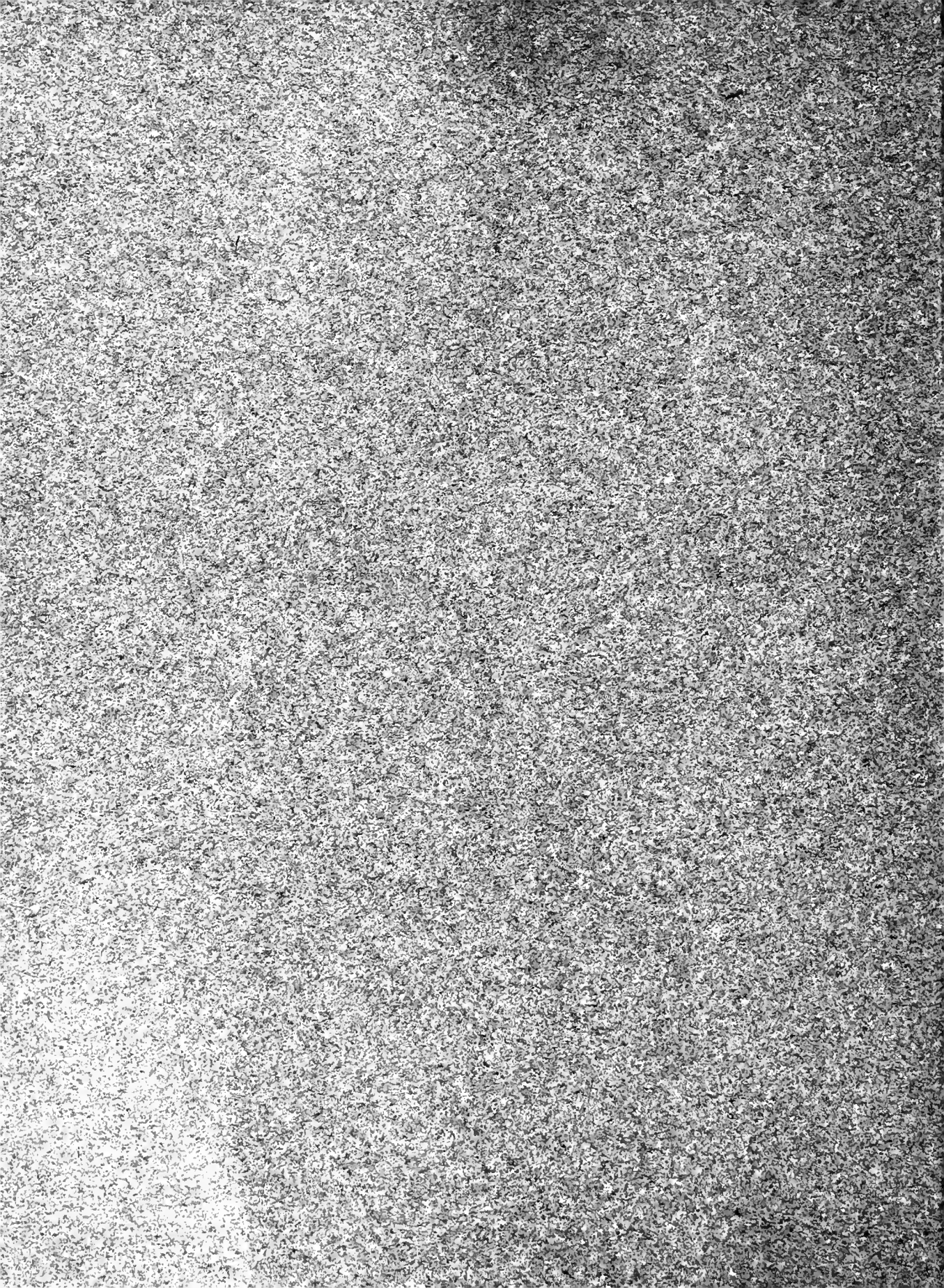
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Best regards,
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Page 1 of 1
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Per cent of water used 21

Specific gravity 3.10

A sand test proportioned 1 to 3 by weight showed:

Tensile strength

in lbs. per square inch

<u>7 days</u>	<u>28 days</u>
387	420

9.5 per cent of water used.

Reinforcing Bars:- The reinforcement was square corrugated bars 1/2" - 3/4" and 1" sizes, varying in shipping lengths from 6' to 40'.

These were shipped from the main line via Plummer and Spokane to Spokane Bridge and from there hauled by team to the yards.

In the yards the bars were sorted and cut to the various plan lengths. They were then taken to the blacksmith shop and bent into the required shape as they were needed in the work.

The following list shows the amount of reinforcing material used in the work:

	<u>East Abutment</u>			
Size	1/2"	3/4"	1"	Total
<u>Lin. Ft.</u>	6167	6544	3285	15996
Lbs.	5242	12519	11169	28930

CHAPTER 10

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West Abutment

Size	1/2"	3/4"	1"	Total
Lin.ft.	14391	9817	10998	35206
Lbs.	12232	18780	37393	68405

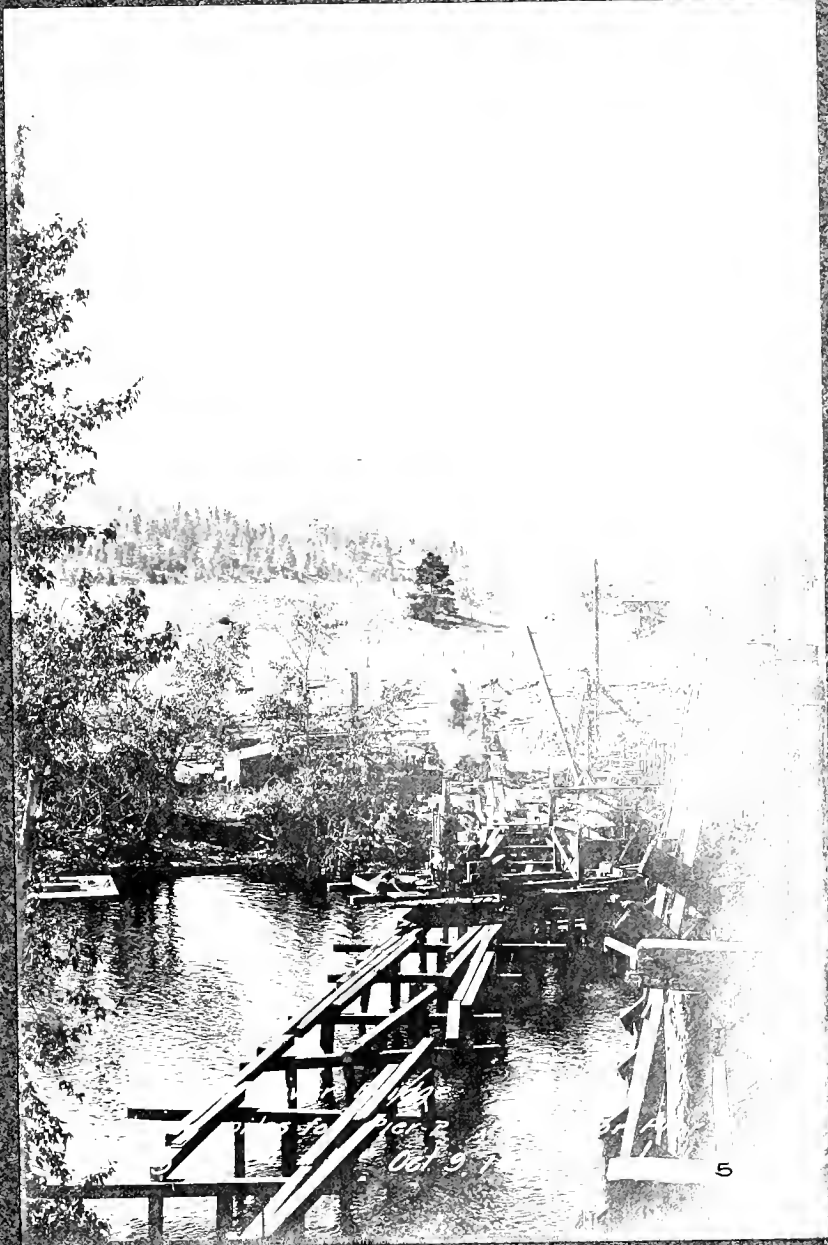
Timber, Lumber and Piling:- The timbers used in the work trestle and upon various structures as mixer platform, gravel washer, etc., were old bridge timbers shipped to Spokane Bridge from the main line yards and hauled to the work by team.

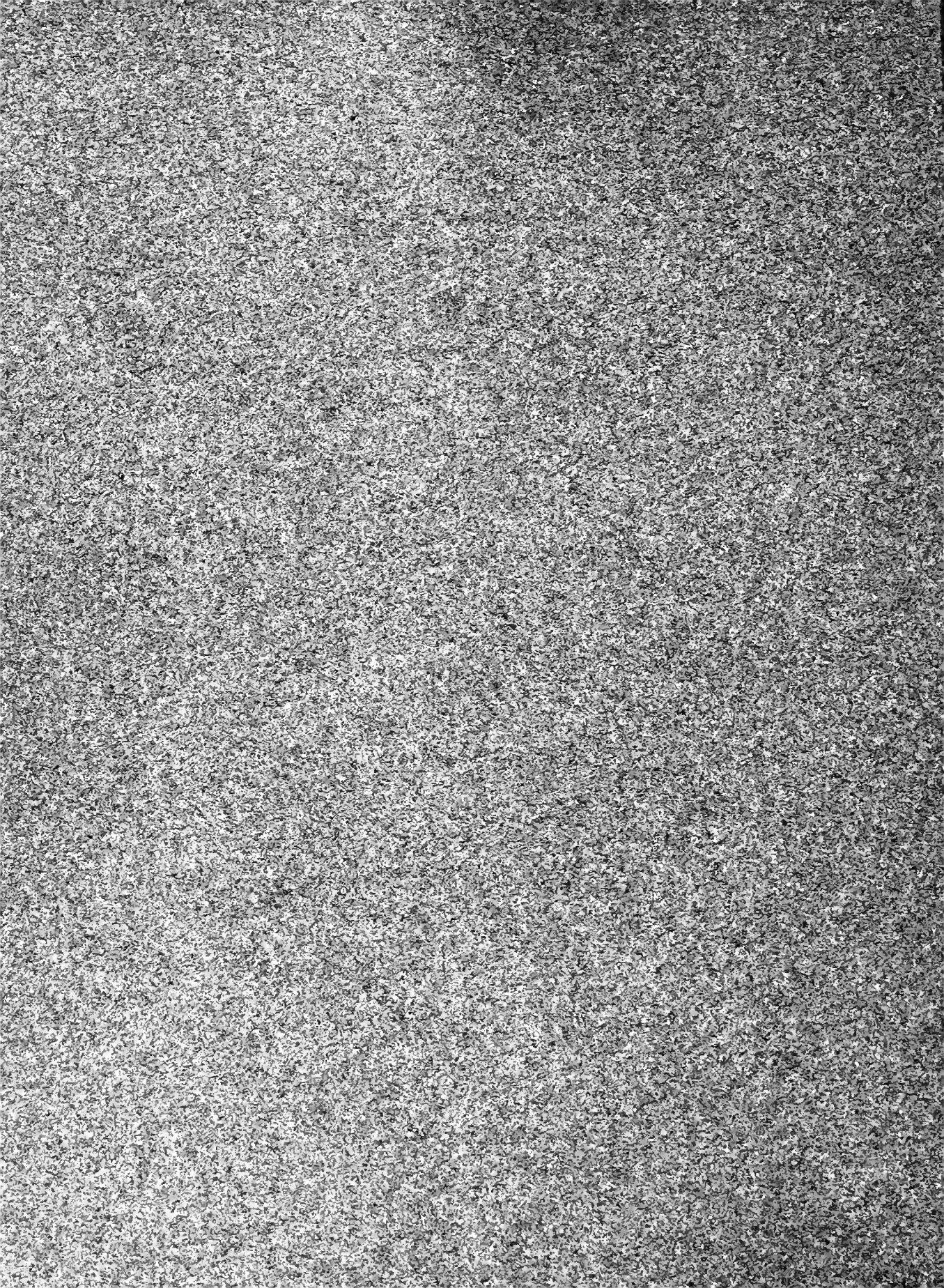
The contractors used 45956 feet B.M. of this material, not including the timber in the temporary trestle. Of this 34660 feet B.M. was recovered upon the completion of the work and sent into the old material supply again. The remainder was either lost in the river, or cut into such lengths as were not acceptable for further use.

The form lumber and caisson timber was shipped via the Inland Empire System to Spokane Bridge from a local mill in Coeur d'Alene. That which was left at the end of the work was sent into the railway company's old material stock.

Approximately 135000 feet B.M. of small dimensioned stock was used for forms, cofferdam, sheds, etc. The amount used in the caissons for Piers #1 and #2 was about

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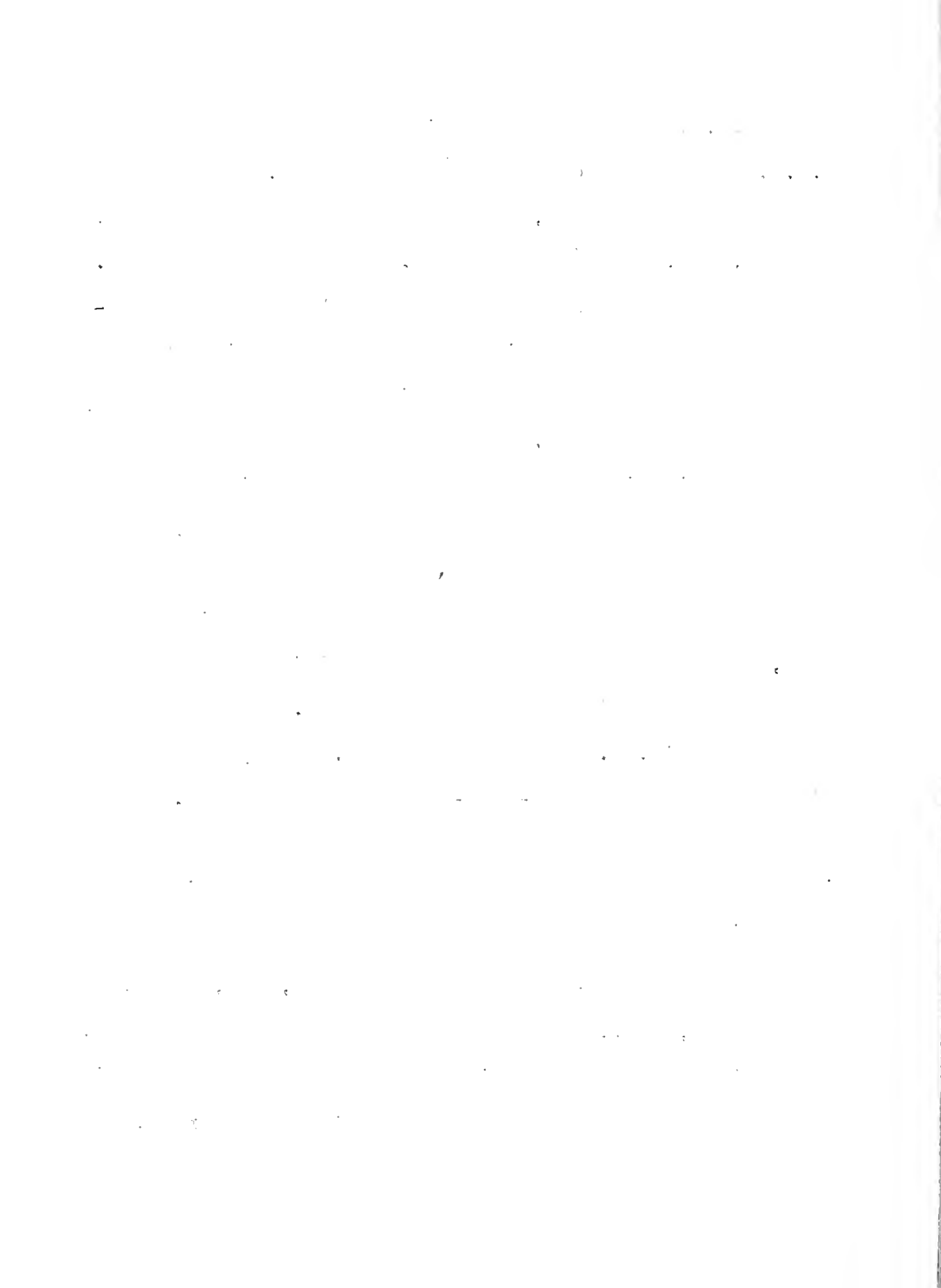
61900 F.B.M. From these two items approximately 17900 F.B.M. were returned to old material stock. The form lumber was 2 x 8 stock, with 3 x 12 planks for flooring, runways, etc, and 3 x 8 M. and D. material for sheeting.

The piling also came from Coeur d'Alene and was unloaded on the old main line of the Inland Empire System opposite the work. From there it was brought to the work by team as needed.

The switching charges by the Inland Empire System for the use of the main line were a minimum of \$5.00 for one hour. Unloading there was a great saving as two cars came in at once and could be unloaded in an hour, saving a long team haul and providing a storage yard on the Inland Empire System right of way.

10000 lin.ft. of piling was used. The piles were fir and tamarack of 20 - 25 - and 32 foot lengths. At the completion of the work the pile cut offs were sent into the old material stock to be used for building foundations and fuel.

Miscellaneous:- Such items as nails, oil, waste, small tools, etc., ordered from time to time on the work, were shipped from dealers in Spokane via the Inland Empire System to Spokane Bridge by local freight or express.

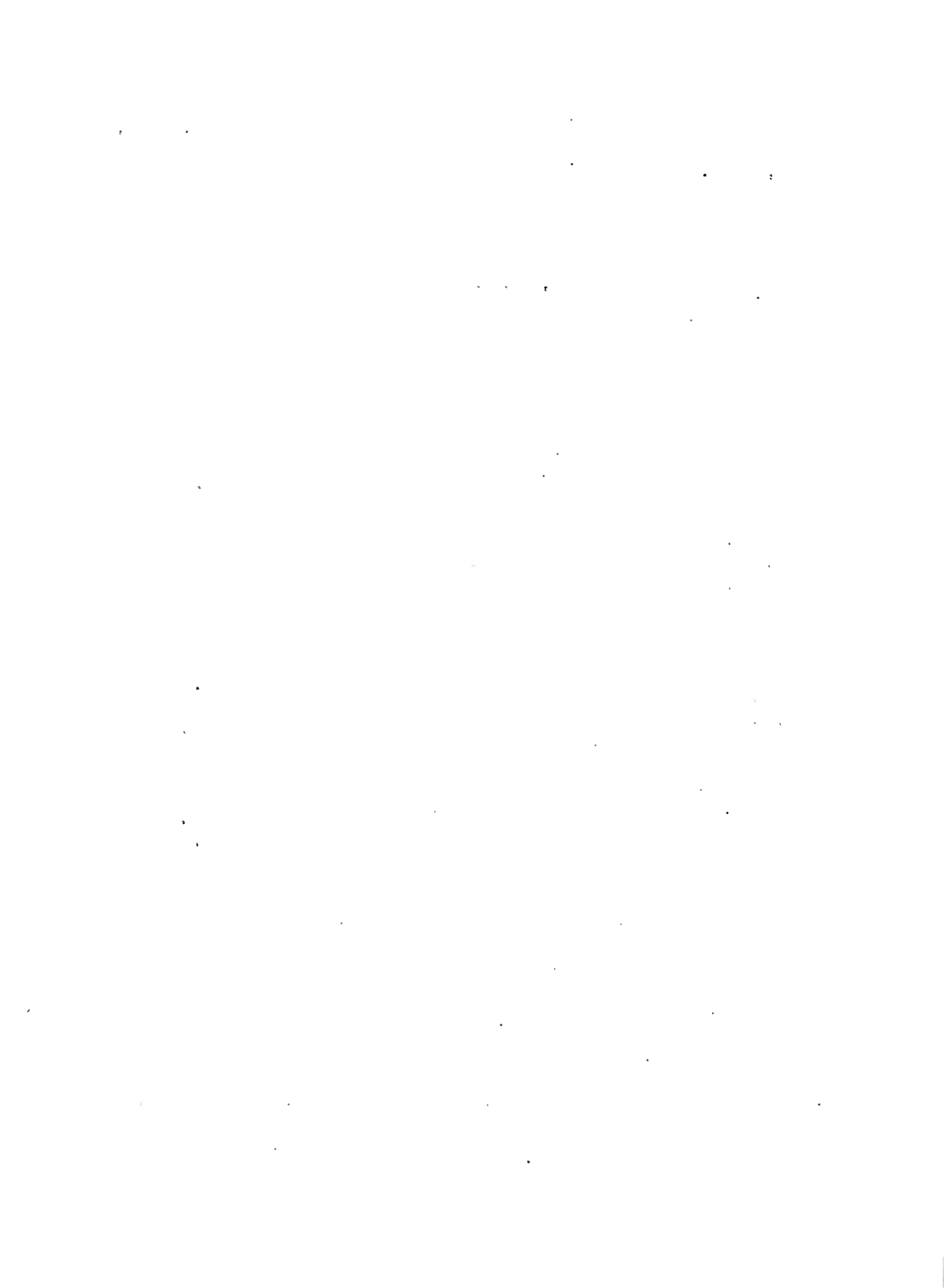


The following list shows the amount of nails, oil, bolts, etc. used during the course of construction:

Article	Amount
Coal from Bellview, B.C.	160 tons
Drift bolts	2100
10 d nails	20 kegs
60 d nails	8 "
40 d "	6 "
16 d "	17 "
20 d "	2 "
8 d "	1 "
3/8" x 8" boat spikes	6 "
3/8" x 3" track spikes	50 lbs.
Nuts and washers	65 "
Tool steel and iron	1450 "
Packing	33 "
Mill brooms	1 doz.
8" files	18
Tarred felt	8 rolls
Waste	1 bale
Blacksmith coal	6 sacks
Oakum	50 lbs.
White lead	25 "
Boiler compound	10 gals.
#16 Annealed wire	12 rolls
9 " "	17 "
Coal oil	1 drum
Lubricating and cylinder oil	50 gals.
Cup grease	20 lbs.

The above list does not include iron washers and bolts ordered on engineer's requisition, or that shown on plan bills of material.

All material was ordered by the contractors at the direction of the engineer in charge and bills rendered at the end of the month. The only exception to this



being the cement, reinforcing bars and old timber which were ordered on requisition of the Division Engineer.

Labor:- The labor on this work was furnished by the contractors as stated in the contract. A specimen of the daily force report on page 27 shows the average force on the work.

These reports were sent to the office of the Division Engineer and to the main office of the contractors upon the completion of each day's work. By this method a daily report of the progress of the work was always on record and in determining the cost of the various parts of the work was absolutely necessary.

Distributions for all the work done were kept in this way being classified for each separate pier or abutment and also for general work as gravel, cement handling, bridge protection, rip rap, etc.

The superintendence of the work for the contractors was done by a general superintendent who made occasional trips to the work, but was not resident there. During his absence a general foreman had entire charge, but was always subject to the orders of the engineer on the work.

The wages paid for the various classes of labor is shown in the specimen report. These were constant throughout, with the exception of the wages for common



Bates & Rogers Construction Co.

355 Dearborn Street, Chicago.

DAILY REPORT.

P. O. ADDRESS... Box 17

BRIDGE Spokane... DATE, Oct. 31... 1910

WORK DONE:	COST LABOR.
<u>East</u> <small>ABUTMENT</small> EXCAVATION _____ CU. YDS.	4 <u>50</u>
<u>Pier #2</u> " CONCRETING _____ CU. YDS.	21 <u>97</u>
<u>West</u> " FORMS _____	43 <u>86</u>
<u>Pier #2</u> " _____	14 <u>05</u>
<u>Pier #1</u> PILES DRIVEN NO. <u>7</u> LIN. FT. <u>224</u>	23 <u>23</u>
Hauling Lumber	7 <u>50</u>
Reinforcing W. Abut.	7 <u>30</u>
Gravel	35 <u>34</u>
	<u>\$157 75</u>

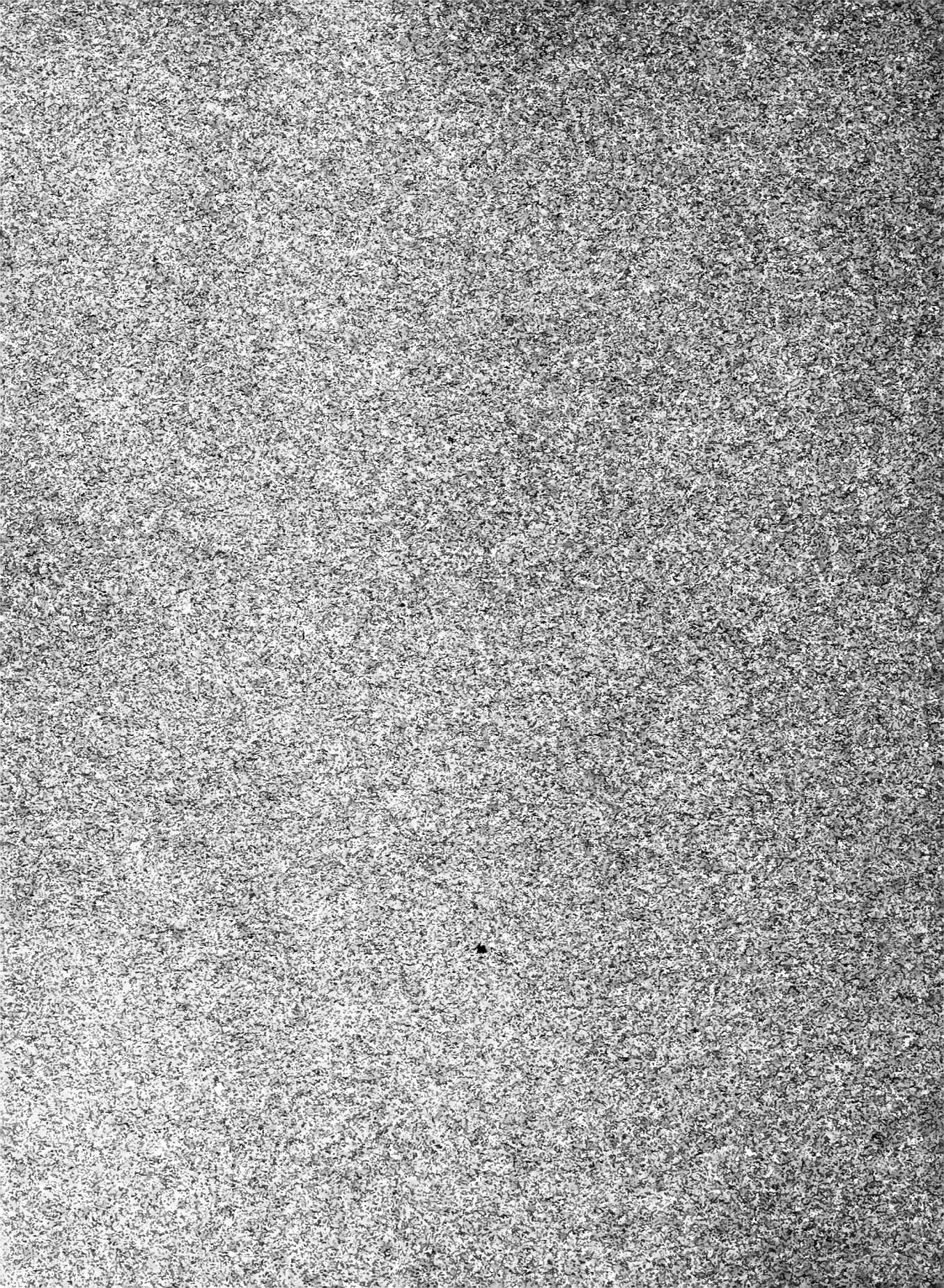
FORCE:			
<u>1</u> FOREMEN	@ \$ <u>125 00</u>	PER Mo.	4 <u>03</u>
<u>3</u> ENGINEERS	" \$ <u>3 50</u>	PER DAY.	10 <u>50</u>
<u>12</u> CARPENTERS	" \$ <u> </u>	"	42 <u>00</u>
<u>1</u> " 4 man.	" \$ <u>4 00</u>	"	4 <u>00</u>
<u>4</u> LABORERS	" \$ <u>2 50</u>	"	10 <u>00</u>
<u>26</u> "	" \$ <u>2 25</u>	"	58 <u>50</u>
<u>1</u> Blacksmith	" \$ <u>3 50</u>	"	3 <u>50</u>
<u>1</u> TIMEKEEPERS	" \$ <u>75 00</u>	" Mo.	2 <u>42</u>
<u>2.8</u> TEAMS & Men	" \$ <u>6 00</u>	" day	16 <u>80</u>
<u>1</u> Rigger	" \$ <u>3 00</u>	"	3 <u>00</u>
<u>1</u> Engineer	" \$ <u>3 00</u>	"	3 <u>00</u>
	" \$ _____	"	
			<u>\$157 75</u>

NO. SACKS CEMENT USED _____

EXPECT TO COMPLETE THIS JOB _____ 191 _____

REMARKS: 18 yds. of sand delivered
90 yds. of gravel hauled
Average penetration Pier #1 piling 17.1 #

WEATHER: Clear _____ C. H. Smith
 FOREMAN.



laborers, which were cut from 25 cents per hour to 22 1/2 cents and finally to 20. Exceptionally good men of this class were paid in a like proportion 27 1/2 - 25 and 22 1/2 cents per hour.

The largest force on the work at one time consisted of the following:

- 1 General Foreman
- 1 Carpenter "
- 1 Pile driver "
- 4 Engineers
- 10 Carpenters
- 4 Carpenter helpers
- 1 Blacksmith
- 2 Riggers, or pile driver men
- 1 Timekeeper
- 3 Teams
- 1 Single horse and man
- 51 Laborers

For a time during the driving of piling for foundations a pile driver foreman was on the pay roll for 40 cents per hour. This was only a temporary expense, as the general foreman and carpenter foreman were ample to direct the work other than pile driving where supervision

must be constant.

Construction-Concrete Sub-structure:- The construction work will be discussed in the actual order of its progress and not for each abutment and pier separately. This is done because the work did not proceed in the direct order of Piers #1, #2 and #3, but often two or more pieces of work were in progress at one time.

Before the permanent bridge work was commenced, it was deemed necessary to construct a temporary timber trestle to be used for traffic in the event of the non-completion of the permanent bridge at the time track was to be laid. This temporary structure was built and complete before the bridge contractors were ready to work.

In order to have an advantageous means of carrying on the work, it was deemed advisable to build a temporary work trestle to transport concrete on and also for the use of the pile driver. This was therefore started at once. Twenty-one 3 pile bents were driven and decked with old bridge timbers. The piling used were 20 x 25 ft. lengths.

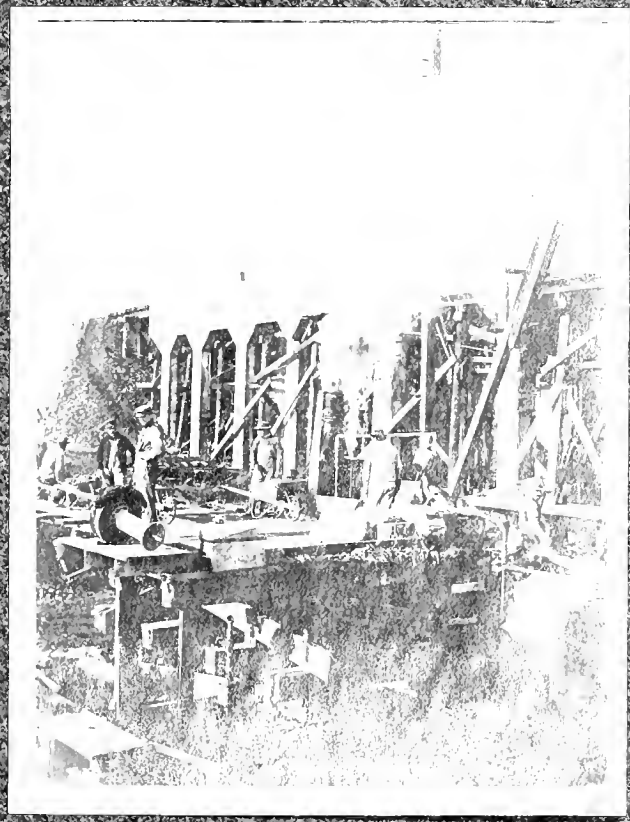
While the temporary trestle was under construction, the timbers for the cofferdam for Pier #3 were being framed and put in place. This cofferdam was 14' x 45' inside of the sheeting. The method of construction was:

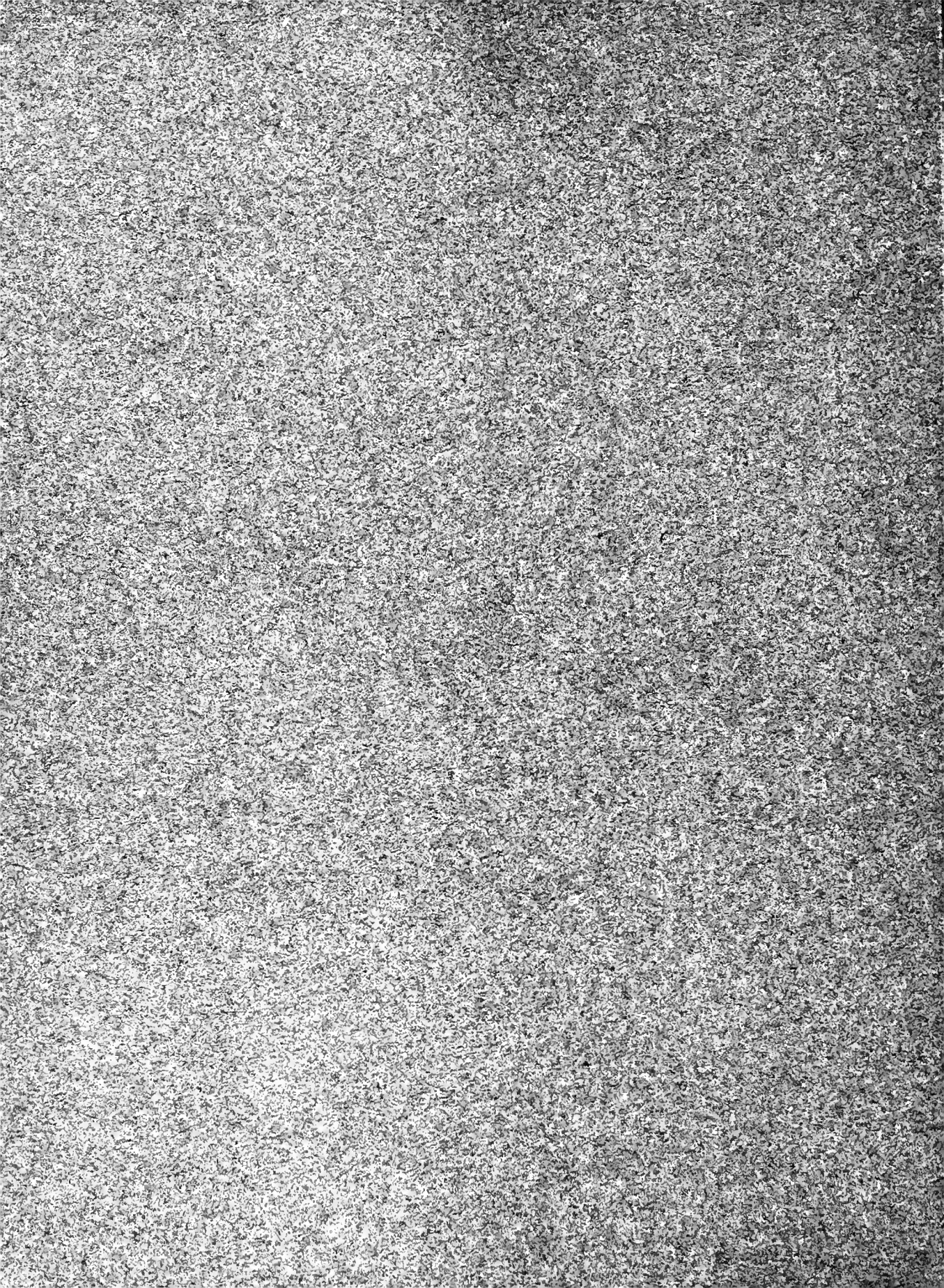
The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both manual data entry and the use of specialized software tools. The goal is to ensure that the data is both accurate and easy to interpret.

The third part of the document provides a detailed breakdown of the results. It shows that there is a clear trend in the data, which is consistent with the initial hypothesis. The analysis also identifies some areas where the data deviates from the expected pattern, which may be due to external factors.

Finally, the document concludes with a summary of the findings and some recommendations for future research. It suggests that further studies should be conducted to explore the underlying causes of the observed trends and to develop more effective strategies for data collection and analysis.





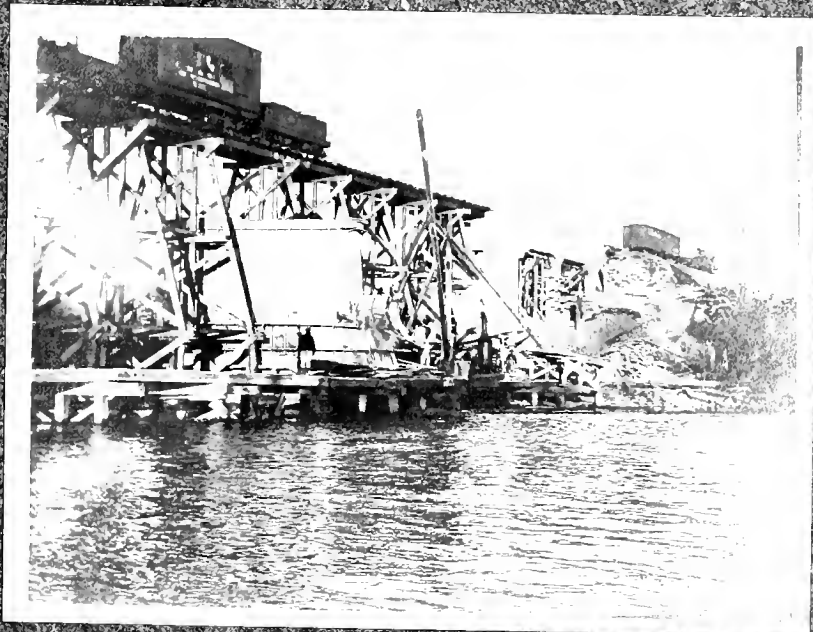
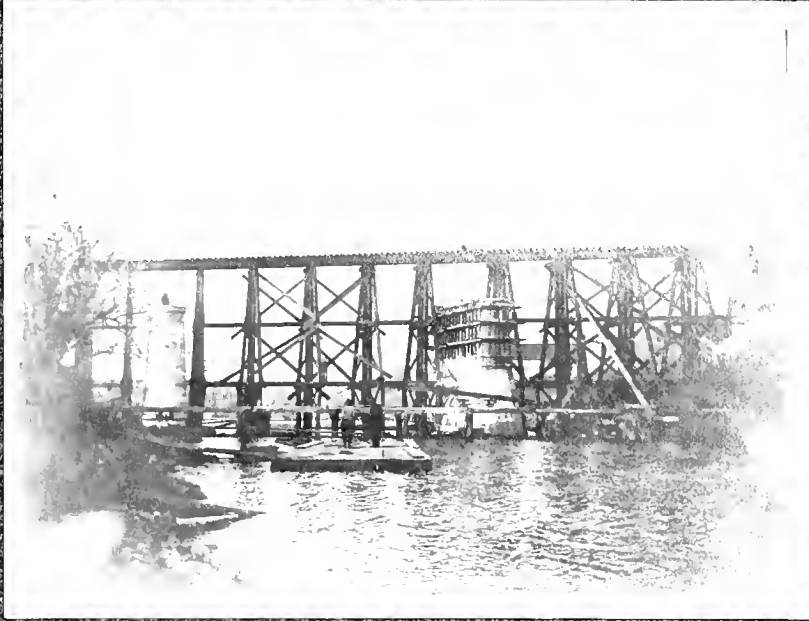
Four 12 x 12 timbers were fastened together in the form of a rectangle and floated into the desired position, being held in place by lines and bracing to temporary work. The sheeting, 3 x 8 M. & D. material, was then put in place around this waling, being held at intervals by small nails. When the entire waling was walled up with sheeting a similar waling was built on the outside, about two feet distant all around on three sides, the west side being in such shallow water that outside protection was not necessary, the puddling material being placed up against the sheeting with no backing.

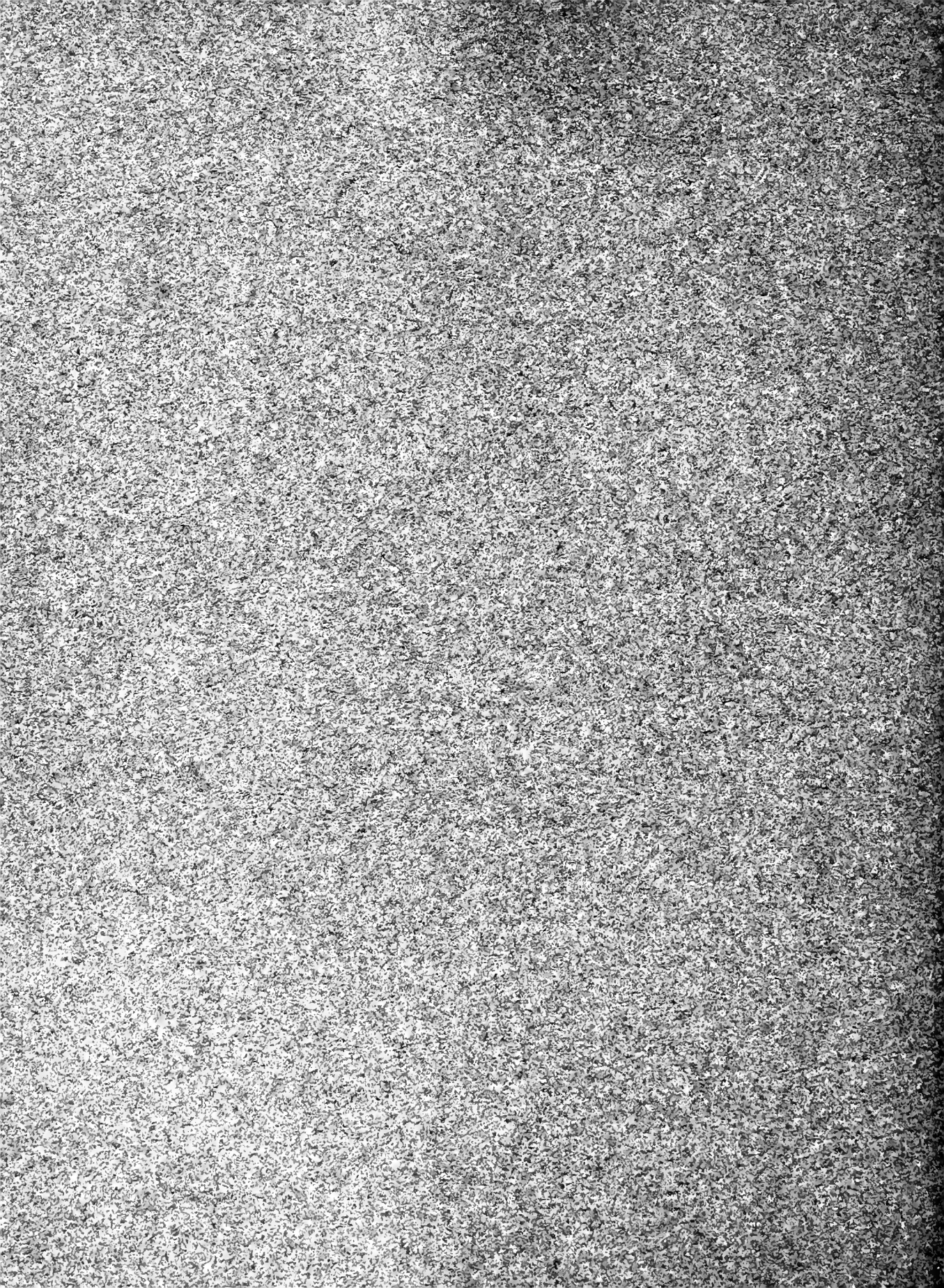
When this second frame was made it was walled up on the inside with 3 x 12 rough lumber. The puddling material, local surface dirt, was then dumped in between these two walls. The puddling process being completed the inside was pumped out and the leaks tamped tight.

The excavation was next started. This was done by hand, the material being loaded into bottom dump buckets, which were handled by a stiff leg derrick situated at (2) near Pier #3 (map page 11) the material being deposited around the cofferdam.

The waling and sheeting were driven down by hand operated tamps. When down about six feet a second waling was built of the same dimension as the first







and put in place about five feet above it. This method of driving sheeting and excavating was then continued until the desired level was obtained in the cofferdam.

A 5" Emerson pump was used in this cofferdam and proved of ample capacity, although the leakage was considerable at times. This was the only wet excavation on the work.

During the cofferdam work the boiler was put in place as shown on map, the gravel washer built and track laid from it to the storage yard, the mixer platform was built and the mixer set up, the tool house and blacksmith shop were built and excavation started on the west abutment.

By the time the excavation in the cofferdam was completed the work trestle was also finished and the pile driver was returned to Pier #3 site ready for driving the foundation piling in the cofferdam. This foundation consisted of 88 - 20 and 25 ft. piles driven every 2' 3" along the center line of the pier and every 2' 6" at right angles to it.

The piles were driven until they practically stopped, or to an average penetration of 10.2 ft. The cofferdam was allowed to fill during the pile driving and was pumped out after all the piles were driven. They were

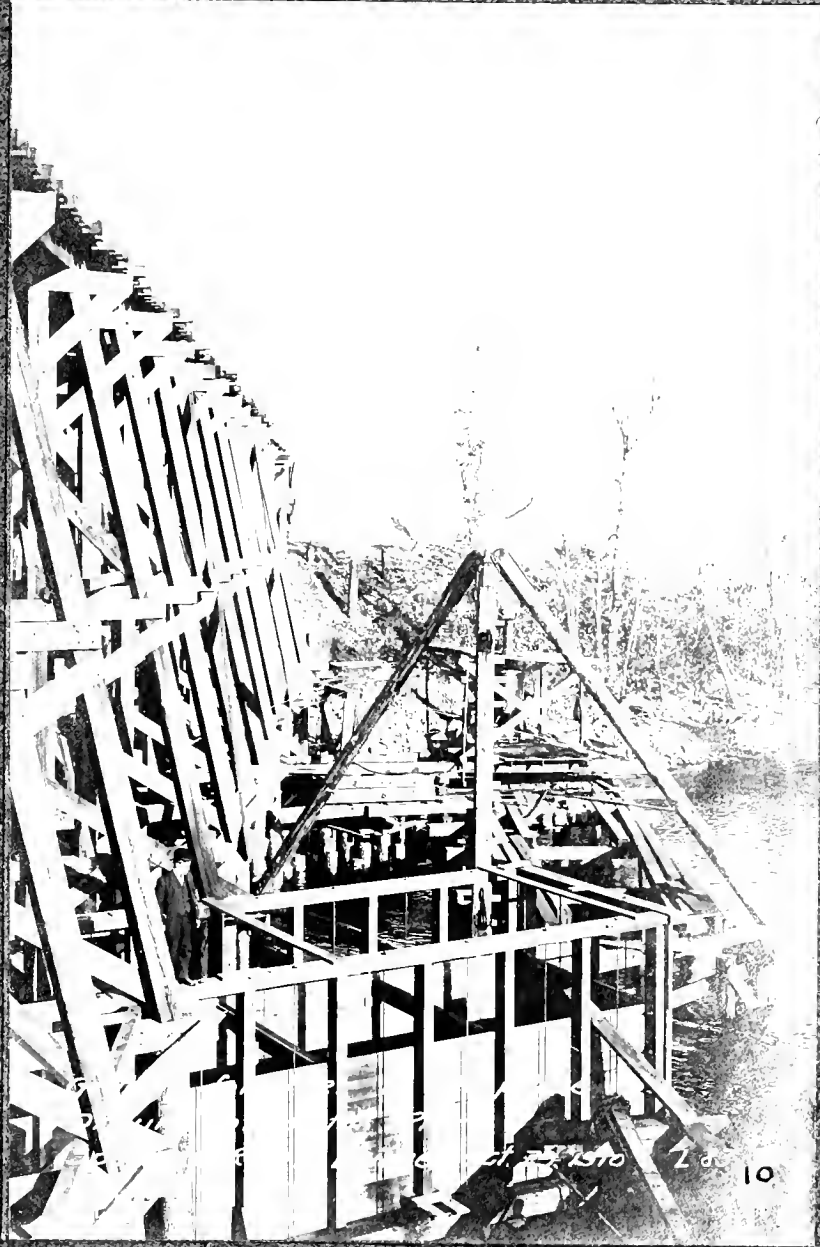


then cut off, by hand, about 1.5 ft. above the ground. A small box was made to carry the water around the sides of the cofferdam to the pump in one corner and everything was in readiness for concrete.

During the process of pile driving at Pier #3 forms were being cut for the nose and back, material delivered and the river bed at Pier #2 site raked with an iron hook to remove large surface boulders.

The pile driver was moved to Pier #2 and 93 - 32 ft. piles were driven every 2' 6" along the center line and every 3 ft. at right angles to it. These were also driven to an approximate stand still, to a penetration of 18.9 ft. During this pile driving Pier #3 was concreted. The concrete being placed with bottom dump buckets which were handled by the derrick at (2).

In the meantime the excavation for the west abutment was continued and construction started on the caisson work for Pier #2. This caisson consisted of three tiers of 12 x 12 S. 1. S. timber bolted together, making a solid base 14 x 48 x 3 ft. On this the side and end walls made of 3 x 12 M. & D. material were fastened by long hook bolts running from the top sill to the base. They were fastened together at the ends by bolts so that when they were used at Pier #2





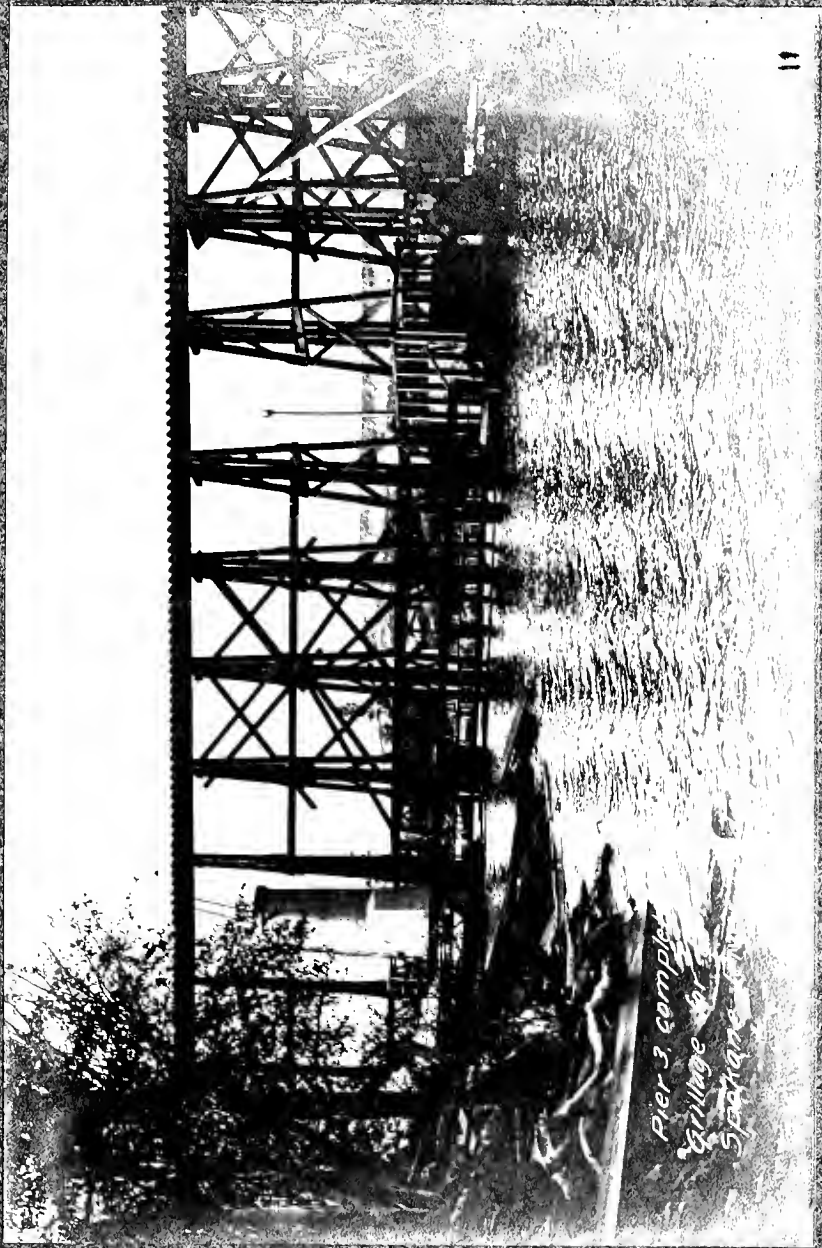
the bolts were removed and the sides and ends came off and were floated into place and set up again on the base for Pier #1.

While waiting for the forms to be placed for the neatwork of Pier #3 the excavation for the main part of the West Abutment was finished and the footing concreted. The concrete was deposited by cars running on a track from the mixer to the foundation.

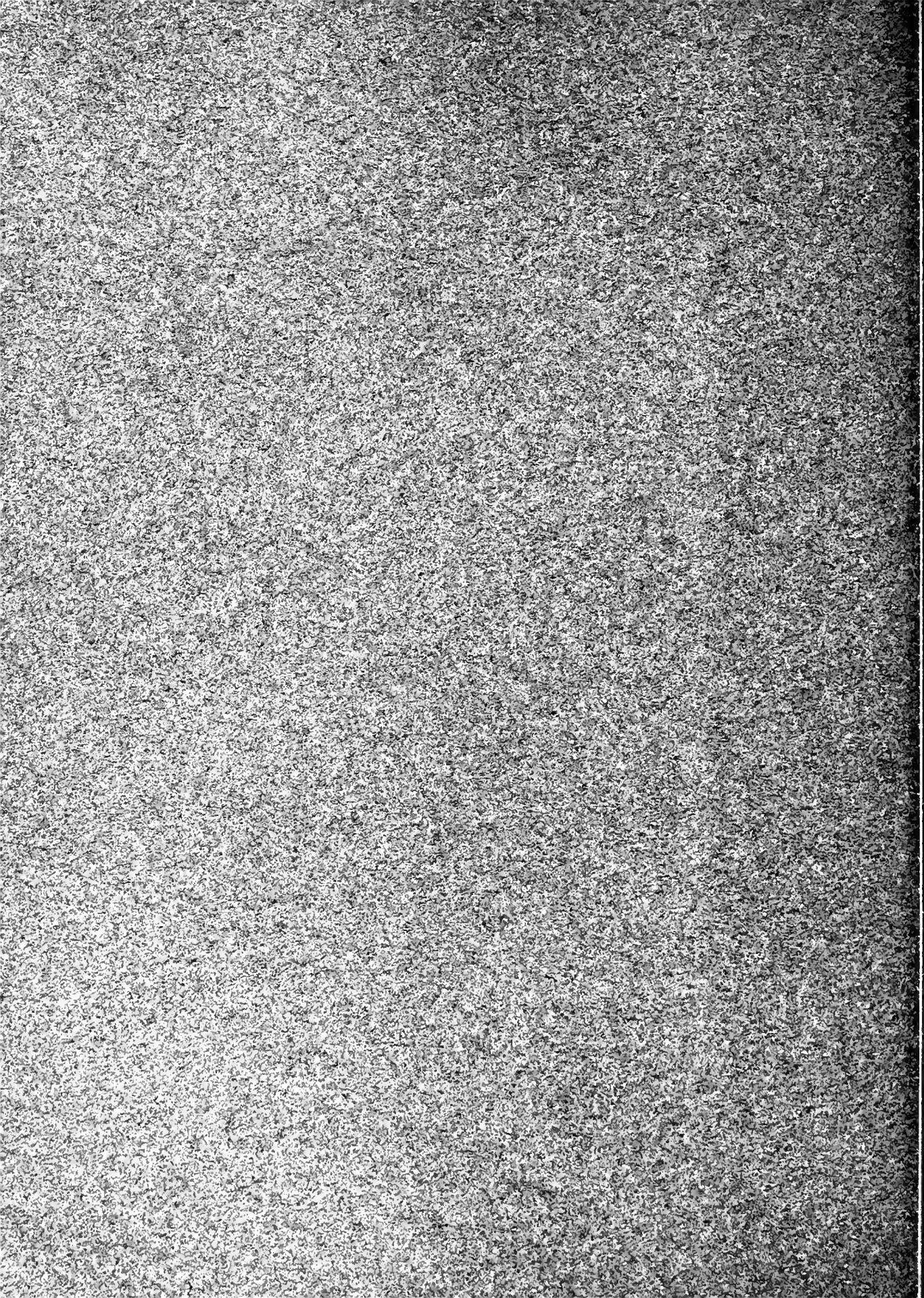
The pile driving at Pier #2 being finished the driver was moved to Pier #1 site, which had been previously raked for boulders, and 94 - 32 ft. piles were driven here. These piles were spaced the same as for Pier #2 and were driven until the movement under last blow of hammer with fall of 20 ft. was less than an inch. The average penetration was 17.8 ft.

While the pile driver was working at Pier #1 the forms for the neatwork of the West Abutment were being made, Pier #3 was stripped, the rip rap work around Pier #3 was started after the cofferdam sheeting had been pulled, the guy derrick at (1) was set up and the engine moved from (2) near Pier #3 to operate it and the piling at Pier #2 were cut off.

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Pier 3, complete
Gallage for
Spokane Co.



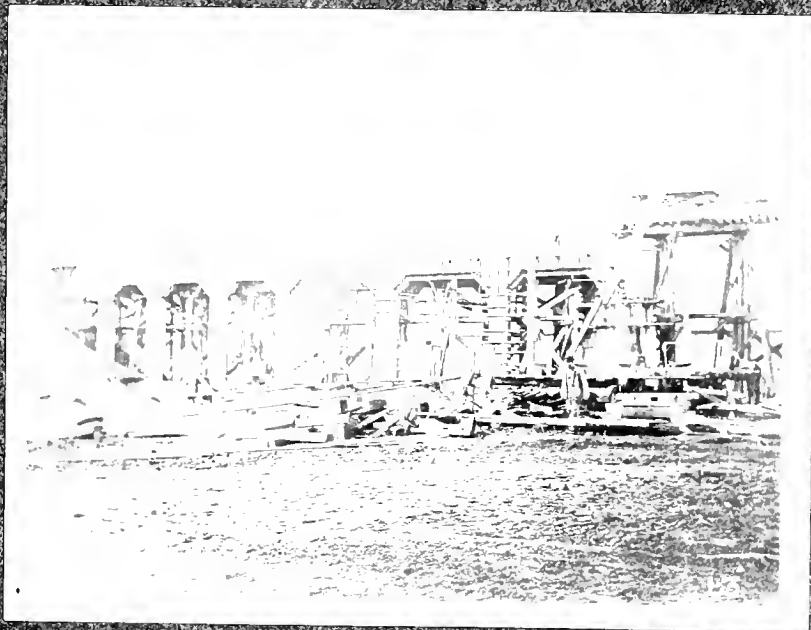
The piling were cut off under water with a circular saw on a vertical shaft. This shaft was mounted on a frame that held the engine and was operated by a belt. Skidways were fastened to the temporary trestle and guide piling and rails were placed on them to an exact level. The saw was set to cut over the highest point of rock on the bottom and held in place by a collar on the shaft. A steam line was laid from the boiler to the saw engine and connection made with steam hose.

The cutting was started at the up stream end of the pier and the frame was skidded back and forth at right angles to the center line of the pier being fed ahead as each row of piling was cut. The levels of the cut offs were frequently checked and the saw reset if necessary. After all the piles were cut a variation in level of only .03 ft. was found.

When the piles were cut and the skidways and saw frame removed, the work trestle was opened and the completed caisson was floated into place. It was lined in and when in position was secured by bracing to the temporary structure and the guide piles.

During this work the pile driving at Pier #1 was completed and the saw was moved to cut the piling there in the method previously described. The pile driver was then taken apart and the engine of the pile driver used on the stiff leg derrick, which was set up at (2)

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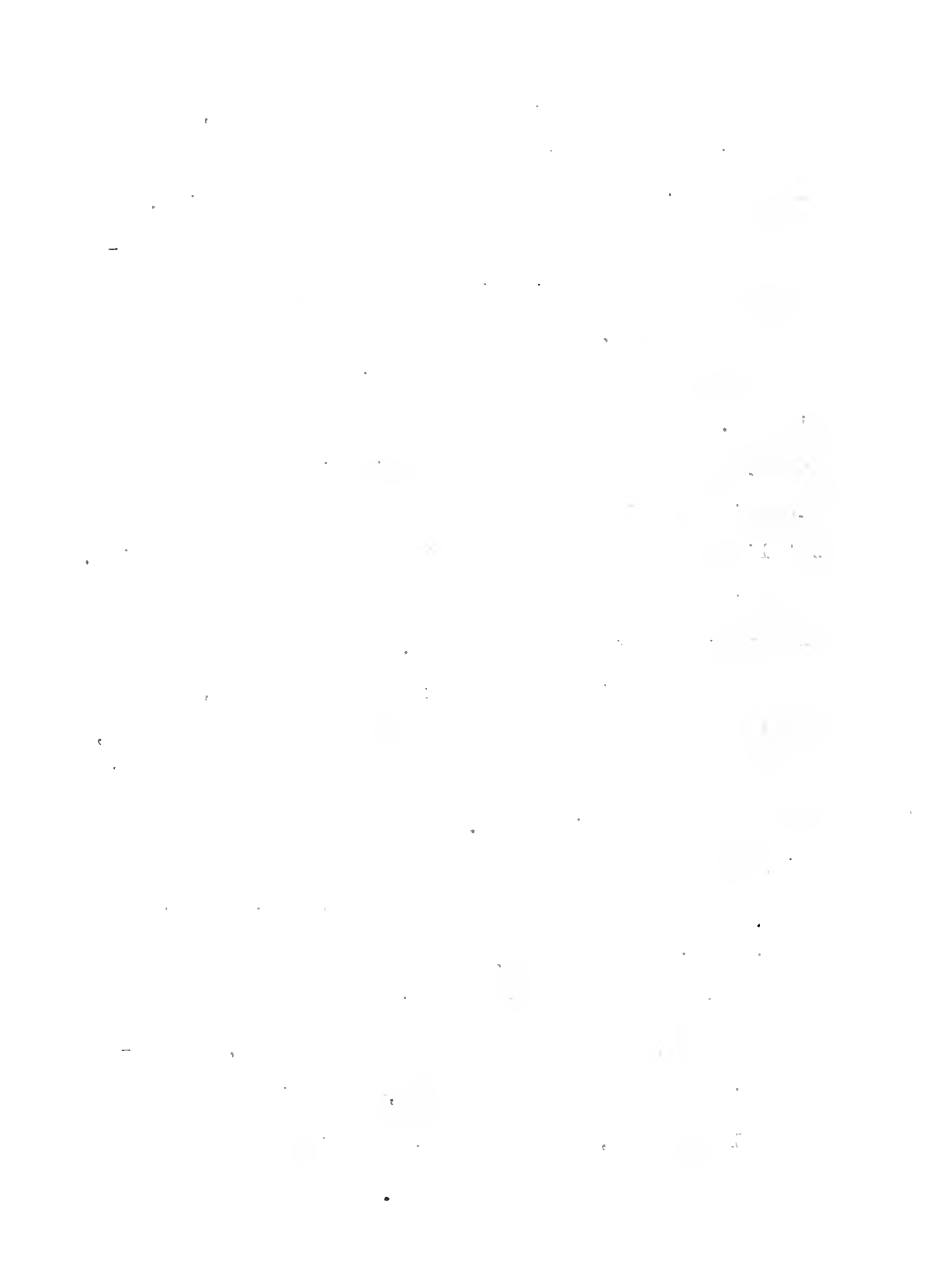


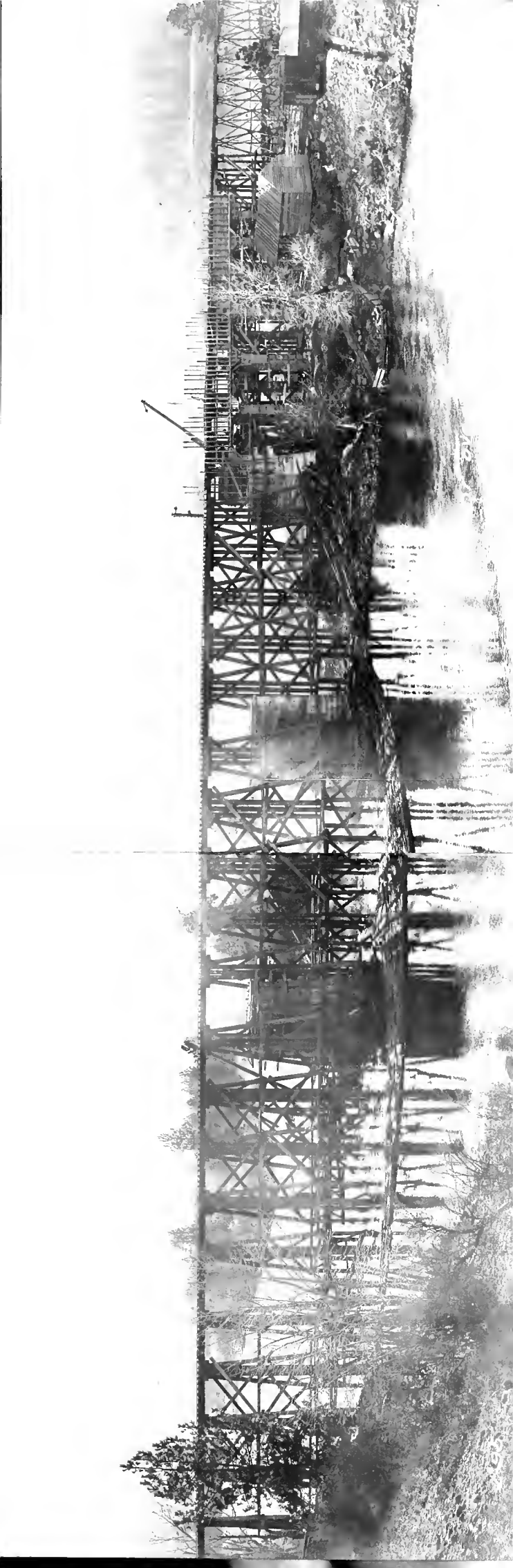
The rip rap work at Pier #3 was completed also, the concreting of the main West Abutment and some rip rap was placed in front of the main east abutment site. The footing pedestals for the west abutment were excavated and all concreted with the exception of those for the future track.

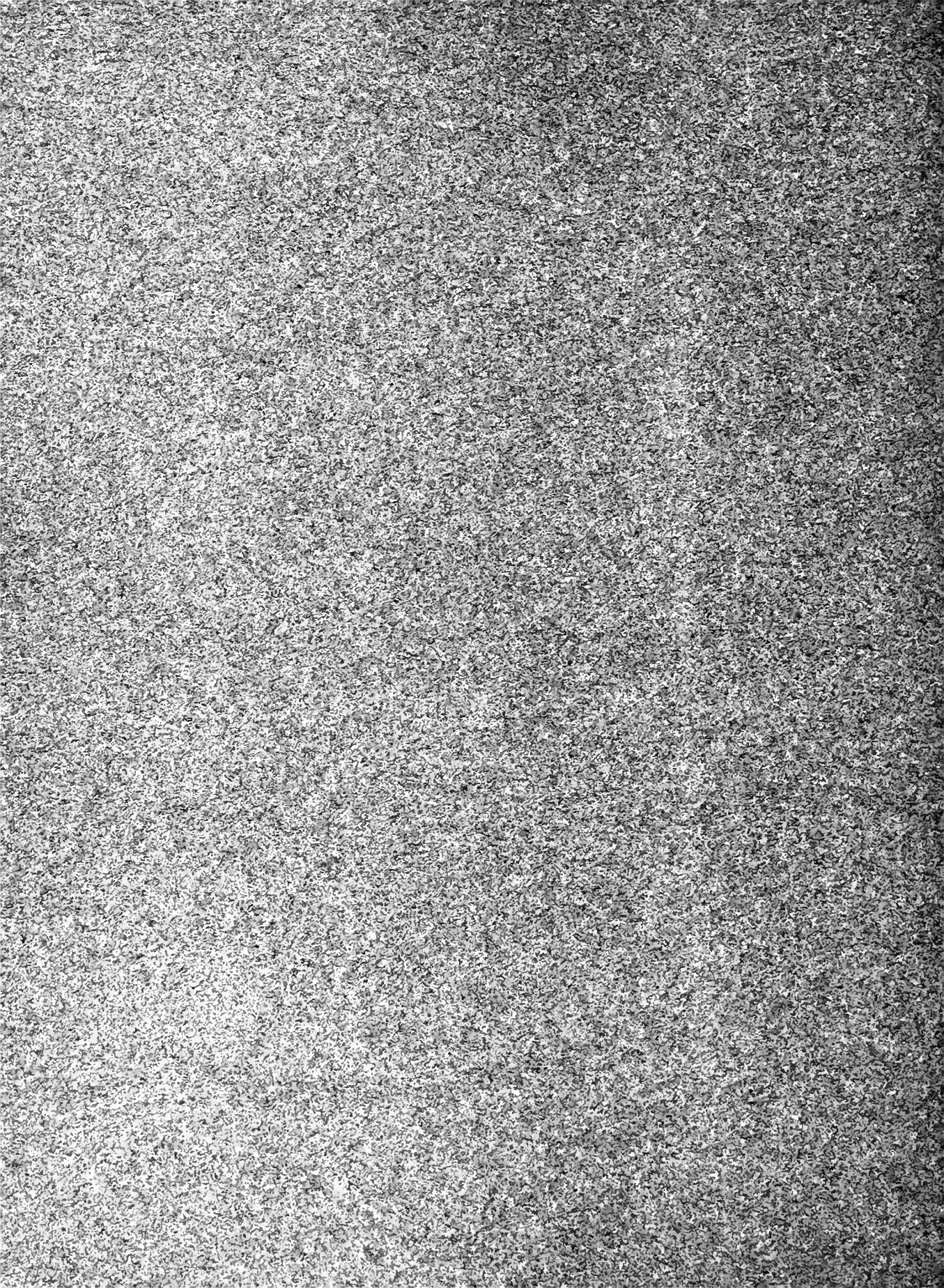
The concrete was next placed in the caisson at Pier #2. It was carried from the mixer in buckets on cars and then hoisted by the derrick into the caisson where it was distributed evenly to prevent undue settling at any one place during the process of sinking. The caisson being calked and water tight there was no trouble in working the concrete.

When the caisson was sunk onto the piling, being reset for alignment just before it was completely down, the footing was allowed to set up before the forms for the neatwork were put in place. As much of the form work as could be saved from Pier #3 was used as the shafts of all three piers were of the same dimension making the forms interchangeable.

During the concreting of Pier #2 the forms for the columns of the west abutment were placed, the reinforcing bars were cut and bent, the caisson base for Pier #1 was made, and the excavation for the main east







abutment started. The gravel was also delivered during this time and the washer and track taken up.

The excavation for the east abutment was attended with some difficulties. The material was coarse gravel and sloughed off considerably, breaking back so far in the main abutment site as to endanger the temporary trestle, which had to be jacked up and repaired with a cribbing under it. The excavation for the footing pedestals were very deep to prevent slipping on the side hill and for this work dry cofferdams had to be built to hold back the dirt on the sides of the excavations. Interference with the temporary trestle also caused more cribbing to be done to maintain that structure.

The west abutment approach was next concreted. The mixture for this work was made very wet and was thoroughly worked by spades against the face, every effort being made to get a good surface and not expose the rods which were within two inches of the forms. The work of spading in the columns was exceedingly difficult as the rods in place left very little room for a man to work and it was necessary for him to move out whenever a car of concrete was dumped.

The concrete for the west abutment was emptied into buckets at the mixer, which were raised by the derrick at

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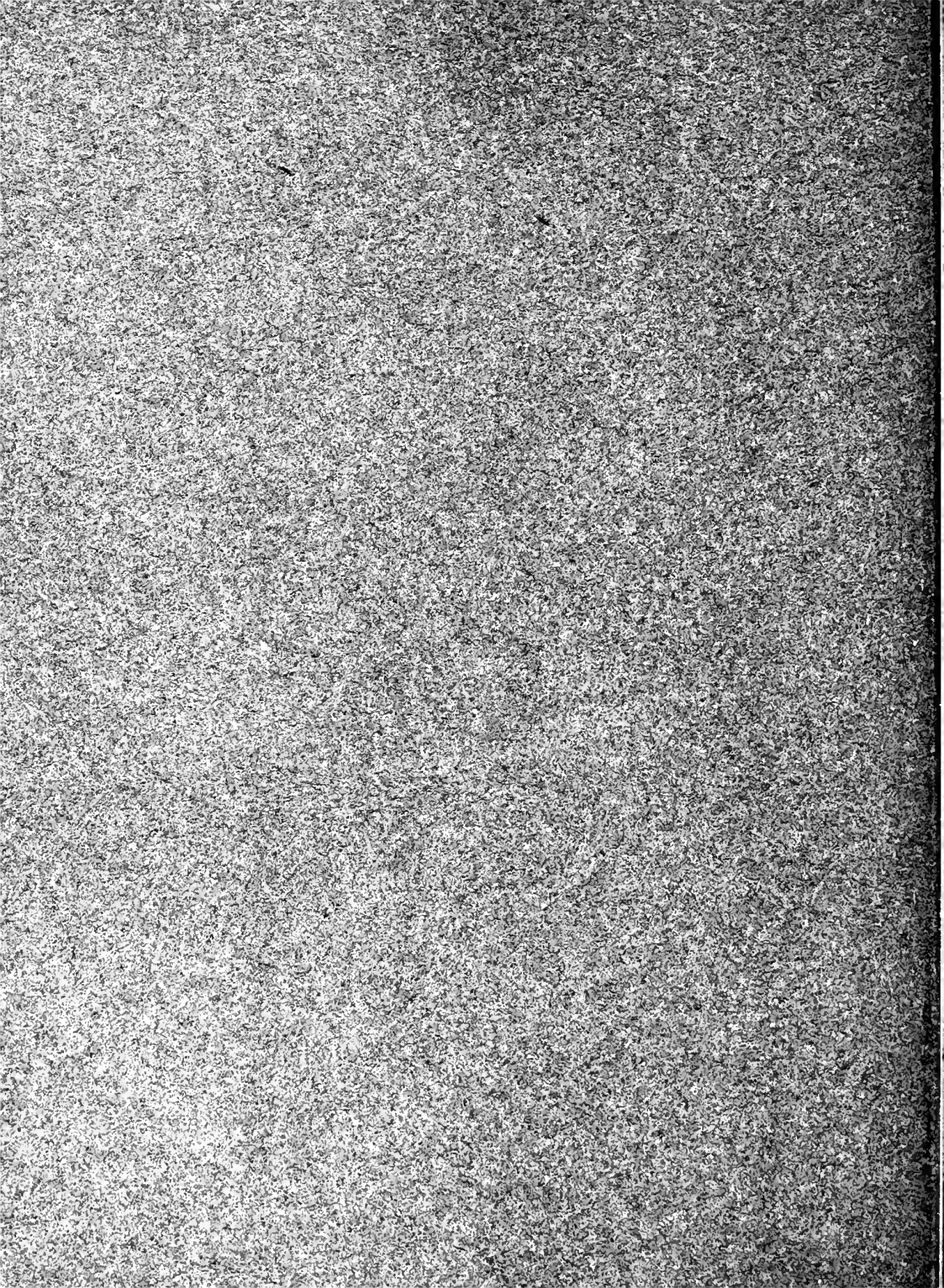
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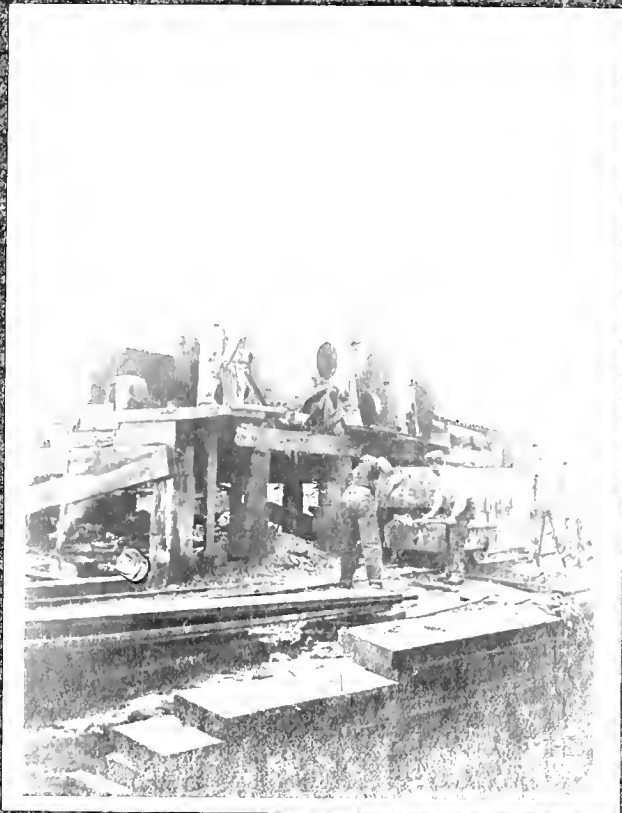


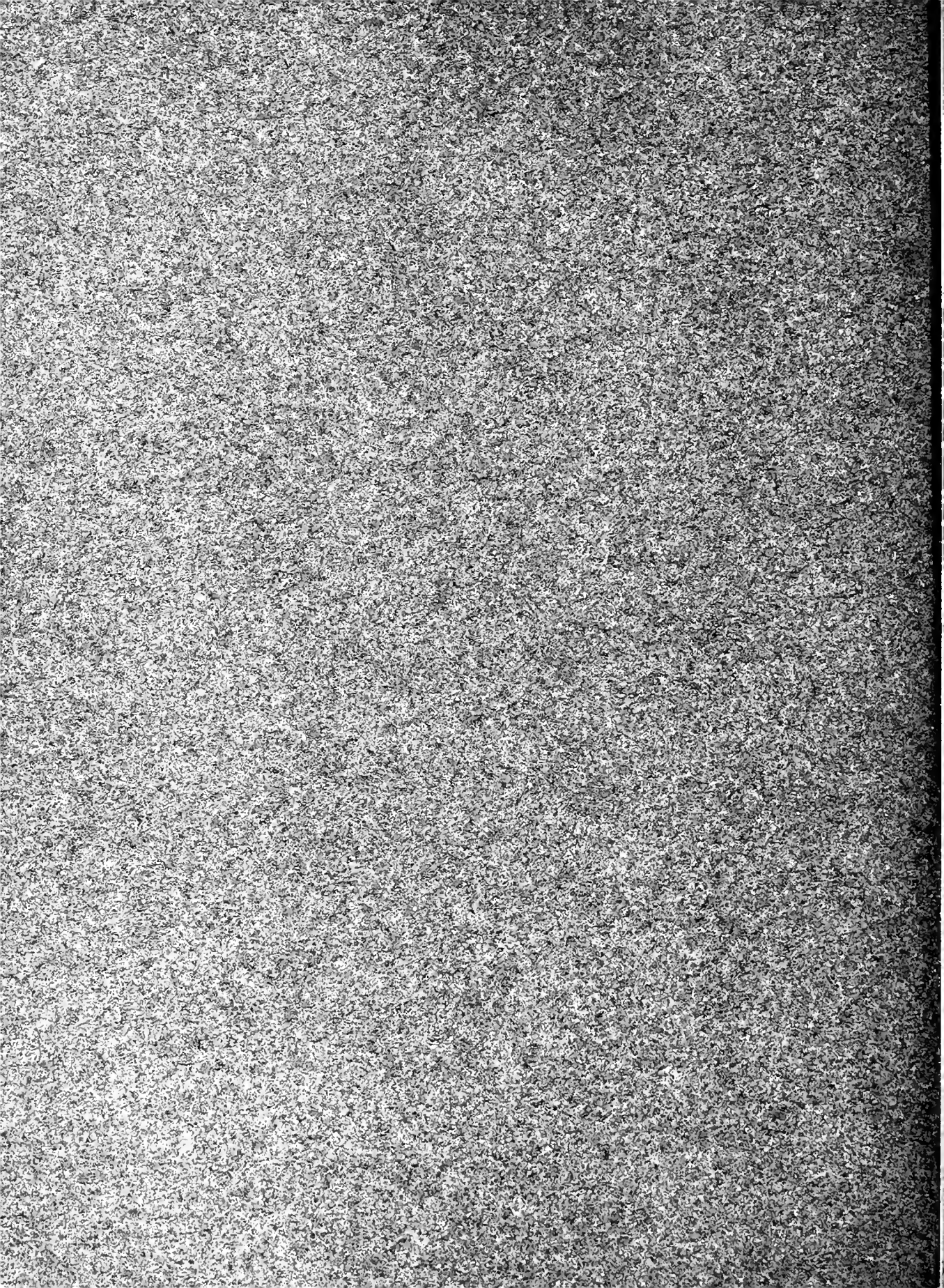
(1) and dumped on a platform on the temporary trestle. From here it was shoveled into a side dump car and conveyed to the place where it was to be used. For concreting the columns it was shoveled into chutes that ran down into the structure. For the side walls and cross beams it was dumped on a platform and shoveled directly into the work. Great care at all times was observed in the placing of this concrete not to disturb the reinforcement.

When the concreting was completed at Pier #2 the derrick and engine were removed to (2) Pier #1 to be used on concreting this Pier. It was then decided to place the caisson for Pier #1, but before this was done the gates of a large dam at Post Falls, Idaho were opened and the water rose four feet bringing all manner of drift with it.

So great was the accumulation of drift that both the work and temporary trestles were in danger. This called for the entire labor force to keep an open channel and send the accumulated drift down the river. This condition prevailed for 12 days, but at the end of this time, although no further inconvenience was caused by drift, the water did not go down more than one half foot, making it inadvisable to place the Pier #1 caisson as it

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might have broken its moorings or got ^{ten} something under it, due to the current, that would have prevented it from sinking to a level footing.

The labor force was increased at this time and the concrete work on the west abutment was completed. The footings for the main east abutment were also concreted. The concrete for this work was carried across the work trestle in push dump cars and emptied directly onto the work. The engine at Pier #1 was rigged to help the cars up an incline at the east end of the work trestle.

While the concreting of the east abutment was under way, track was laid across the temporary structure and as daily work trains were in operation it was necessary to arrange for a rapid means of clearing the track on the bridge. Therefore the platform used on the west abutment work was arranged so that it was not fastened to the structure, but could be lifted off with the derrick, to which a long boom was attached to handle the concrete for the east abutment.

All the concrete with the exception of the main abutment footings on the east abutment, both plain and reinforced, was placed by push cars on the temporary trestle, the concrete being deposited in chutes which were

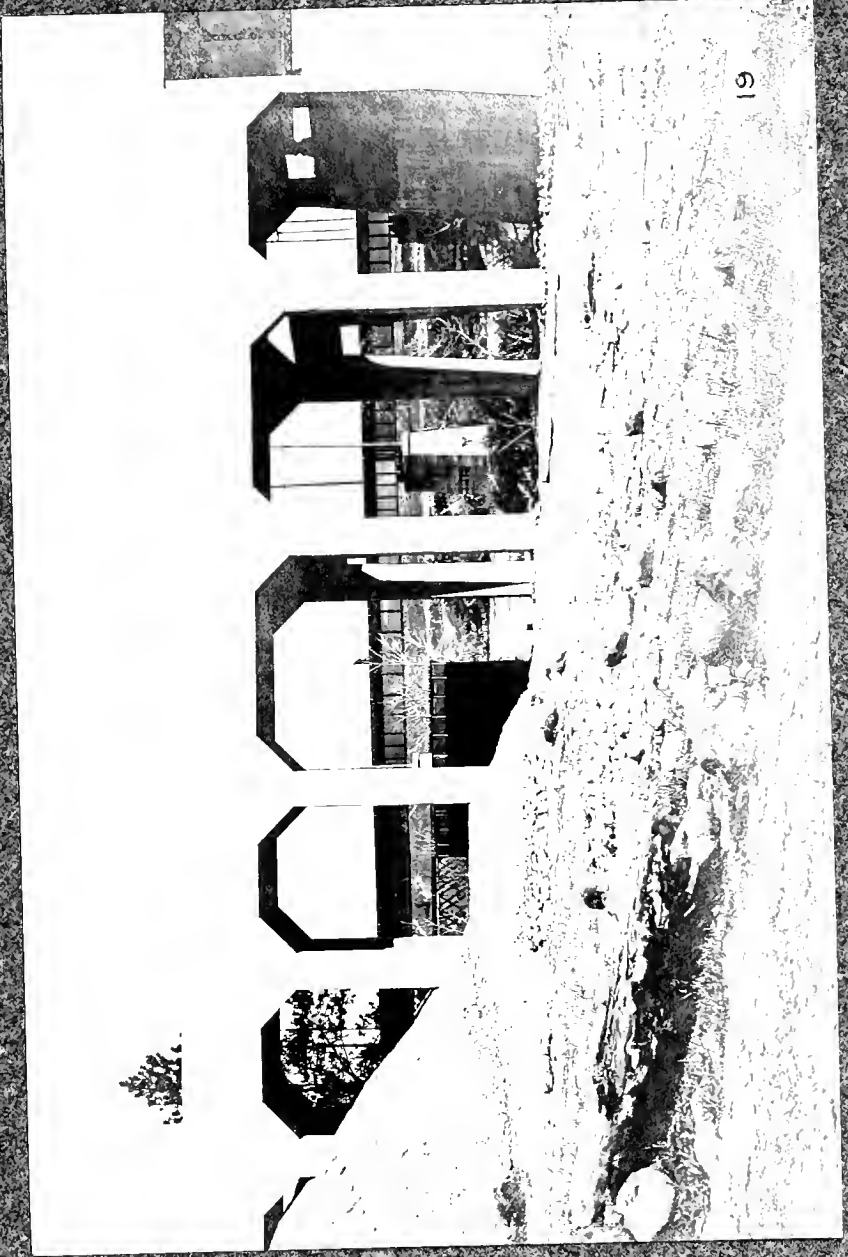
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shortened as necessary. The side walls and cross beams were concreted from a platform similar to that used on the west side.

Shortly after track was laid the water fell considerably and it was deemed advisable to place the caisson for Pier #1. To protect the caisson from any small amount of drift that might be a menace to the work, a boom was placed in front of the Pier site after the caisson was placed.

The concreting of Pier #1 was handled in a manner similar to that used at Pier #2. This work was rapidly done, as the bridge crew were waiting to place the steel and some time was necessary for the concrete to set before it was advisable to put any weight on it. The erection of the steel will be discussed later.

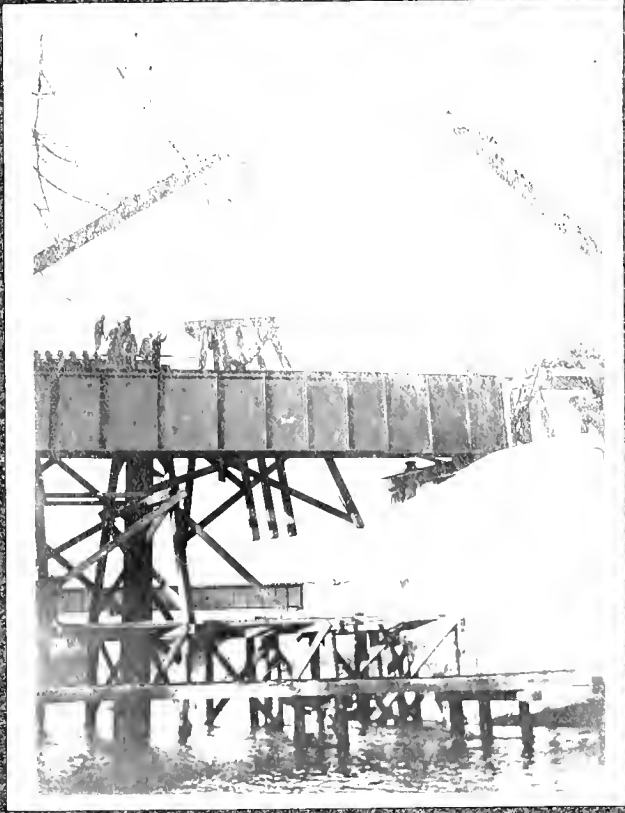
During the concreting of the east abutment and the time forms were being built for Pier #1, the rip rap work was going on at Pier #2. This rip rap consisted of surface boulders picked up on the land surrounding the work, by permission of the owner, loaded on teams and hauled to the west end of the work trestle, here it was loaded on a push car and taken to its destination. This work was done whenever the laborers were not needed on concreting and during the general clearing up.

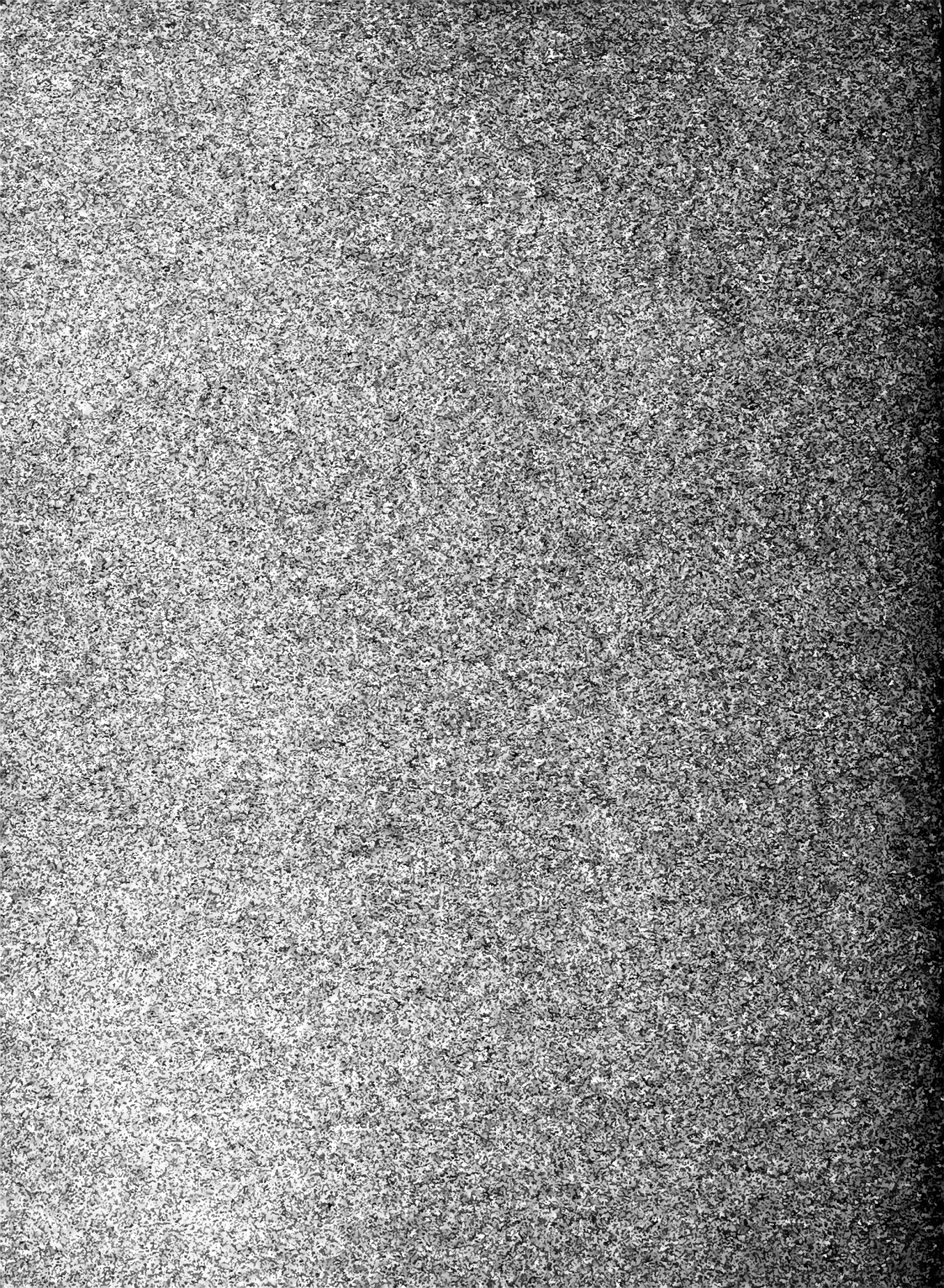
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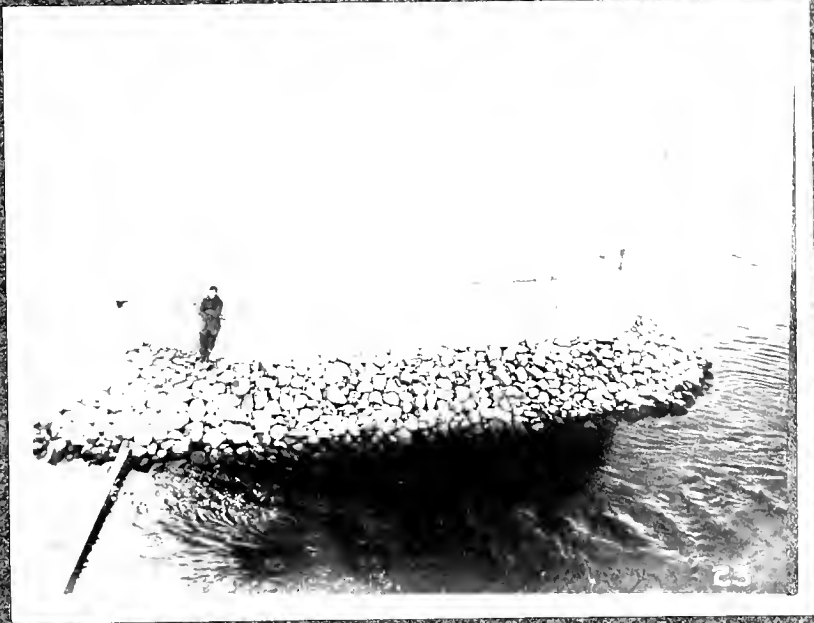
Secondly, the document highlights the need for regular audits. By conducting periodic reviews, any discrepancies or errors can be identified and corrected promptly. This proactive approach helps in maintaining the integrity of the financial information.

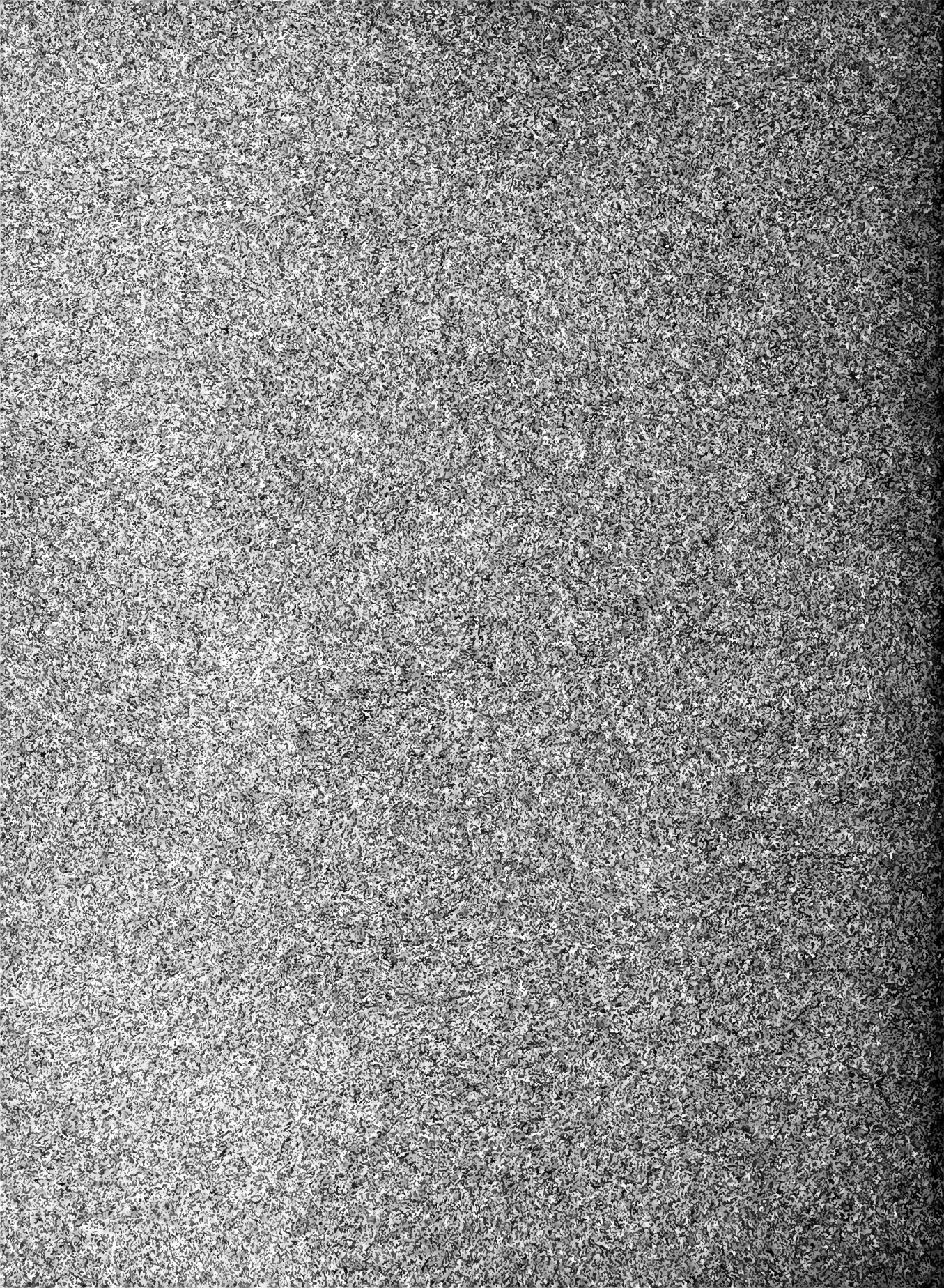
Furthermore, it is advised to use standardized accounting practices. Adhering to established guidelines and conventions facilitates consistency across different periods and departments. This makes it easier to compare data and identify trends over time.

In conclusion, the document stresses that diligent record-keeping and regular audits are essential for sound financial management. These practices not only protect the organization's assets but also provide valuable insights into its operational performance.









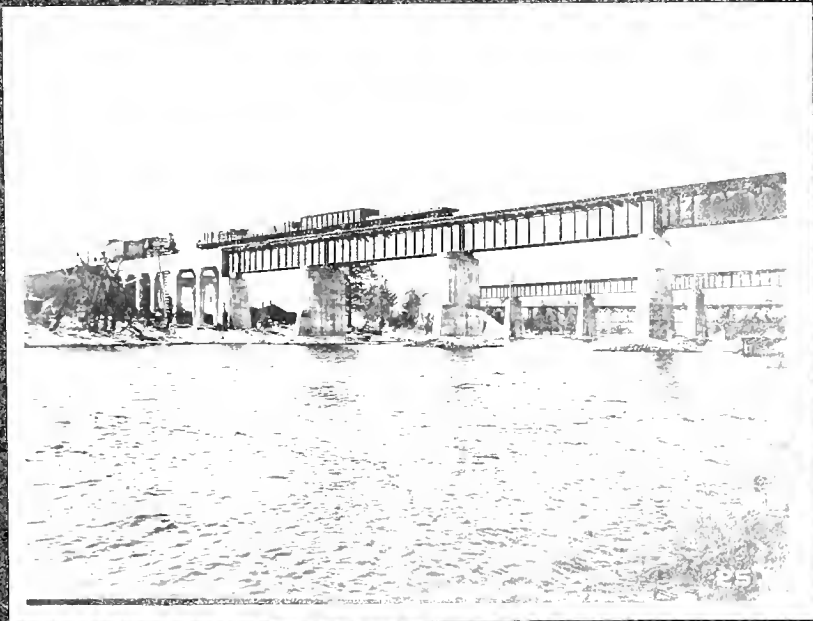
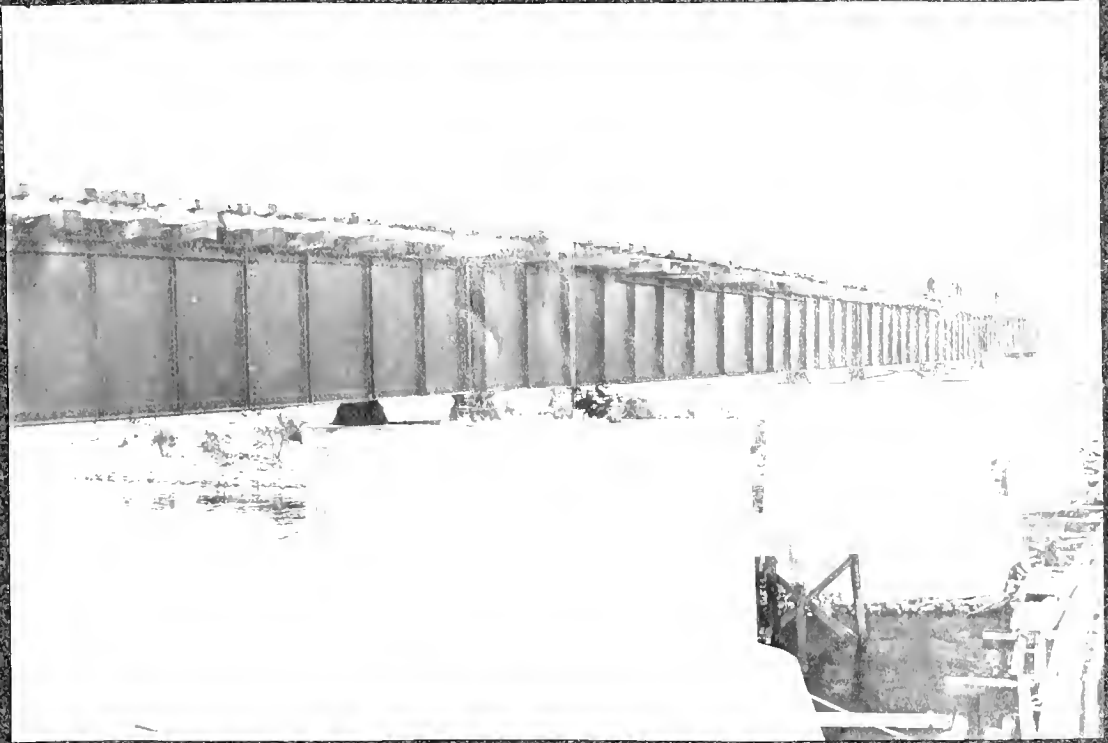
At about this time the future track footings for both the east and west abutments were placed, as it was desired to use the site for storage of the deck slabs.

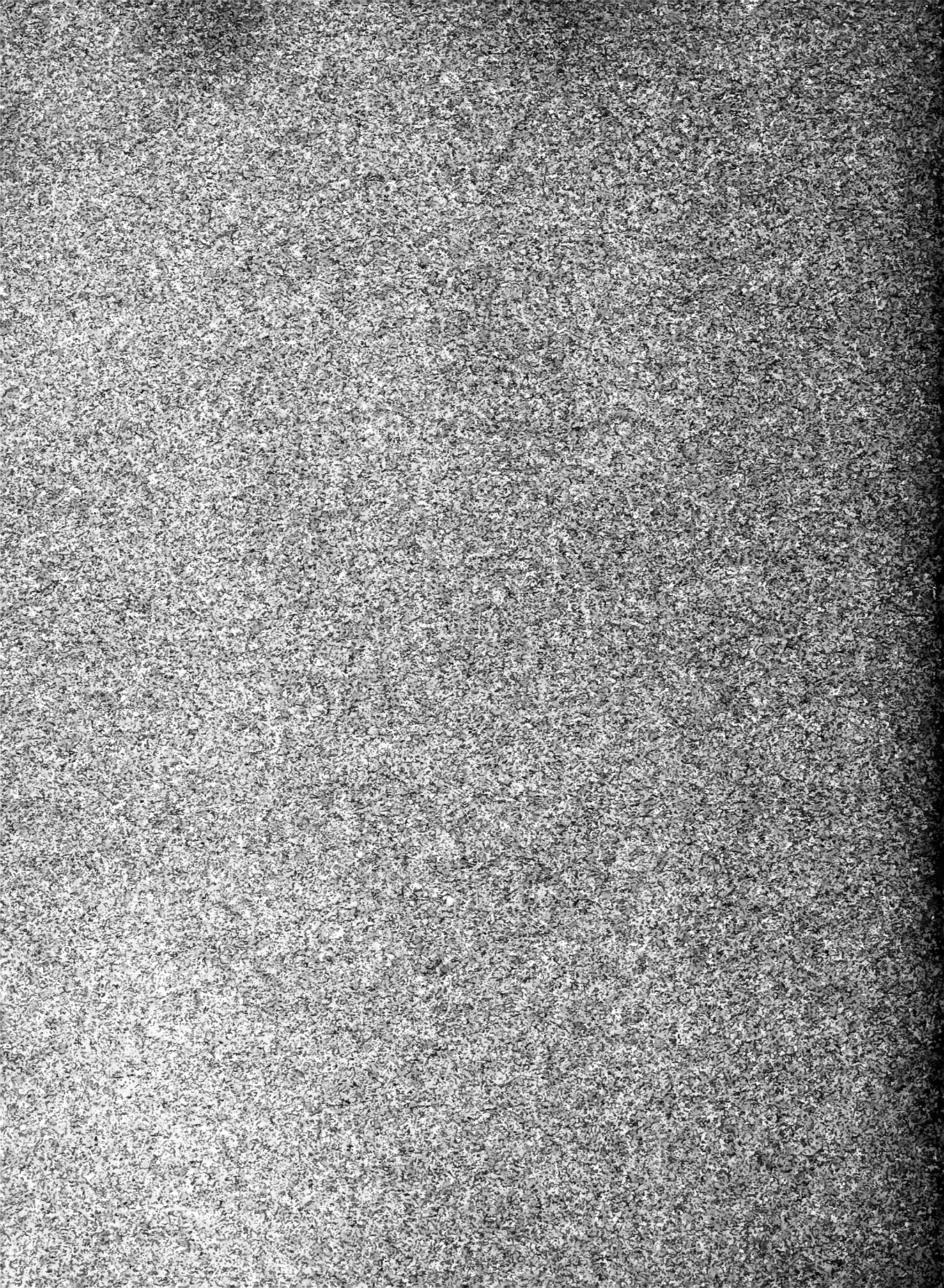
The deck slabs were concreted in forms placed on specially constructed platforms to the south of the west abutment and between it and the sand pile. These were allowed to set for at least ten days and were then moved by the derrick (1) and piled up close to the west abutment for the derrick car to pick up readily when placing. All the slabs were made with two bars placed in them in the form of a U, making a place for hooks to be attached in handling.

When all the concrete had been placed, the work of making the roads at the east and west abutments was begun. This was done with slip teams and hand shoveling, the material being dumped off of flat cars by a Lidgerwood plow. These cars were in use in the track surfacing and the gravel was loaded into them by a steam shovel in a cut about one half mile from the bridge.

While the roadways were being made the rip rap work was finished and the yard cleaned up. All the material to be returned to stock was piled up to the south of the west abutment within reach of the guy derrick (1).

The contractors equipment was hauled up on the right of way





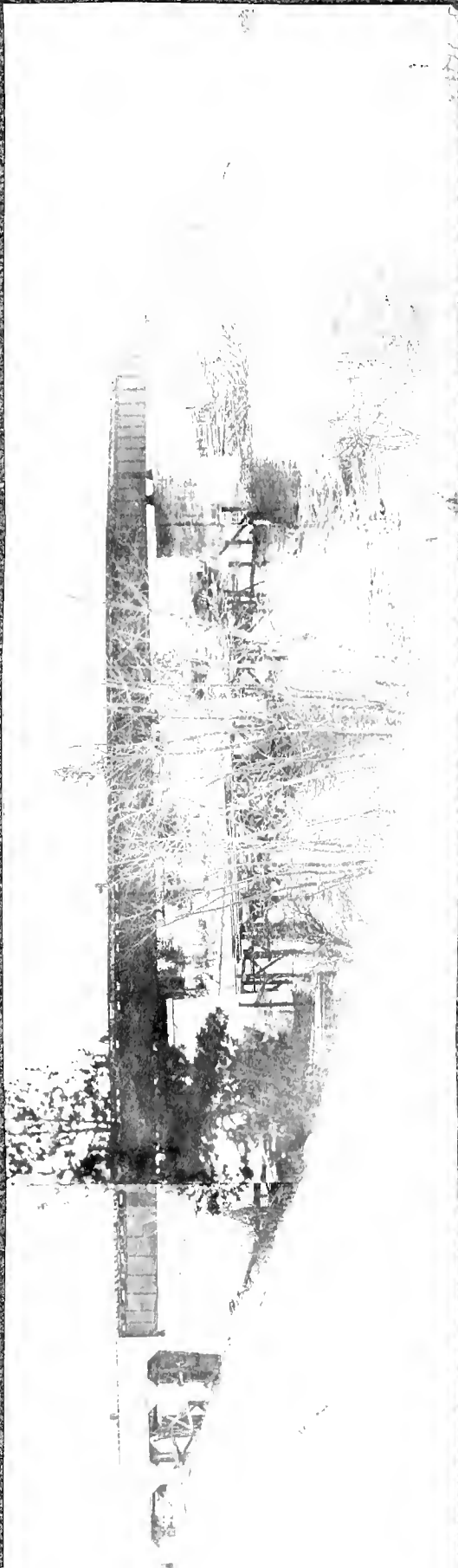
opposite the town of Spokane Bridge to be stored until needed again.

The temporary work trestle was pulled out by the engine at (1), it being moved for this work over where the boiler had been. A block was fastened to a tree on the east bank and the cable with a chain on it stretched across. One drum of the engine was used to pull the chain out and the other to return it. Beginning at the west end by this means all the work trestle was pulled ashore and the salvaged material was piled up with the other old stock.

Upon the completion of all the clearing up and storing of material a work train was furnished and loaded by means of guy derrick. All the material thus loaded was shipped to Dishman and turned into the second hand stock. The ground was leveled off with slip teams and the site was left in good order with no unsightly rubbish lying around to mar the appearance of a very sightly structure.

A reference to the cost sheet in the appendix gives all the information in regard to the yardage, mixtures, and various distributions.

The work was commenced on August 29, 1910 and completed on Feb. 6, 1911. Stormy weather interfered with





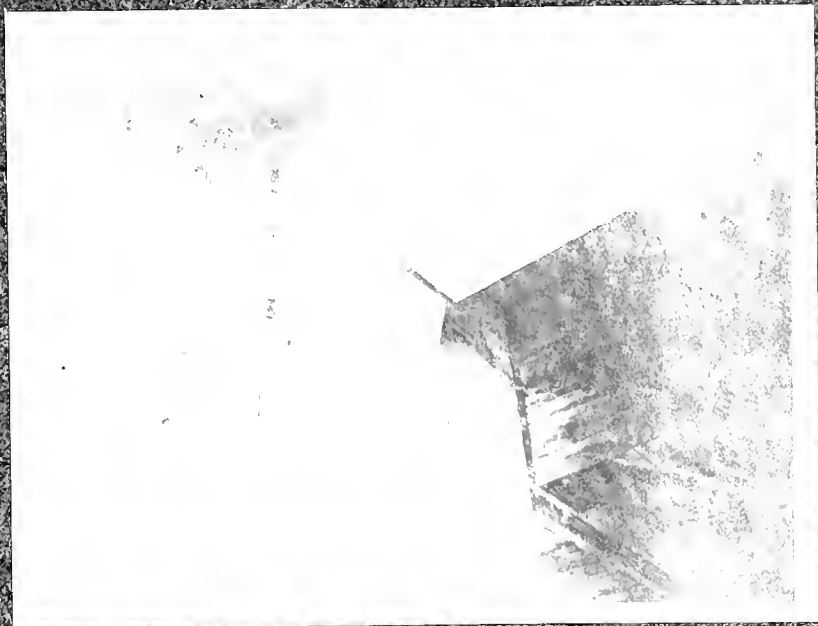
the work on 5 days, a very small percentage. Concrete was actually placed on 56 days. One accident due to the carelessness of a gang foreman in dropping a heavy block on his foot was the only one of consequence during the entire work.

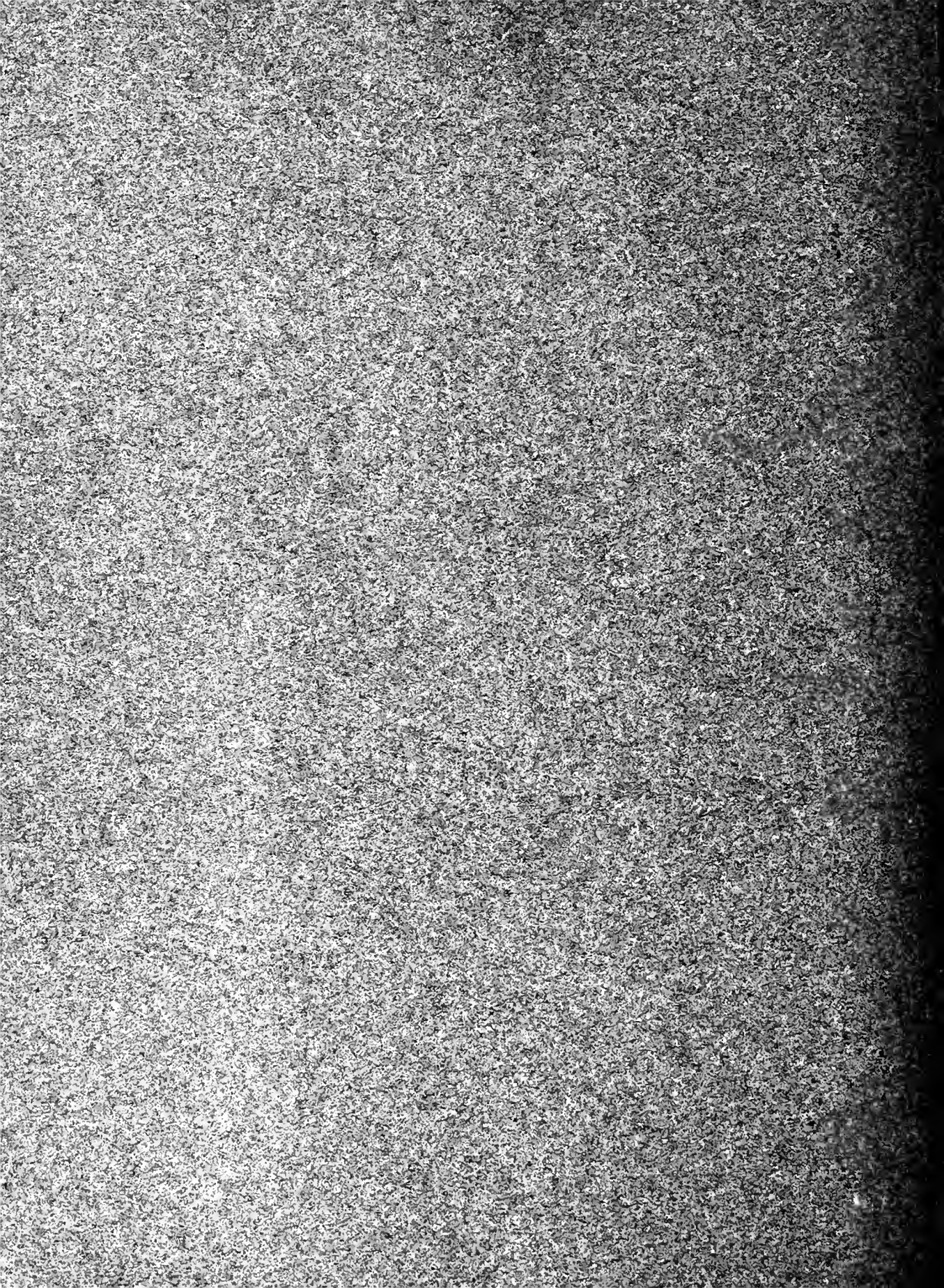
The present temporary trestle made it impossible to run the center line of the track so the line was off set and run in front of the piers. The piers were at an angle of 60 degrees with the center line and were lined in from points set on the old Inland Empire System bridge. Vibration and rough usage made it impossible to use the temporary trestle for permanent sights.

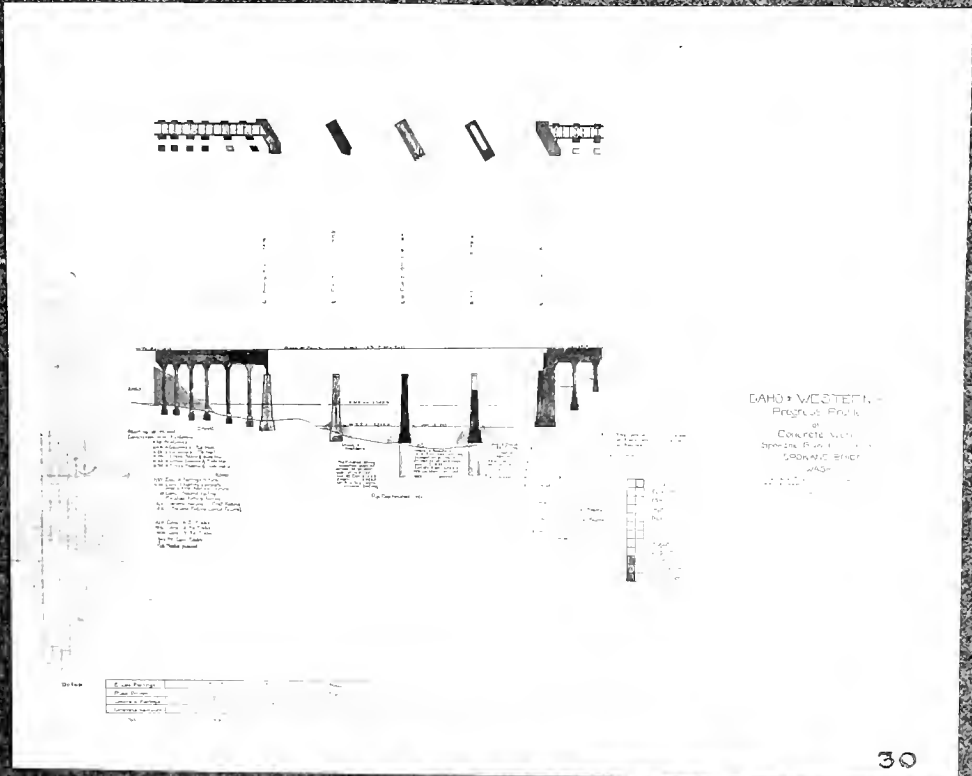
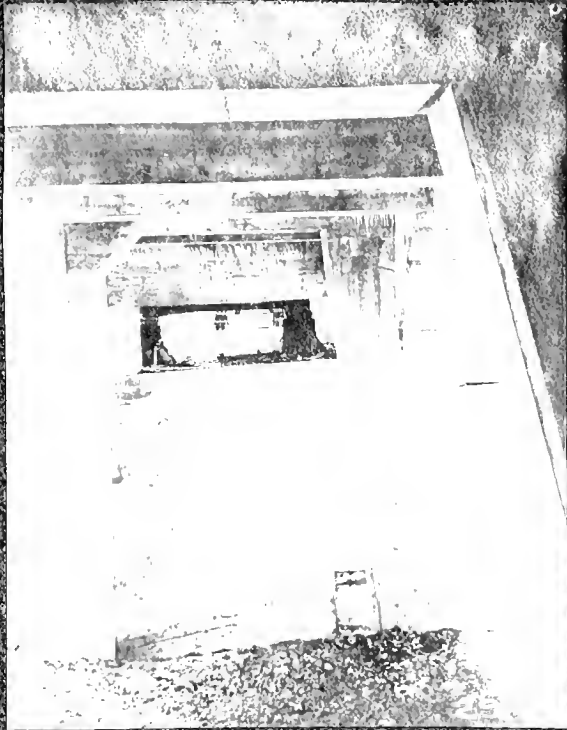
No forms were used in the bottom footings in any of the work. The footings of the piers were placed against the caissons and for all the abutment pedestals they were put in place in the excavation without form work.

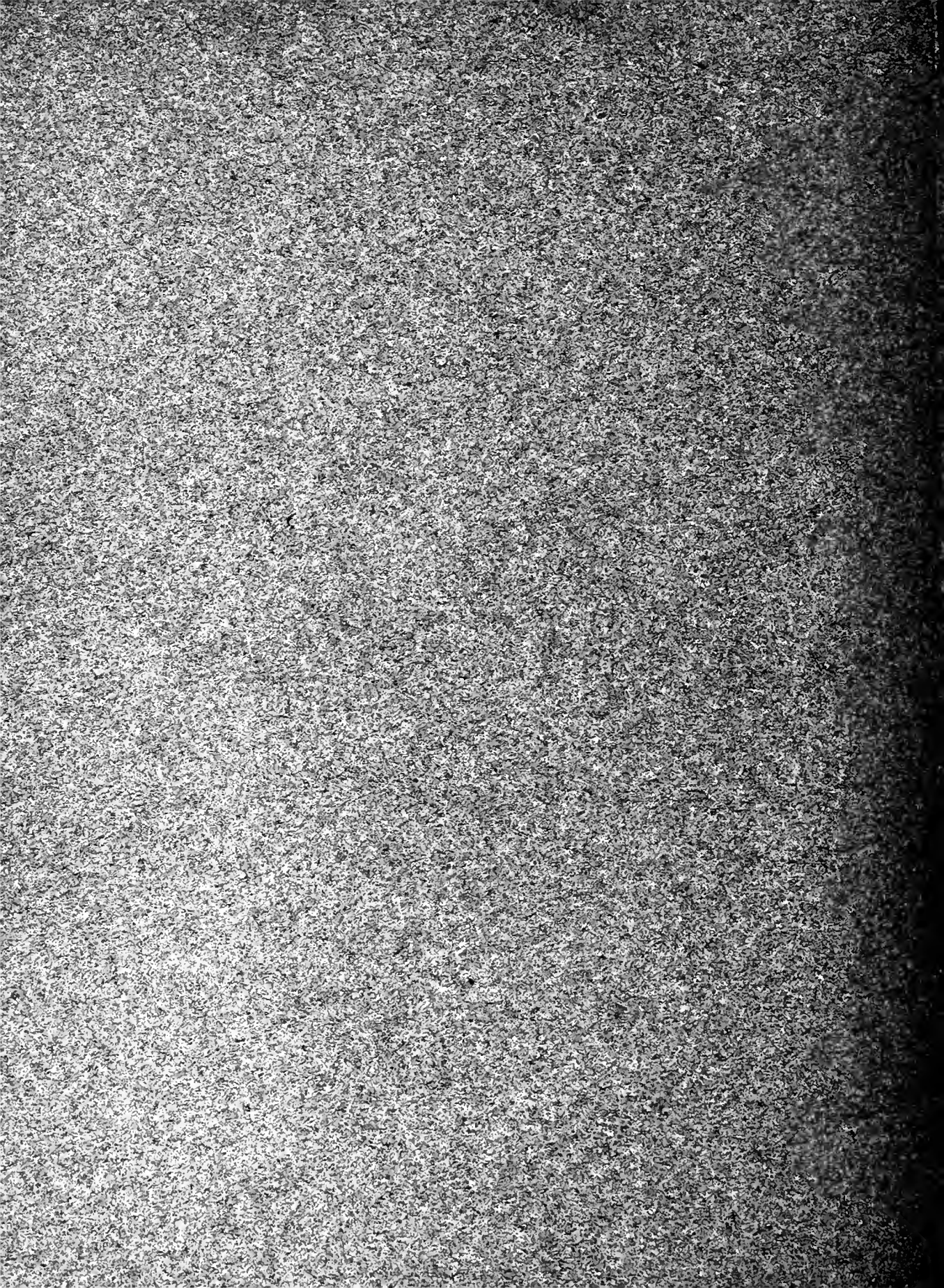
Upon the completion of the work full details of yardage, mixture, materials and all matters of importance during the construction and bearing on future work were recorded on blue prints and sent to the office of the Chief Engineer.

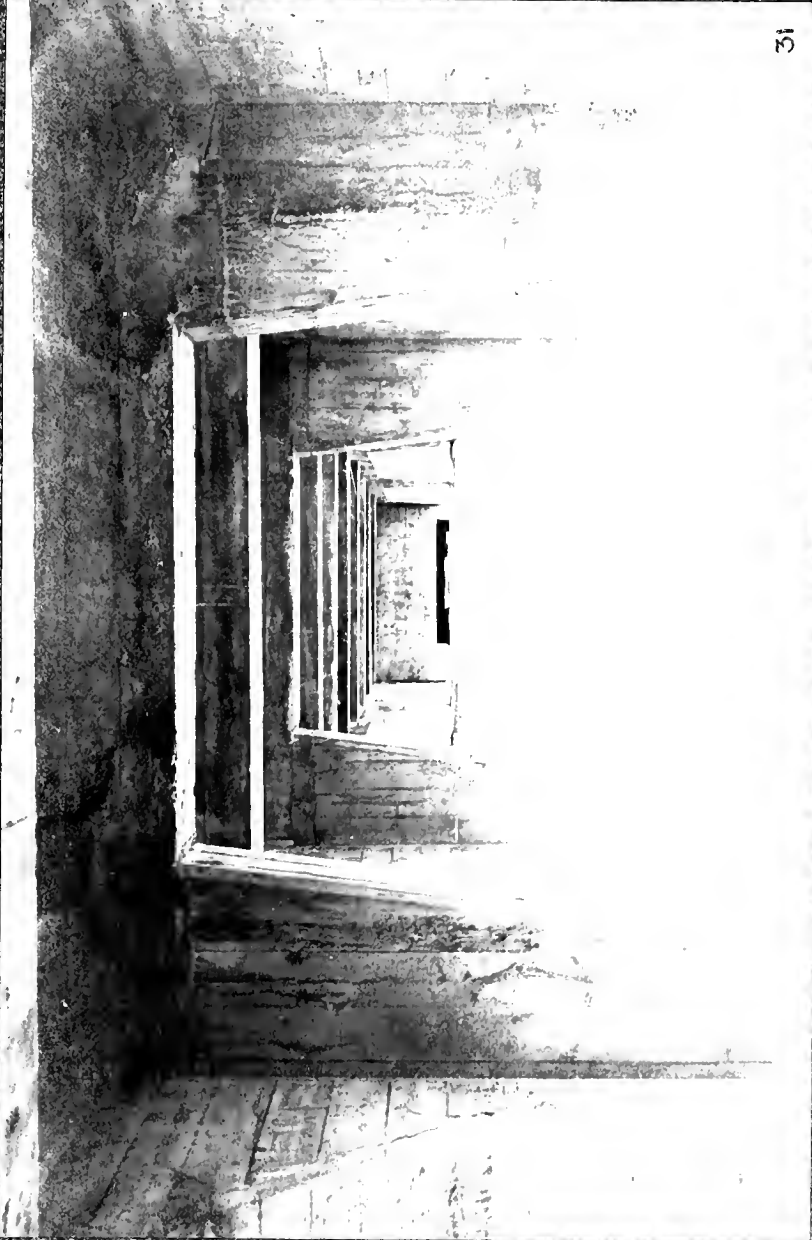
The plans were made in Chicago, under the direction of C. F. Loweth and the construction was handled under Division Engineer A. G. Holt, in Spokane. The writer



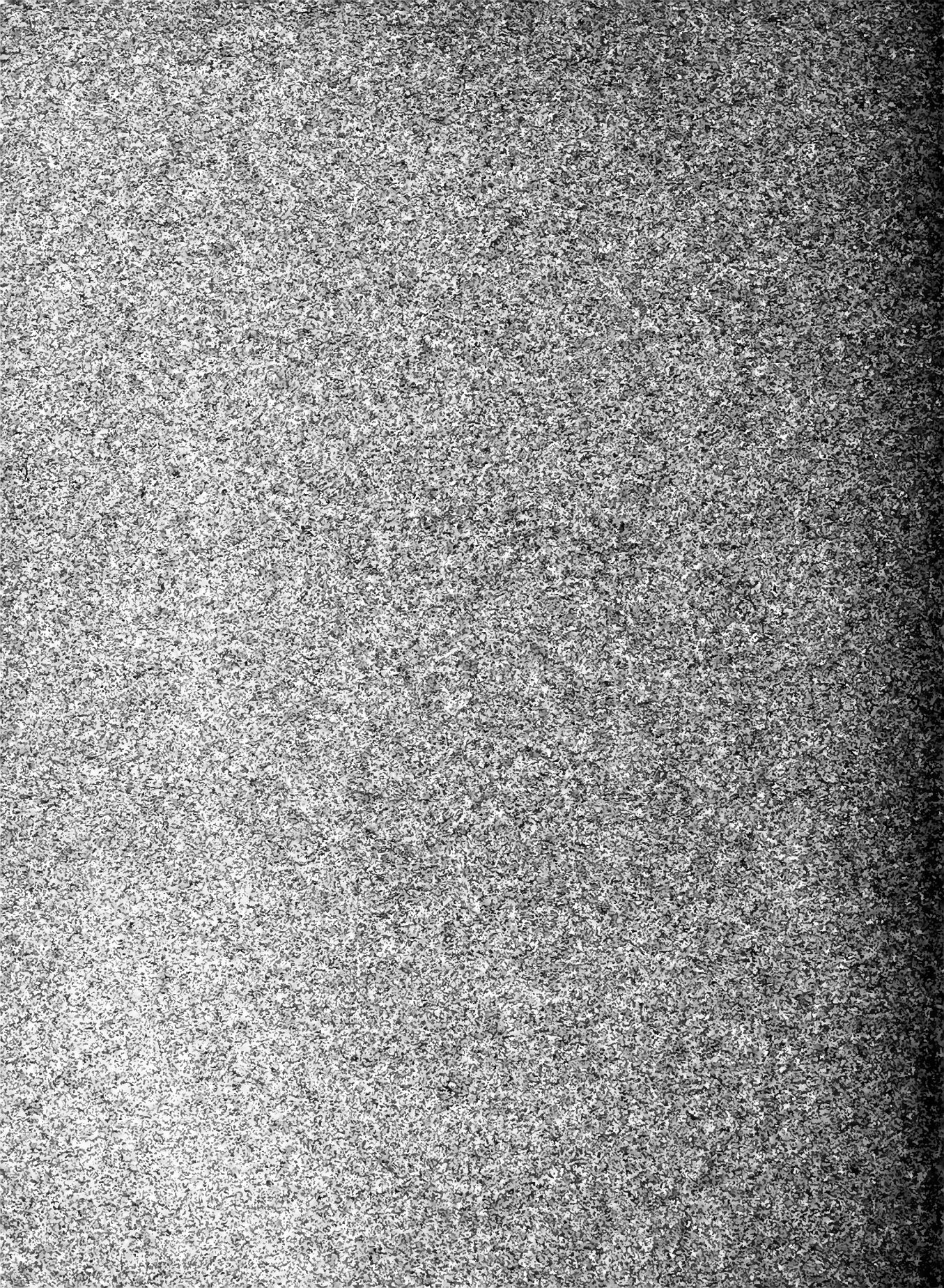








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was the engineer in charge of the work in the field.

For diplomatic reasons it is not deemed necessary to go into the details of the cost of the work, although the cost sheet is shown in the appendix.

Steel:- The steel work consists of four 80 foot girders, 3 of them 9' 6 1/2" deep, made by the railway company for this bridge and one 8' 5 1/2" deep made originally for a main line bridge, but used on this work to economize.

The shallow girder was originally a right angle girder and was delivered as such. The necessary work to change it to a 60 degree skew, being done in the yard at the bridge. This girder was placed at the east end.

The method of erecting the steel will be briefly described. The equipment consisted of two 30 ton derrick cars, with 50 ft. boom, one compressor car, tool cars and the necessary boarding cars for a crew of 30 men, only 12 of these being steel workers.

Girders were brought out on a temporary trestle, on two flat cars with a derrick car on each end. They were then lowered to rest on the second track portion of the piers and a temporary bent at the abutments.

The bents of the temporary trestle were then pukled out down to the caps on the piles. The bed plates were

1. The first step is to identify the problem.

2. The second step is to analyze the problem.

3. The third step is to generate possible solutions.

4. The fourth step is to evaluate the solutions.

5. The fifth step is to select the best solution.

6. The sixth step is to implement the solution.

7. The seventh step is to monitor the results.

8. The eighth step is to evaluate the process.

9. The ninth step is to document the process.

10. The tenth step is to review the process.

11. The eleventh step is to improve the process.

12. The twelfth step is to standardize the process.

13. The thirteenth step is to train the staff.

14. The fourteenth step is to measure the results.

15. The fifteenth step is to report the results.

16. The sixteenth step is to communicate the results.

17. The seventeenth step is to celebrate the success.

18. The eighteenth step is to share the success.

19. The nineteenth step is to learn from the success.

20. The twentieth step is to apply the lessons learned.

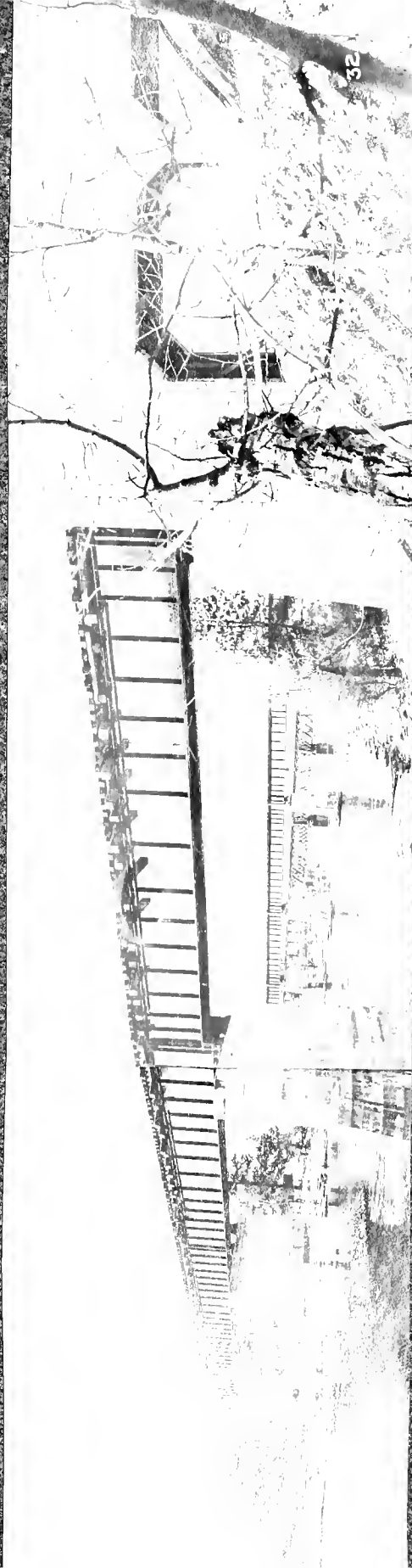
21. The twenty-first step is to continue to improve.

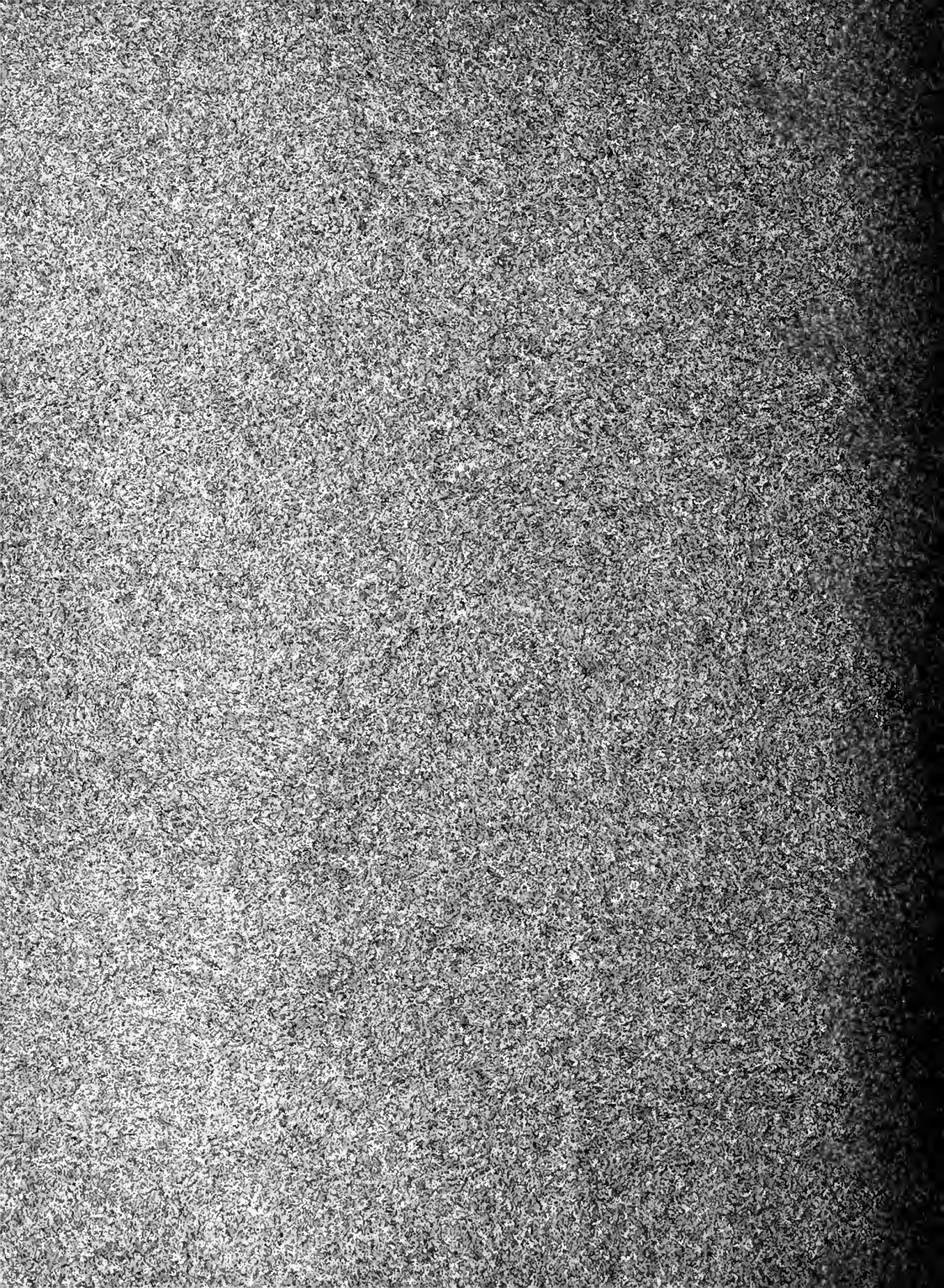
22. The twenty-second step is to stay focused.

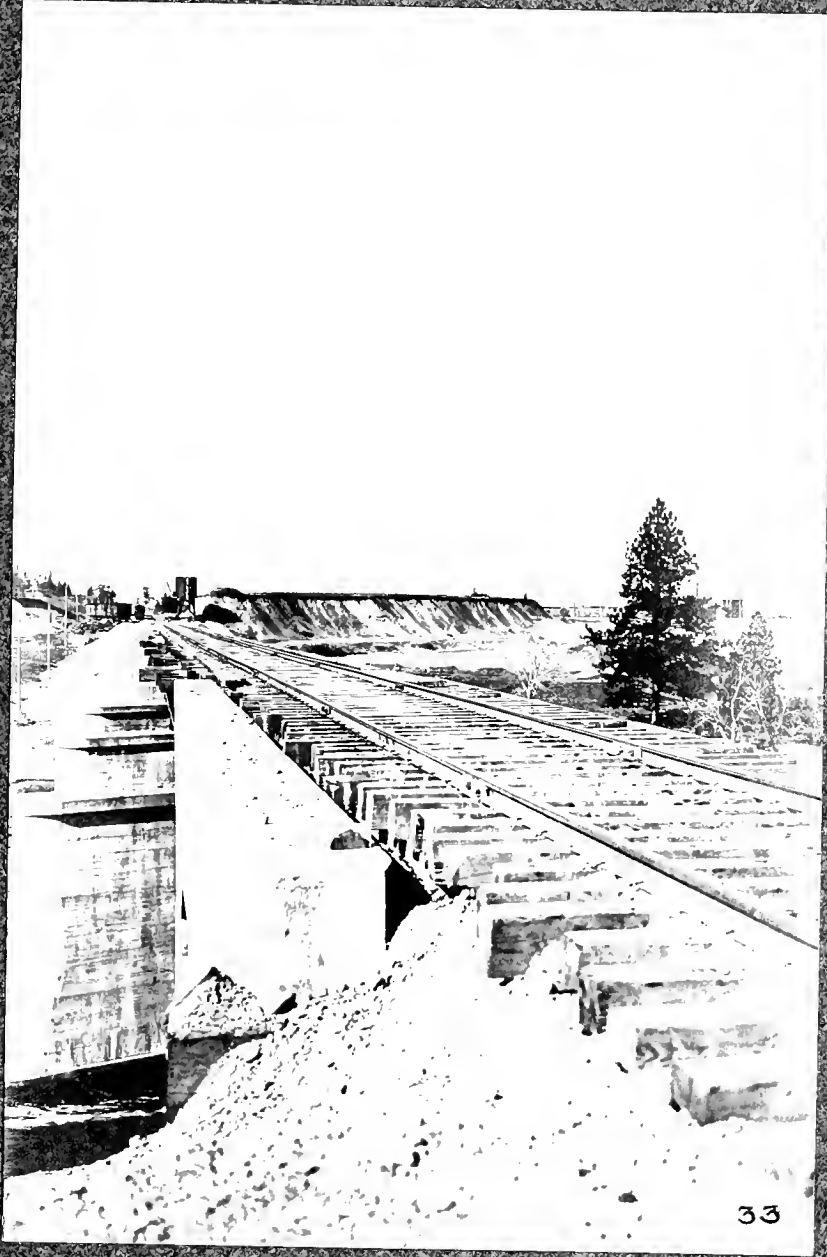
23. The twenty-third step is to stay motivated.

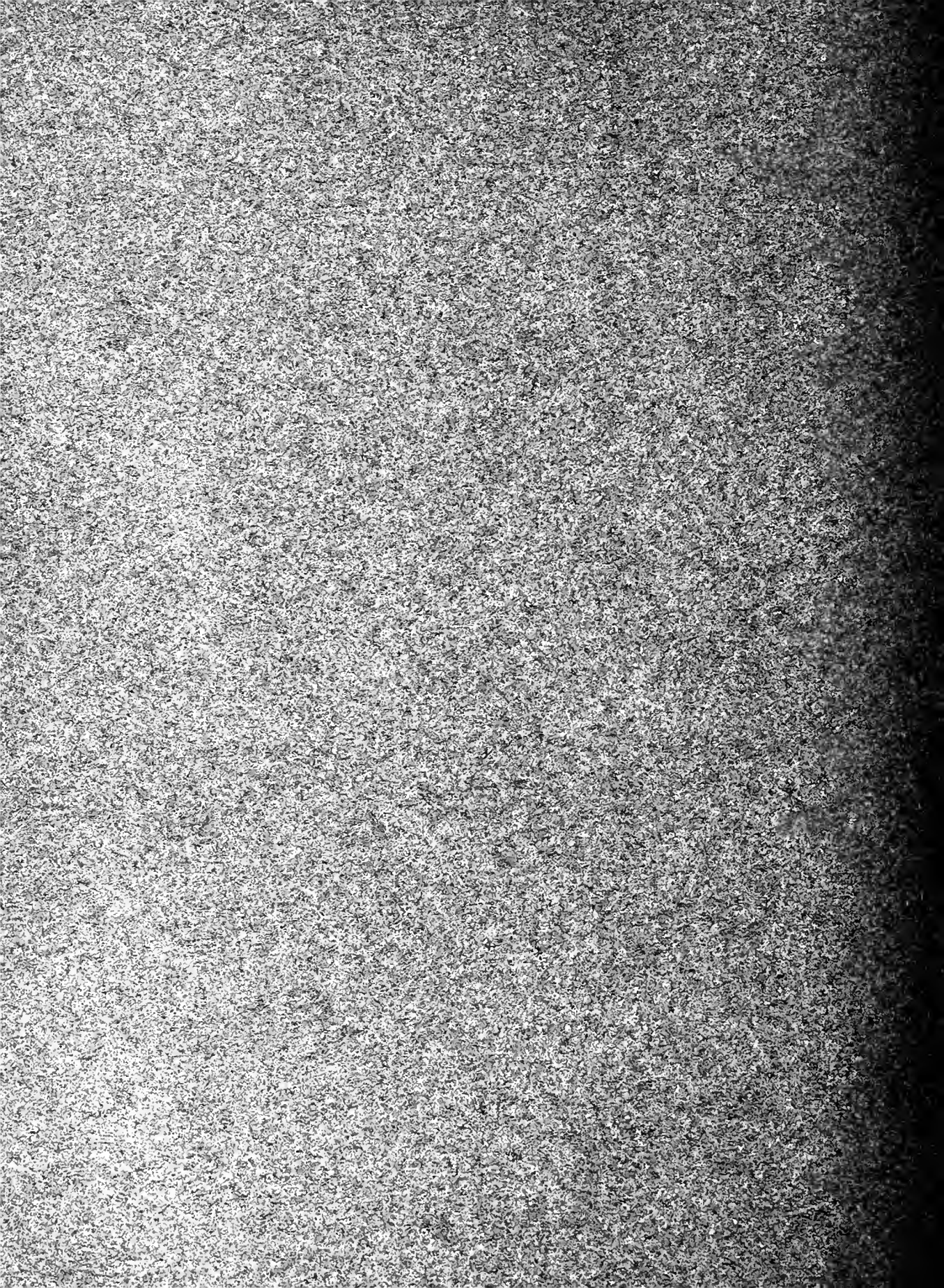
24. The twenty-fourth step is to stay resilient.

25. The twenty-fifth step is to stay positive.

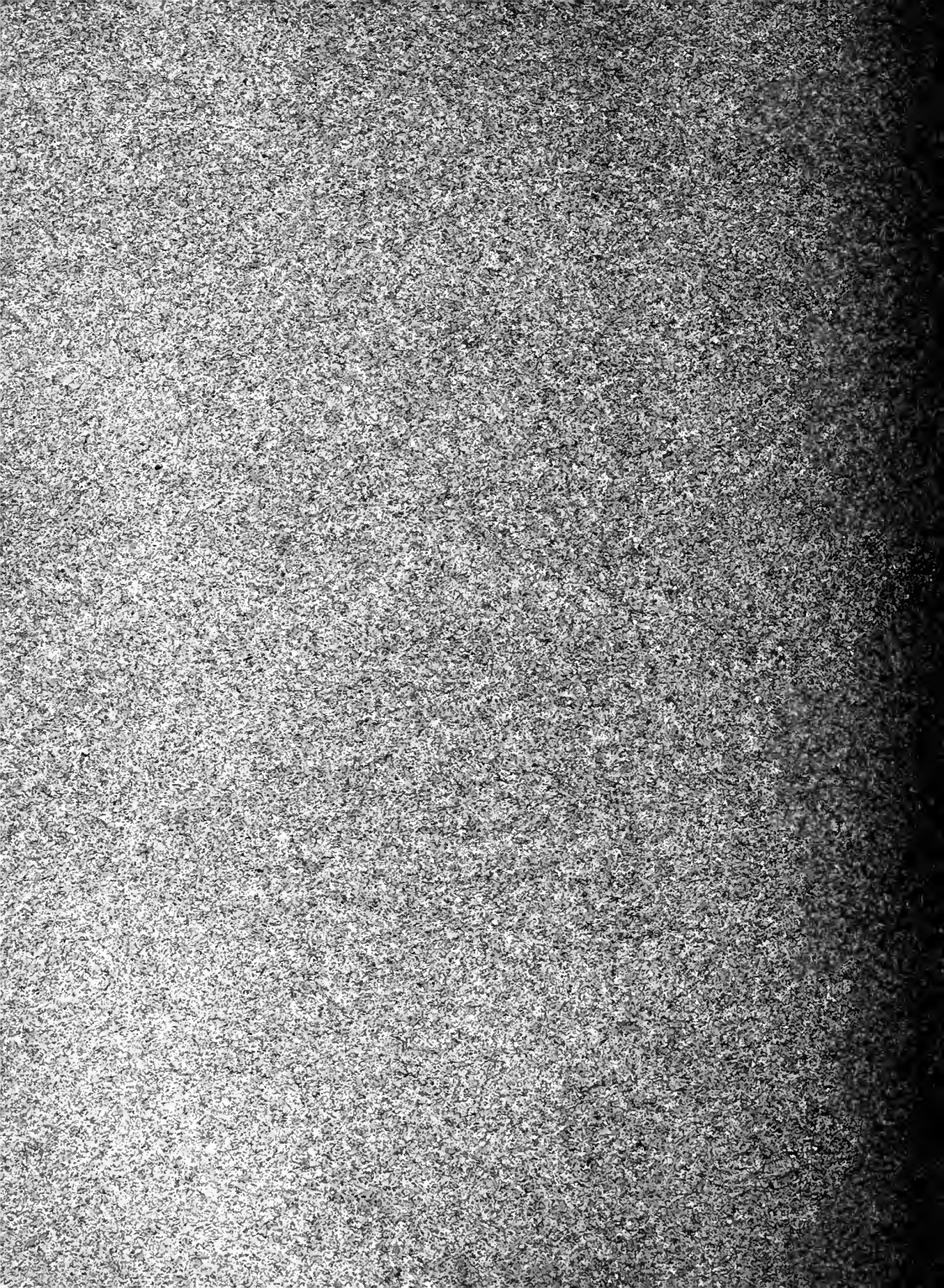




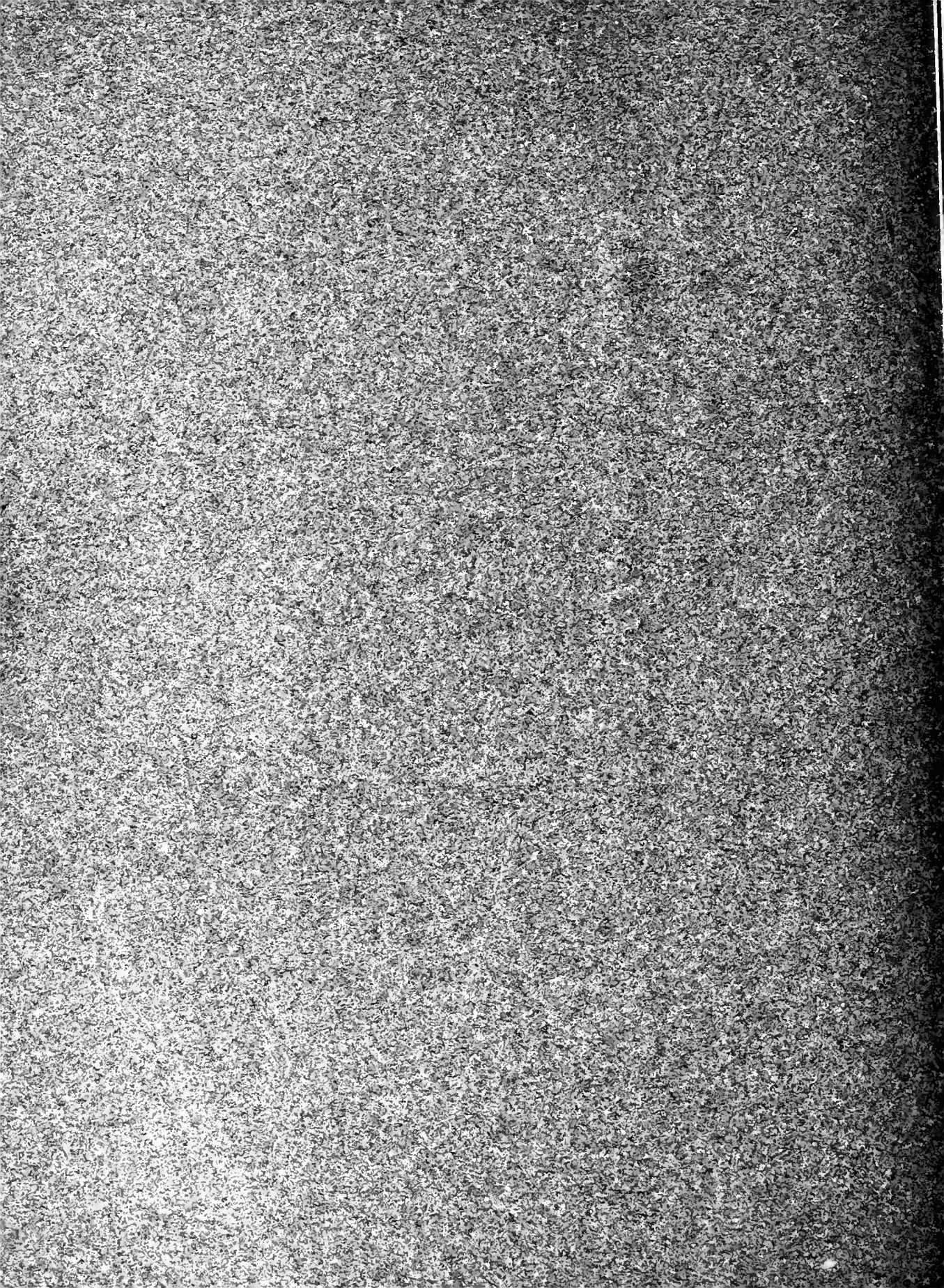












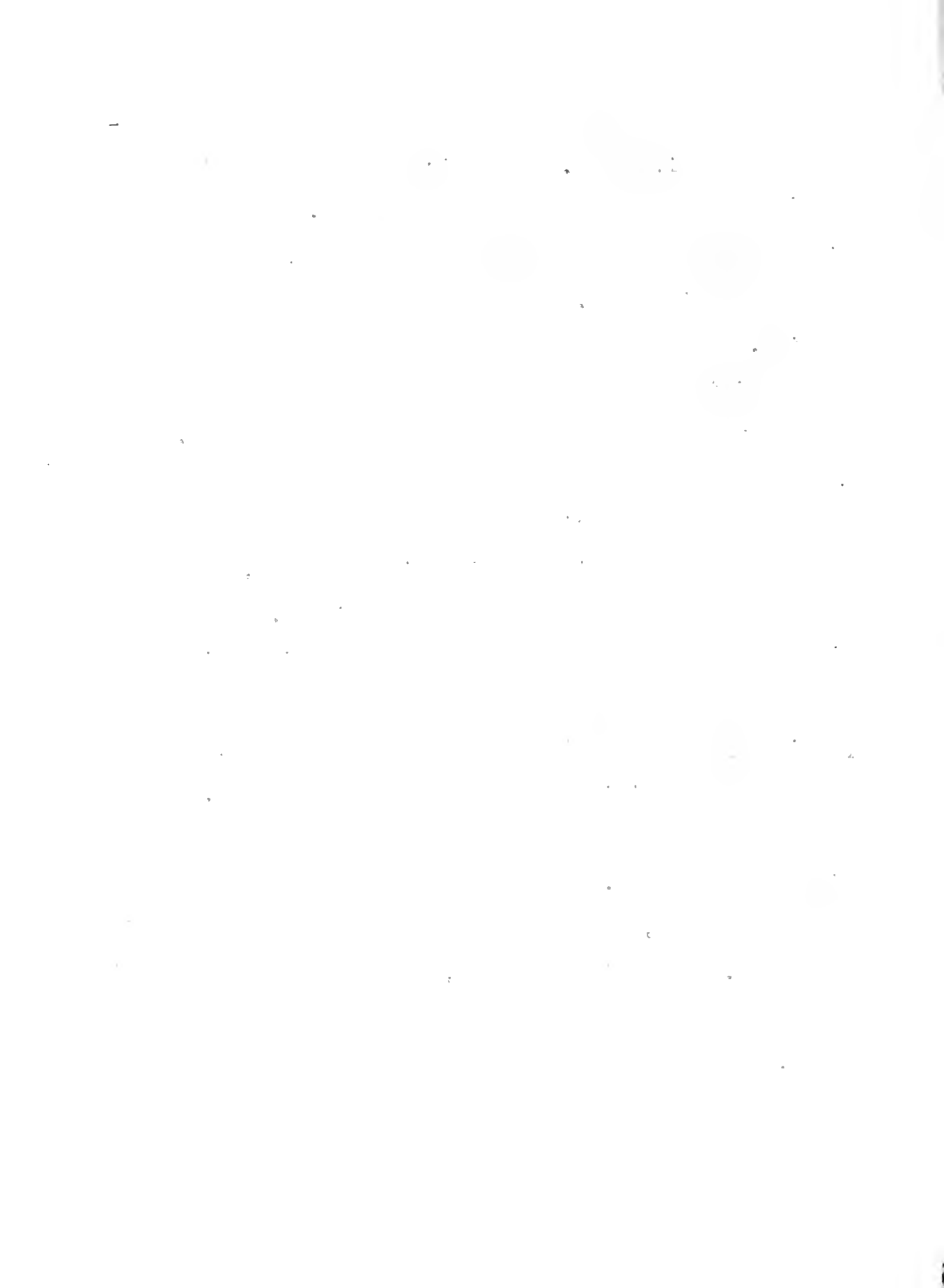
set on sheet lead over the places marked out on the concrete to receive them. The girders were then picked up with derrick at each end and swung into place. A temporary timber deck was then put on the concrete slabs for the steel not being made. This operation was repeated at each opening.

The piling of the temporary trestle was then pulled or broken by the derricks and the work was completed.

When all the steel was placed the riveting was done and the holes bored in the concrete for the anchor bolts. These bolts were slit and driven in on wedges, a neat cement being poured around them as a filler.

The slabs on the approaches were set in a like manner. The trestle was pulled out and the slabs which had been previously piled within reach of the derrick cars were picked up and put in place on a 1" bed of mortar. The deck was then replaced and the cracks between slabs filled with mortar. The ballast on the slab deck will be of crushed rock, being drained through holes provided in the slabs. This gives a solid, noiseless floor with little maintenance cost as compared to the old type of bridge decks.

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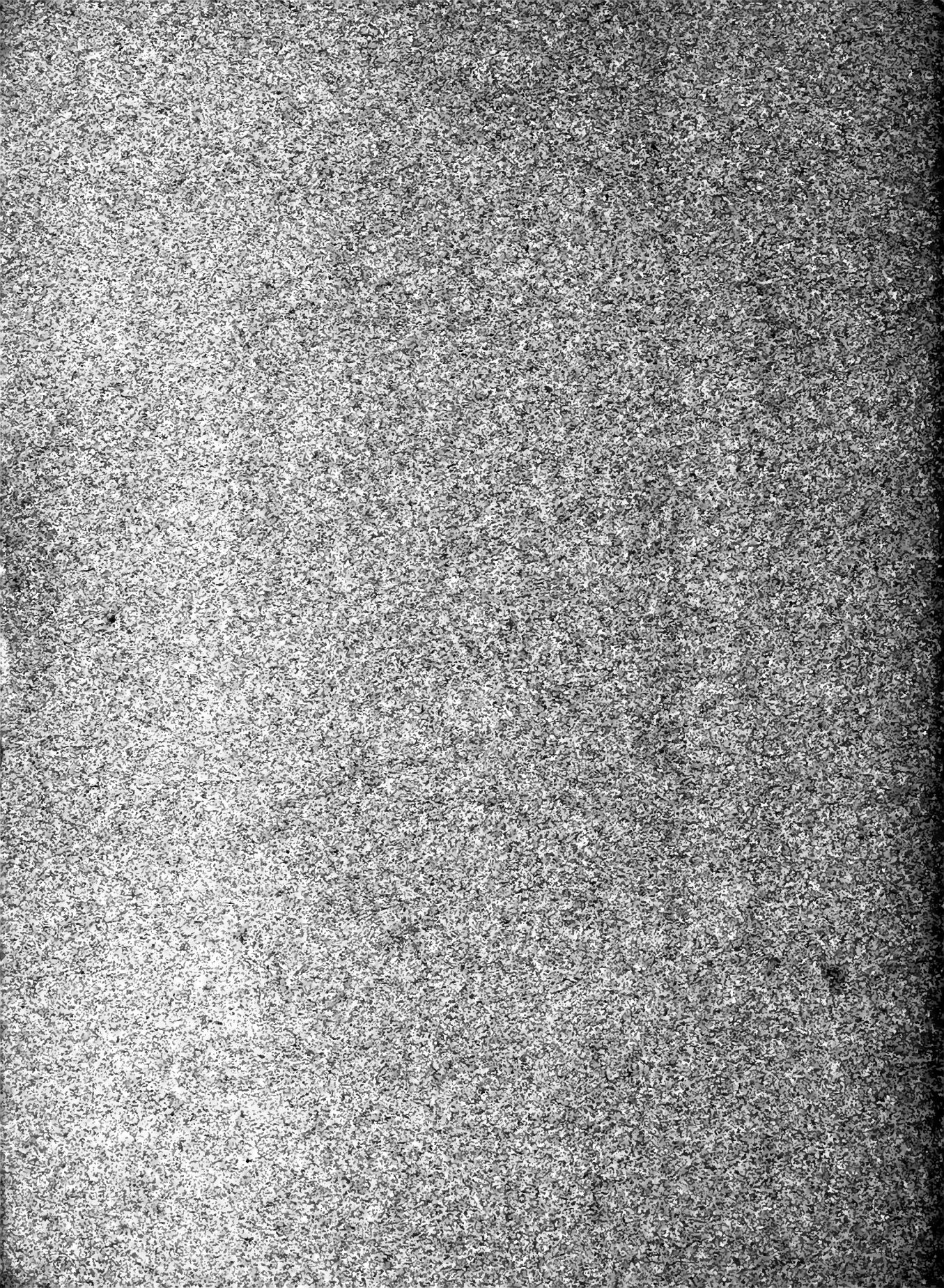
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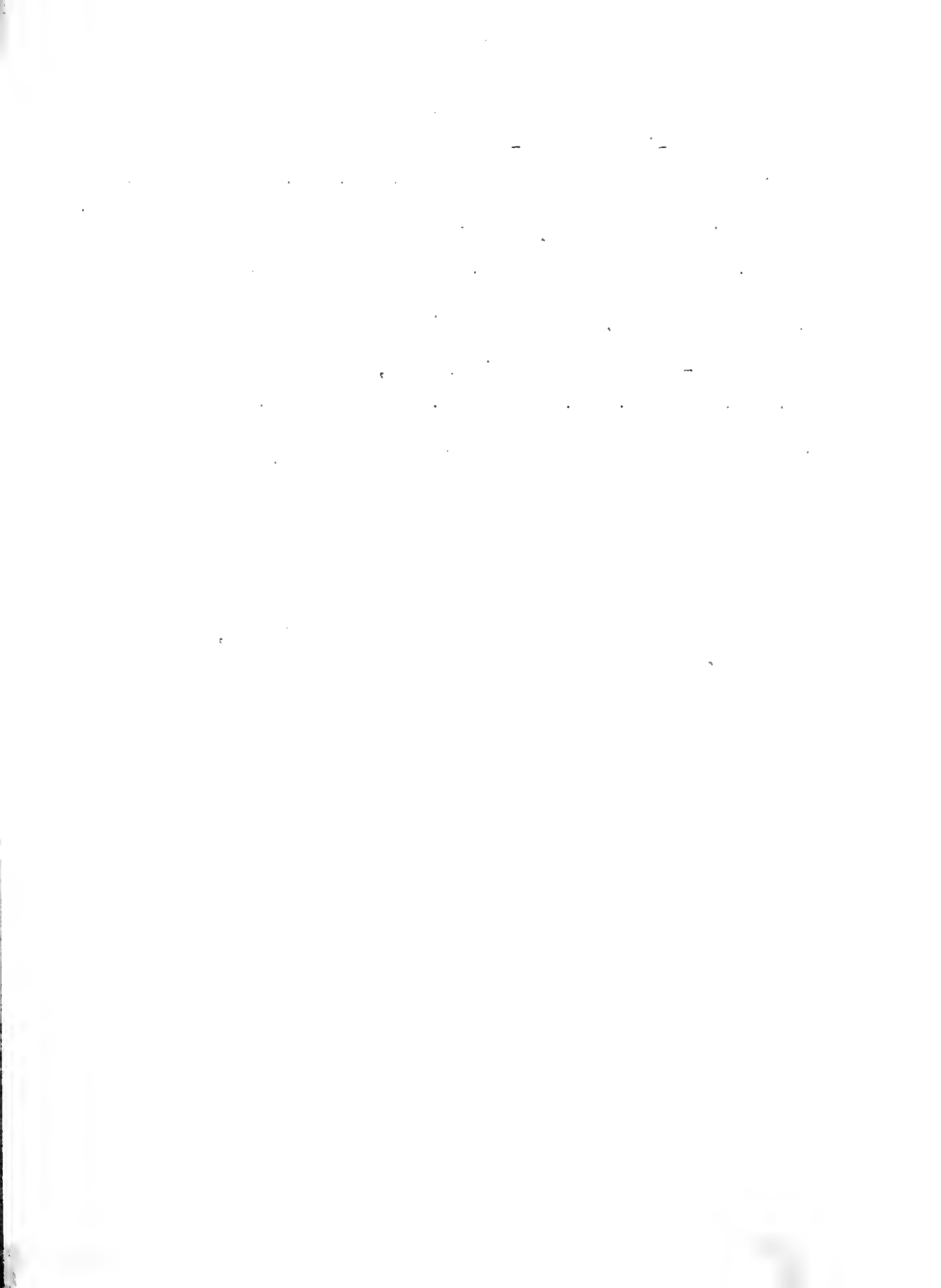
Appendix-Cost Data:- The cost of all the work was carefully recorded and separate distribution made of it for material and labor. This was tabulated upon the completion of the work and is shown on the blue print of the cost sheet. A full set of the working plans for the sub-structure are included, as printed from the tracing on file in the office of the Bridge & Building Department of the railway company.

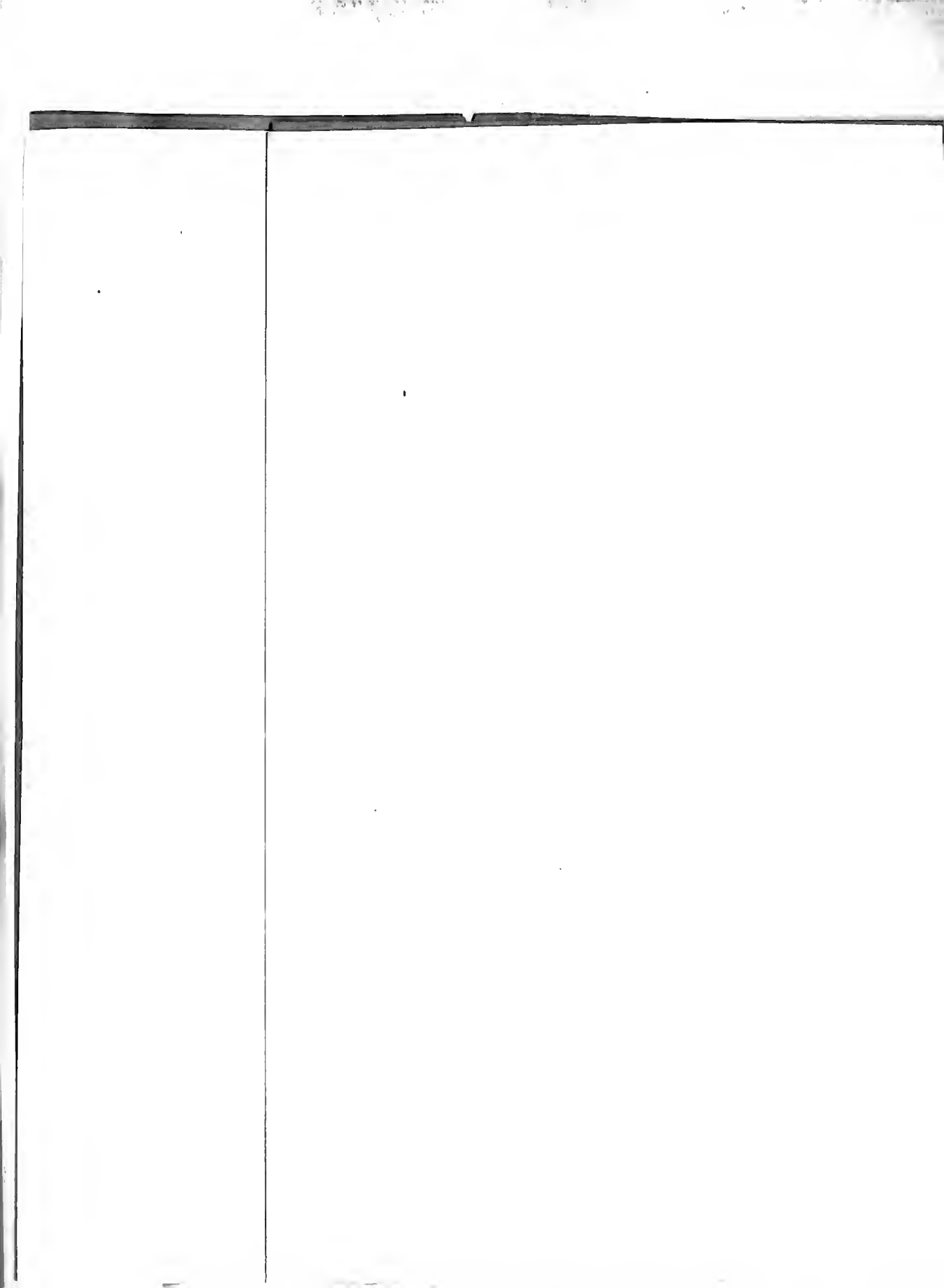
Respectfully submitted,

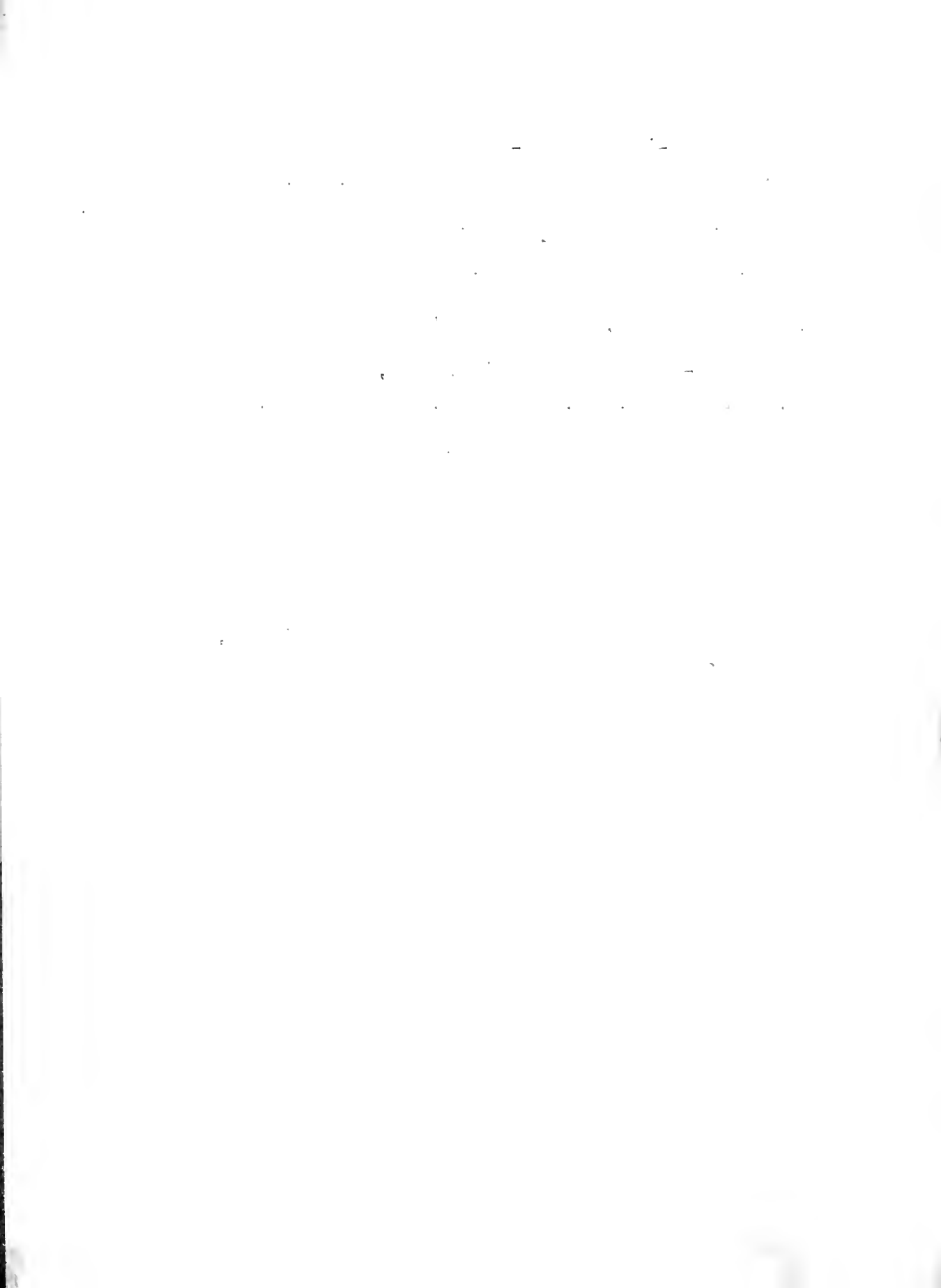
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Spokane
Wash.

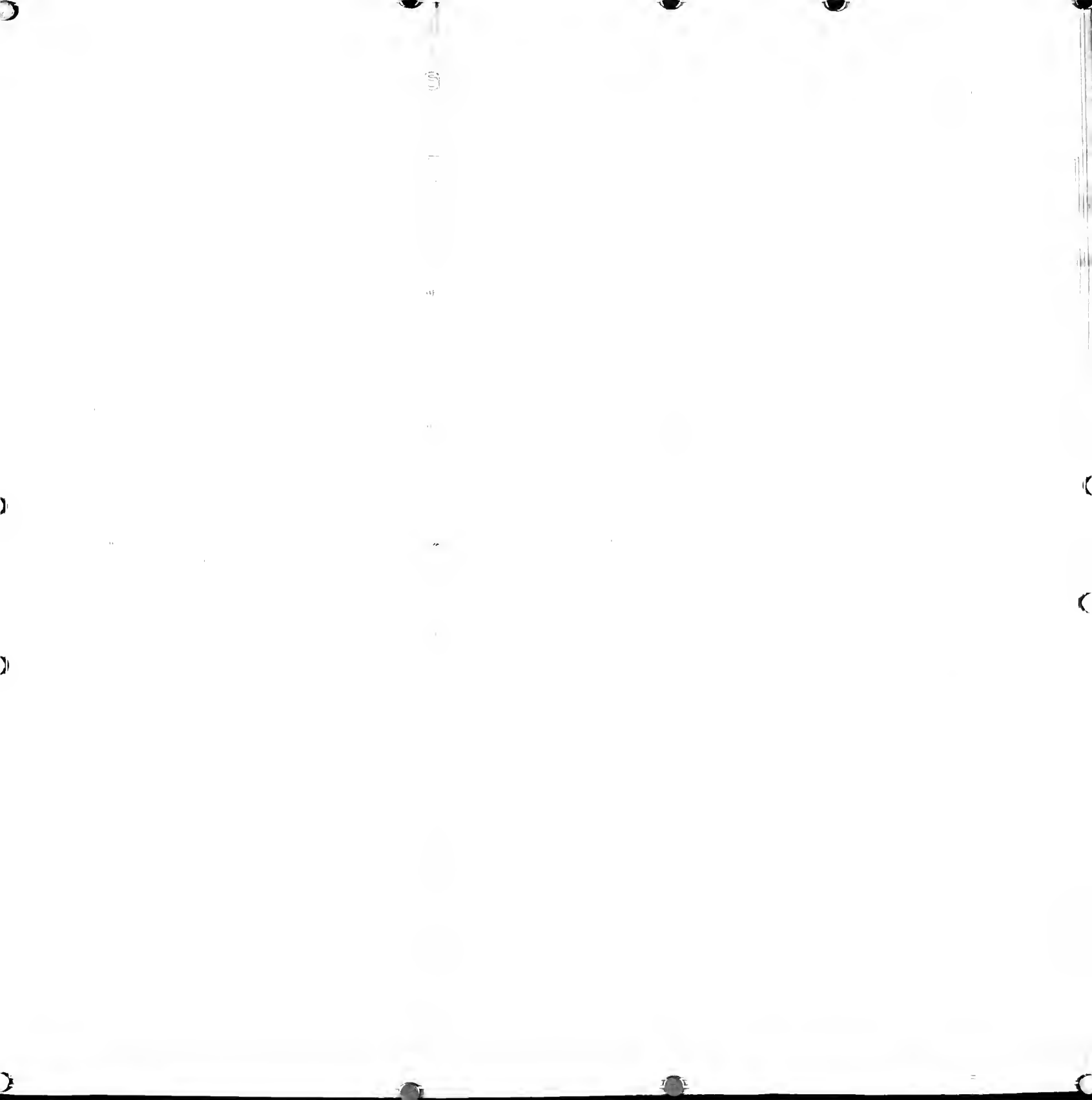
Yours Truly
C. V. Smith



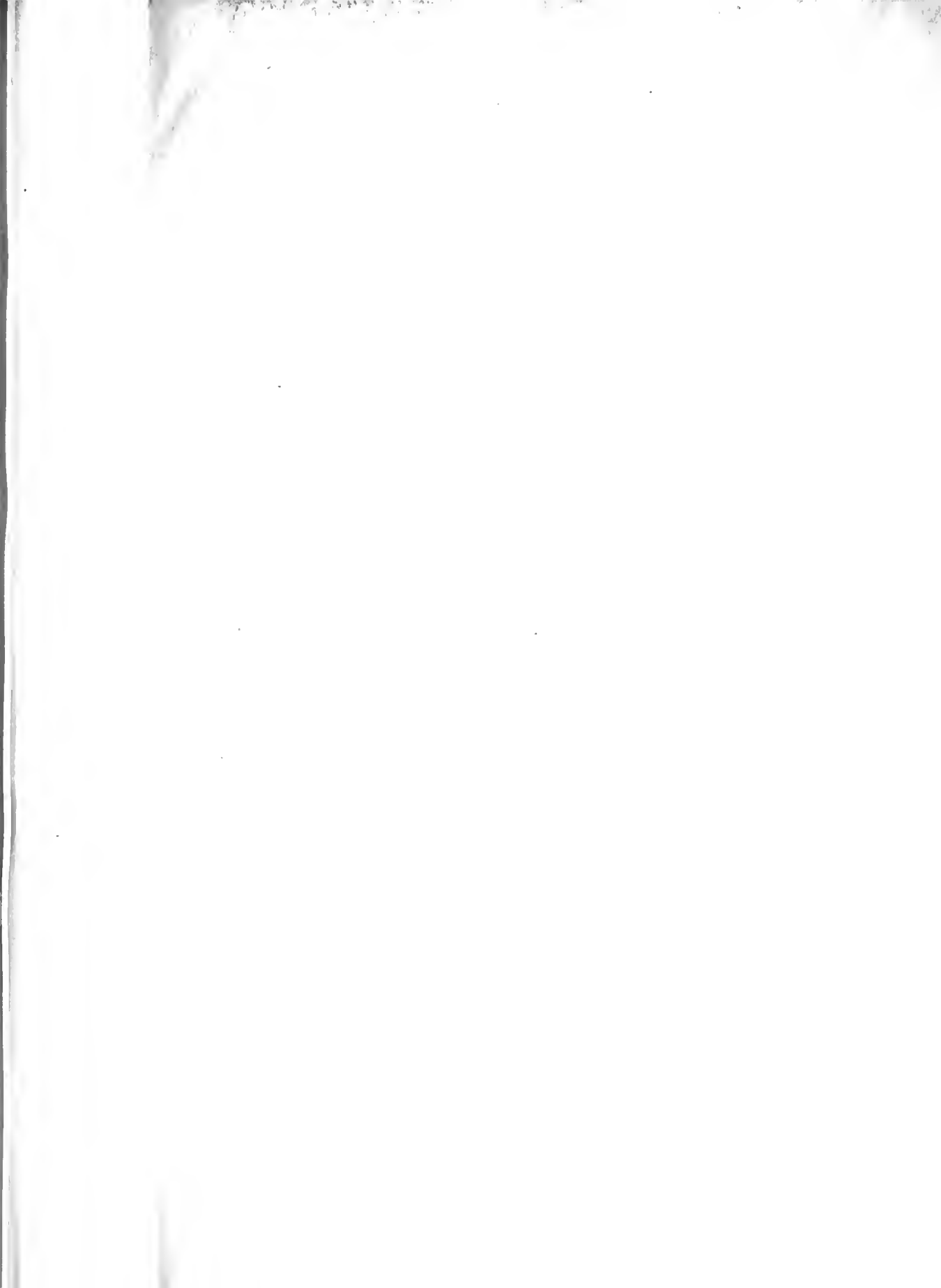










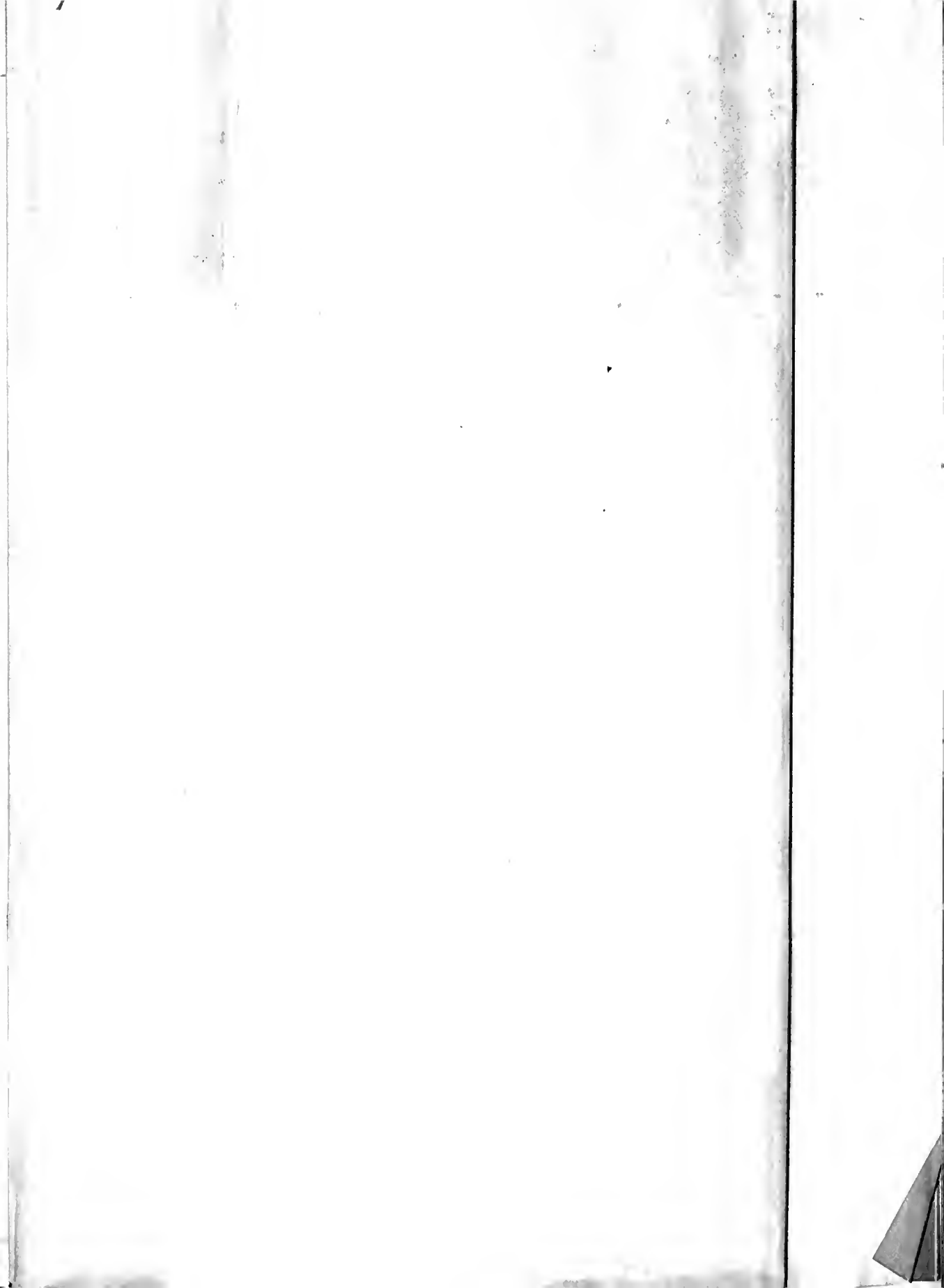


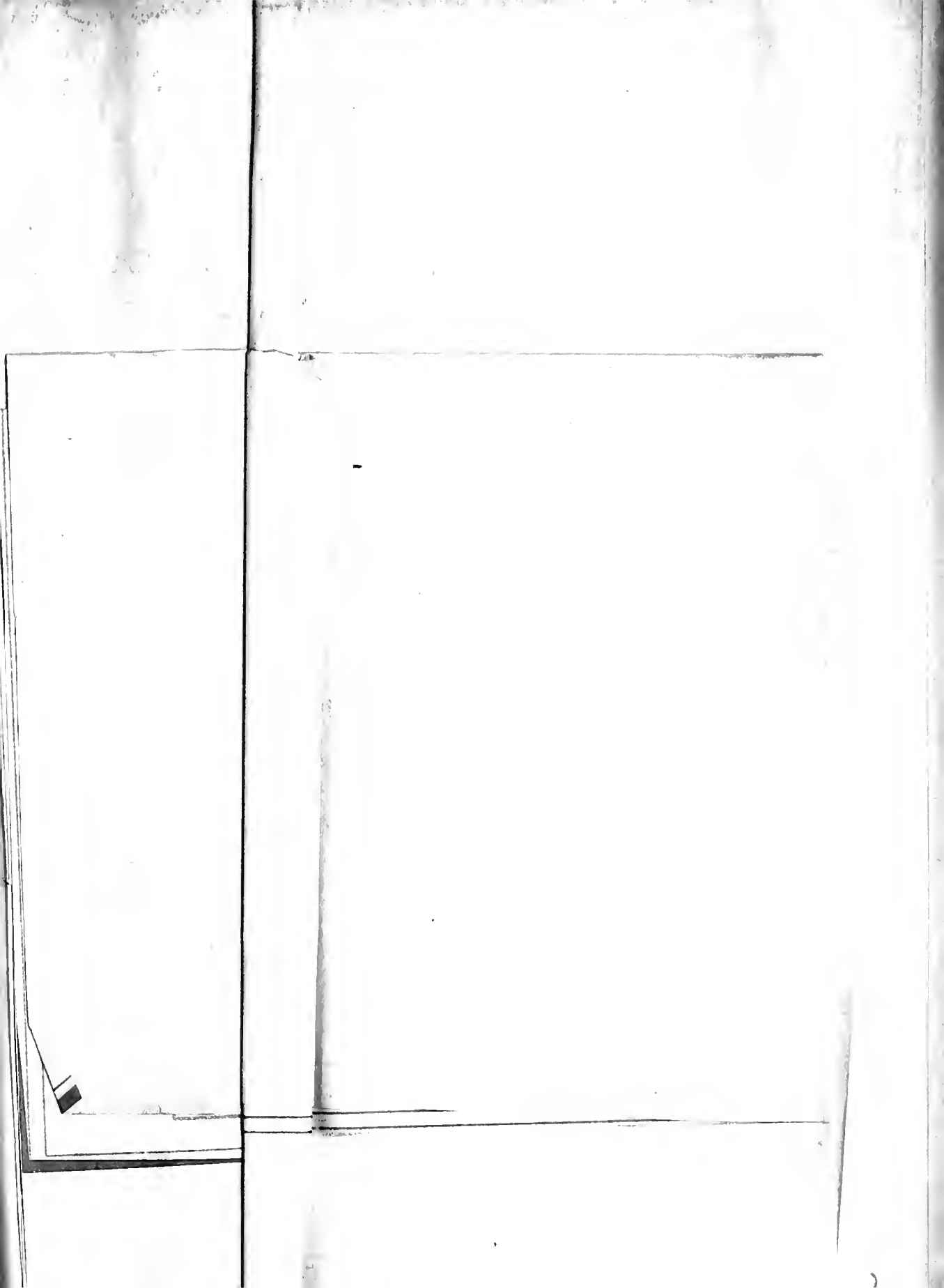


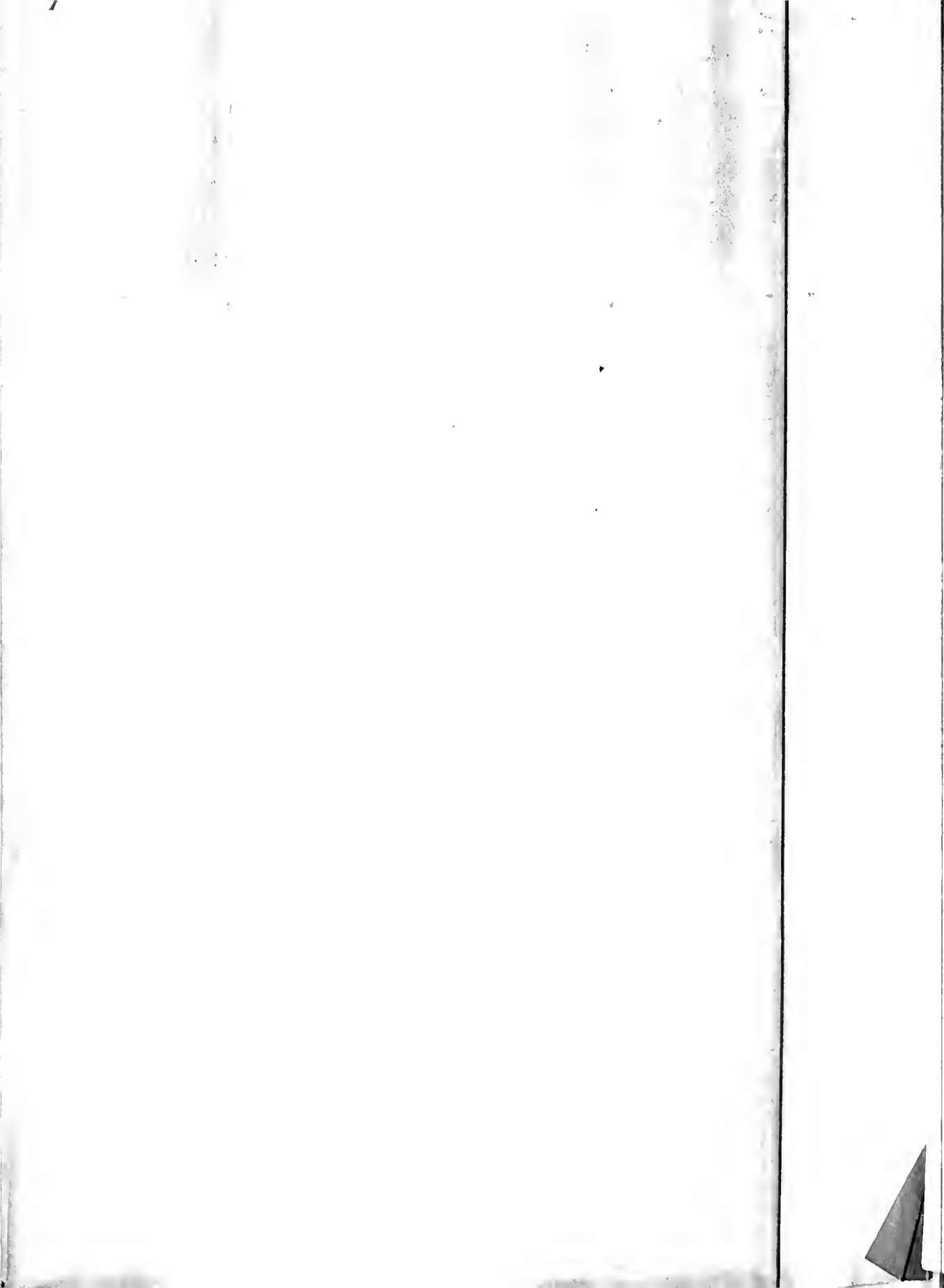


This drawing is a floor plan of a building, showing the layout of rooms, corridors, and structural elements. It includes numerous annotations and dimensions. The drawing is a technical drawing, likely a floor plan, showing the layout of a large building. It includes numerous rooms, corridors, and structural elements like columns and beams. The drawing is annotated with various notes and dimensions.

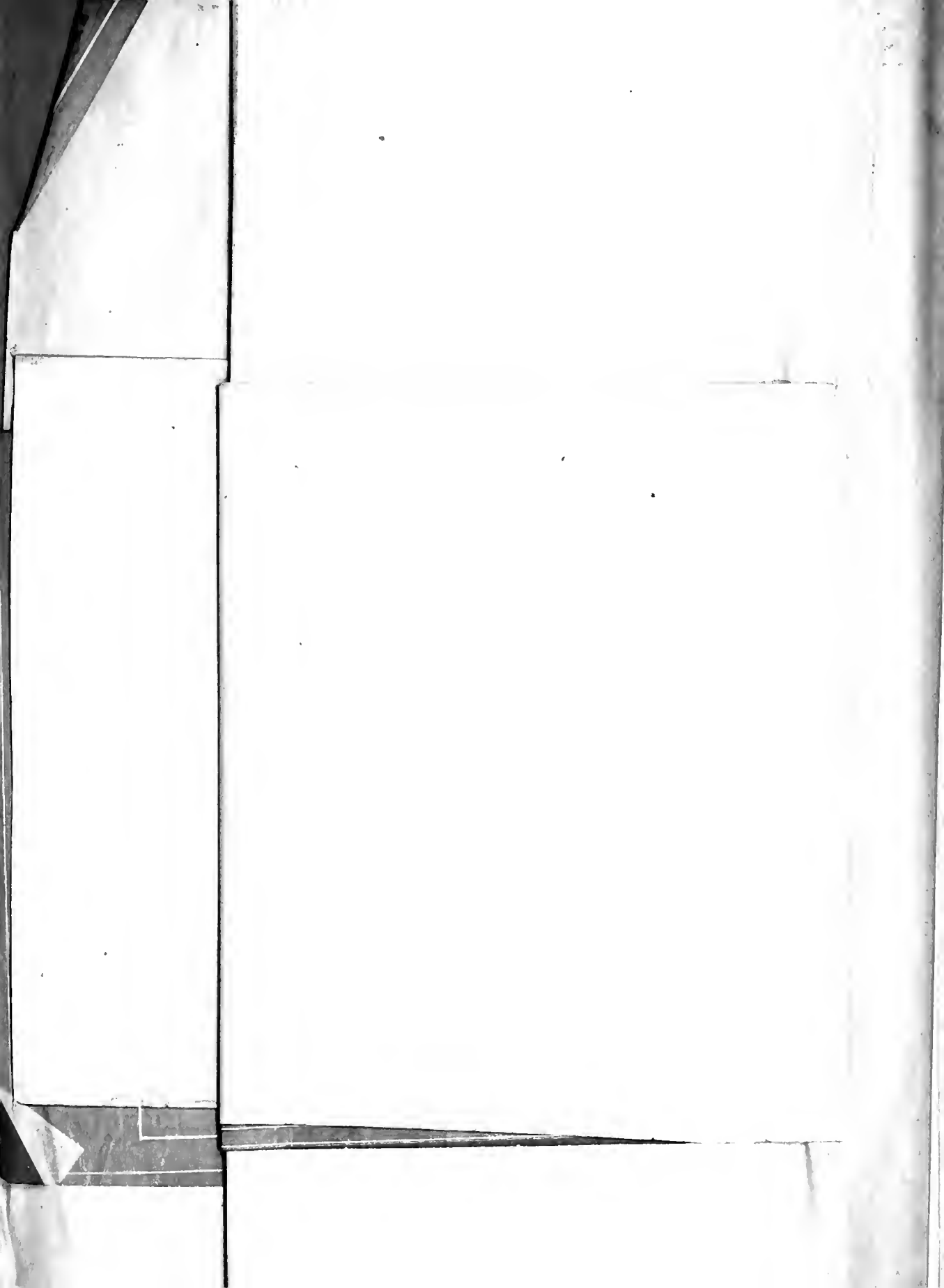
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 SHEET NO. 1
 PROJECT NO. 1000
 DATE: 10/10/1910
 DRAWN BY: J. B. B.

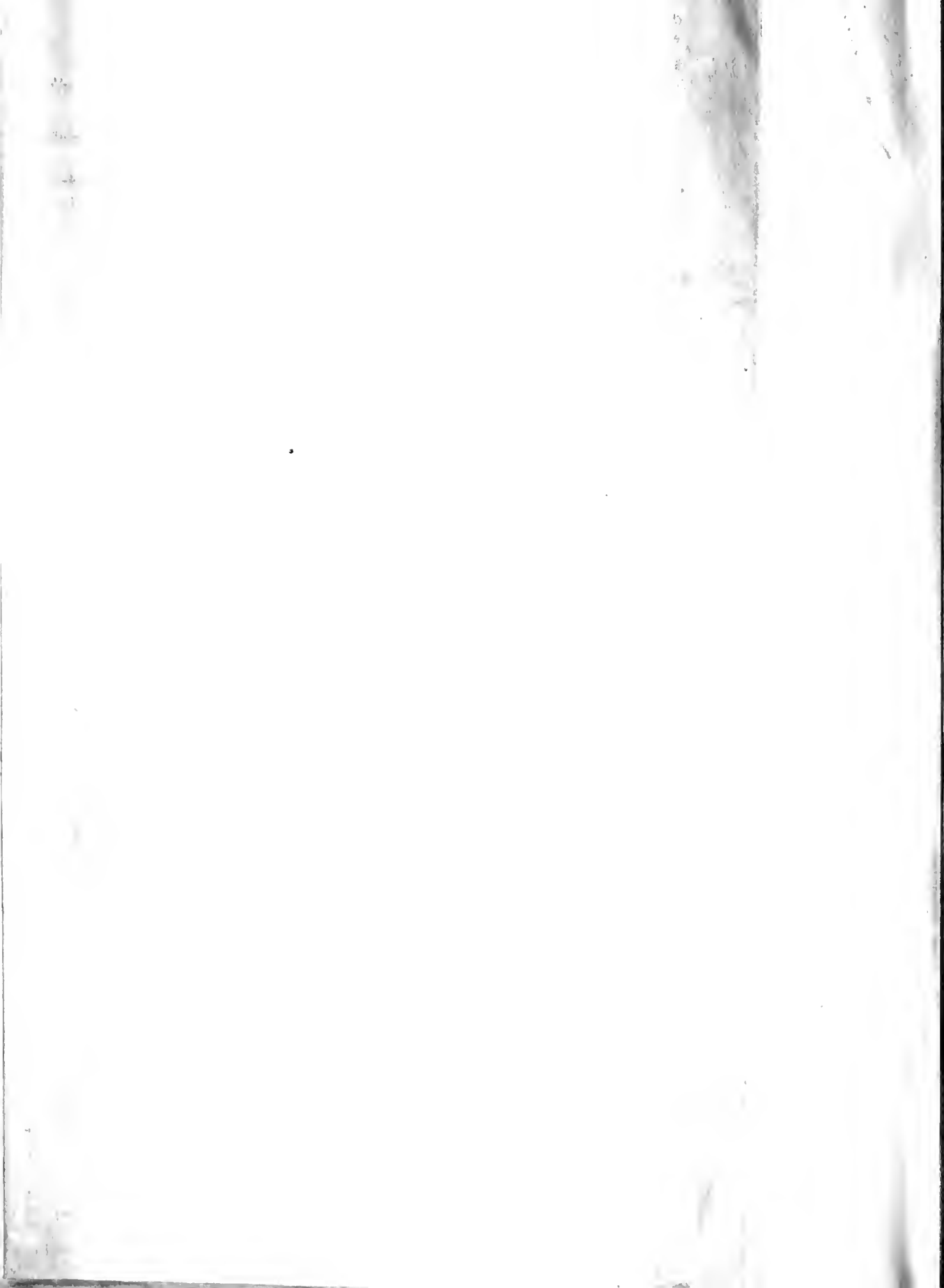


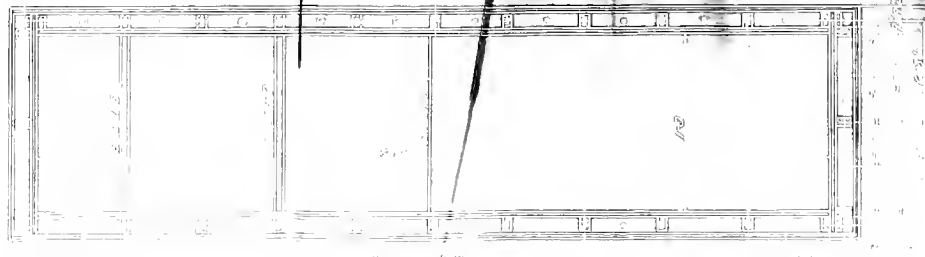




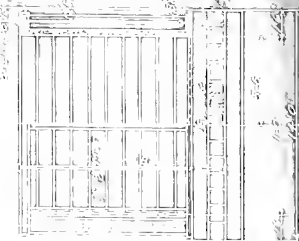






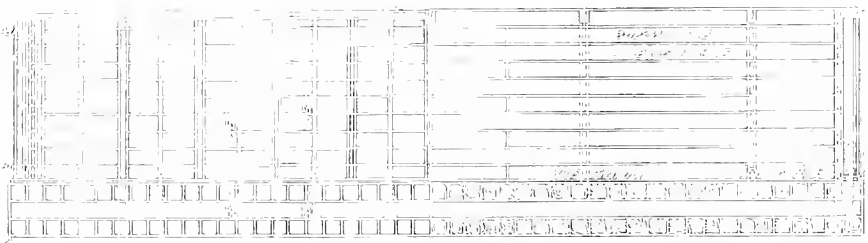


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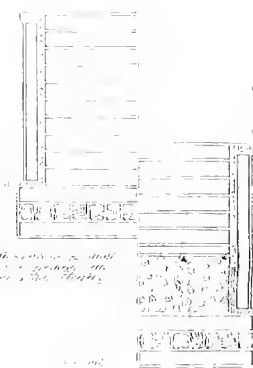


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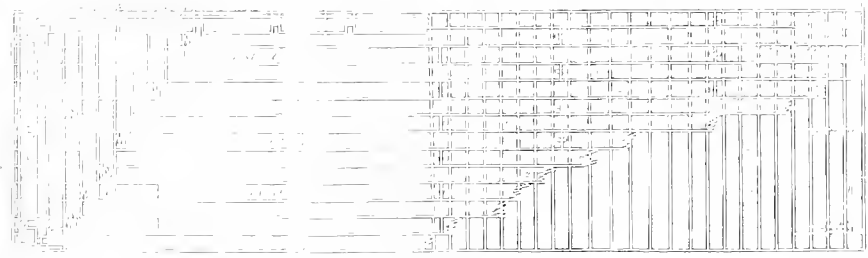


HALF SECTION



HALF SECTION

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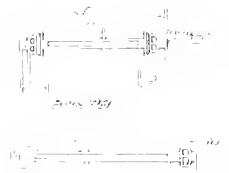


HALF SECTION

Handwritten notes in cursive script, likely providing technical specifications or construction details for the building. The text is dense and difficult to read due to the cursive style.



Detail of Window or Door

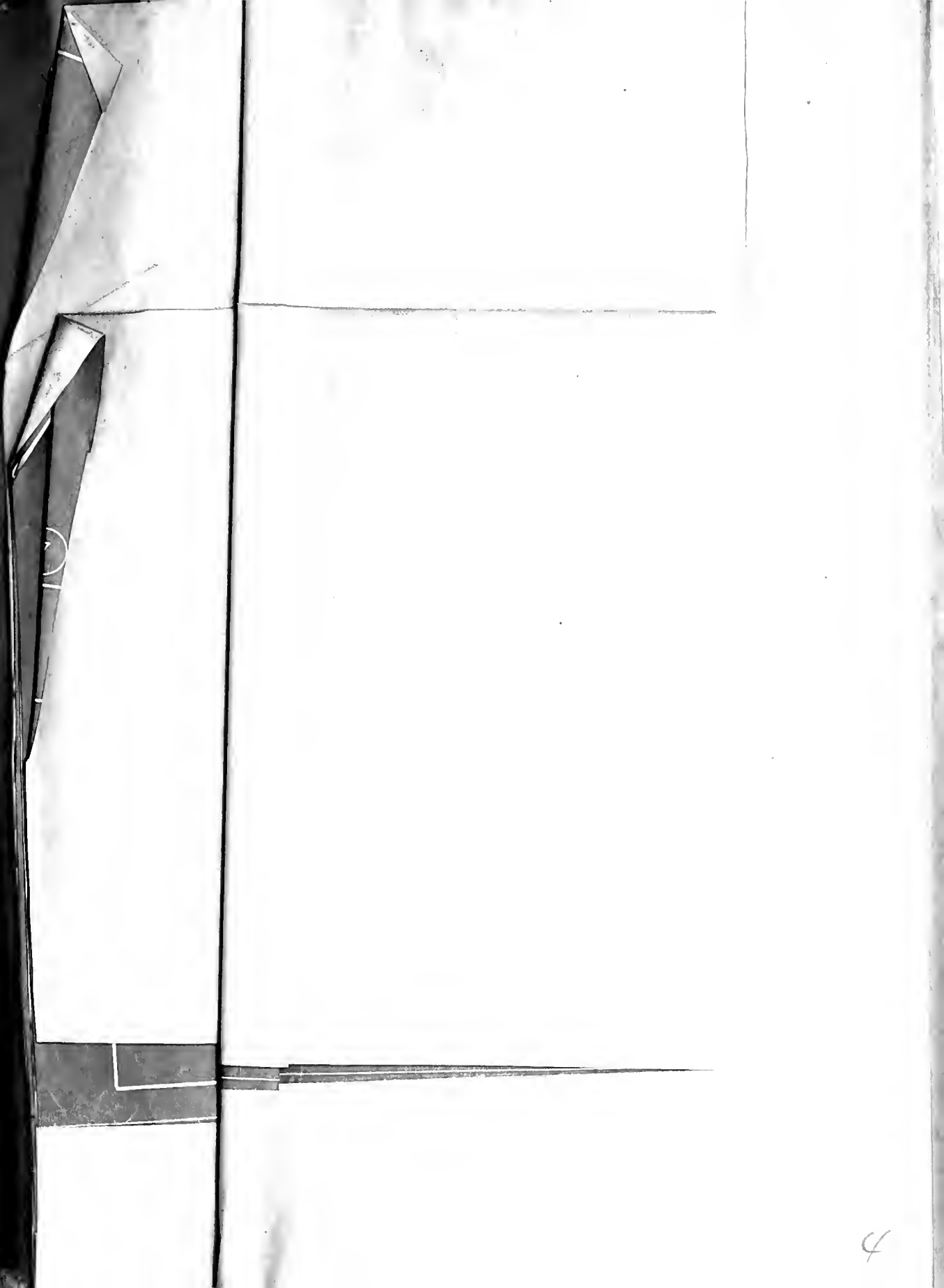


Detail of Wall or Beam

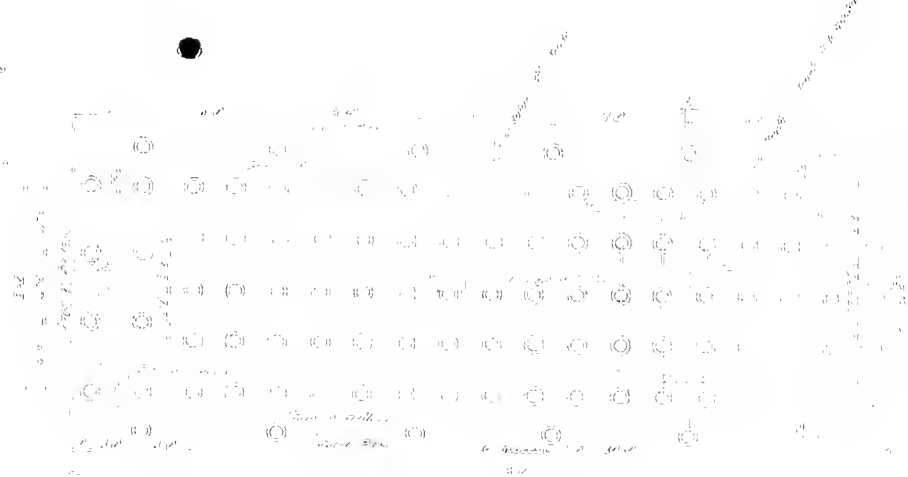
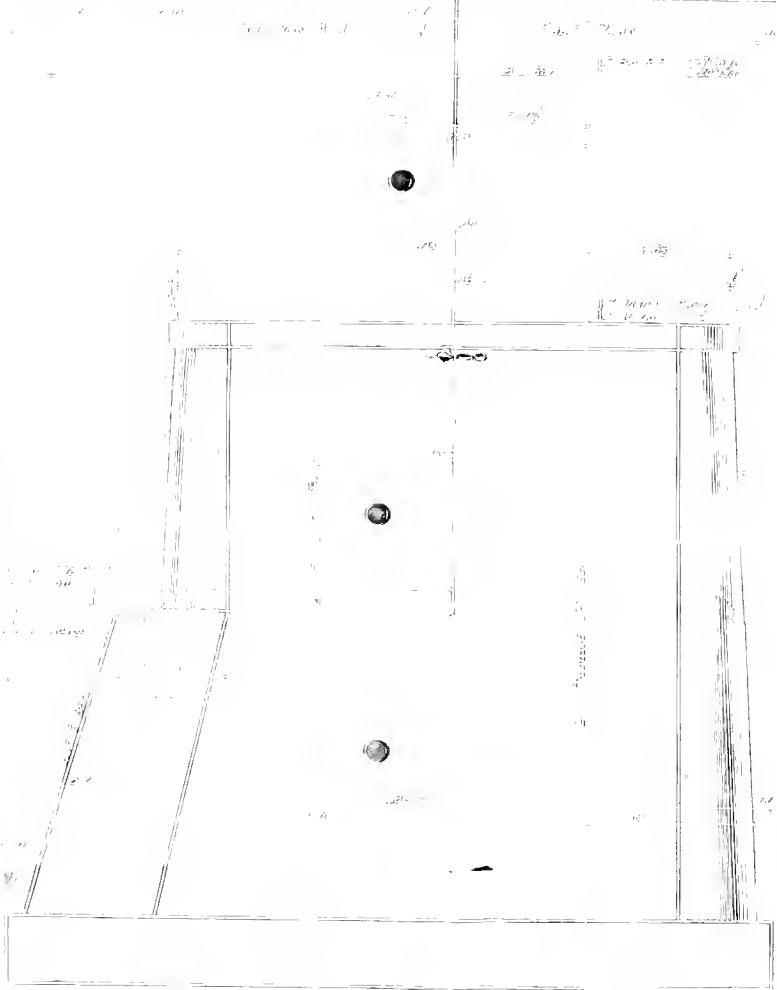


Detail of Wall or Beam

COMPASS
 ENGINEERING AND ARCHITECTURAL DRAWING
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 NEW YORK, N. Y.
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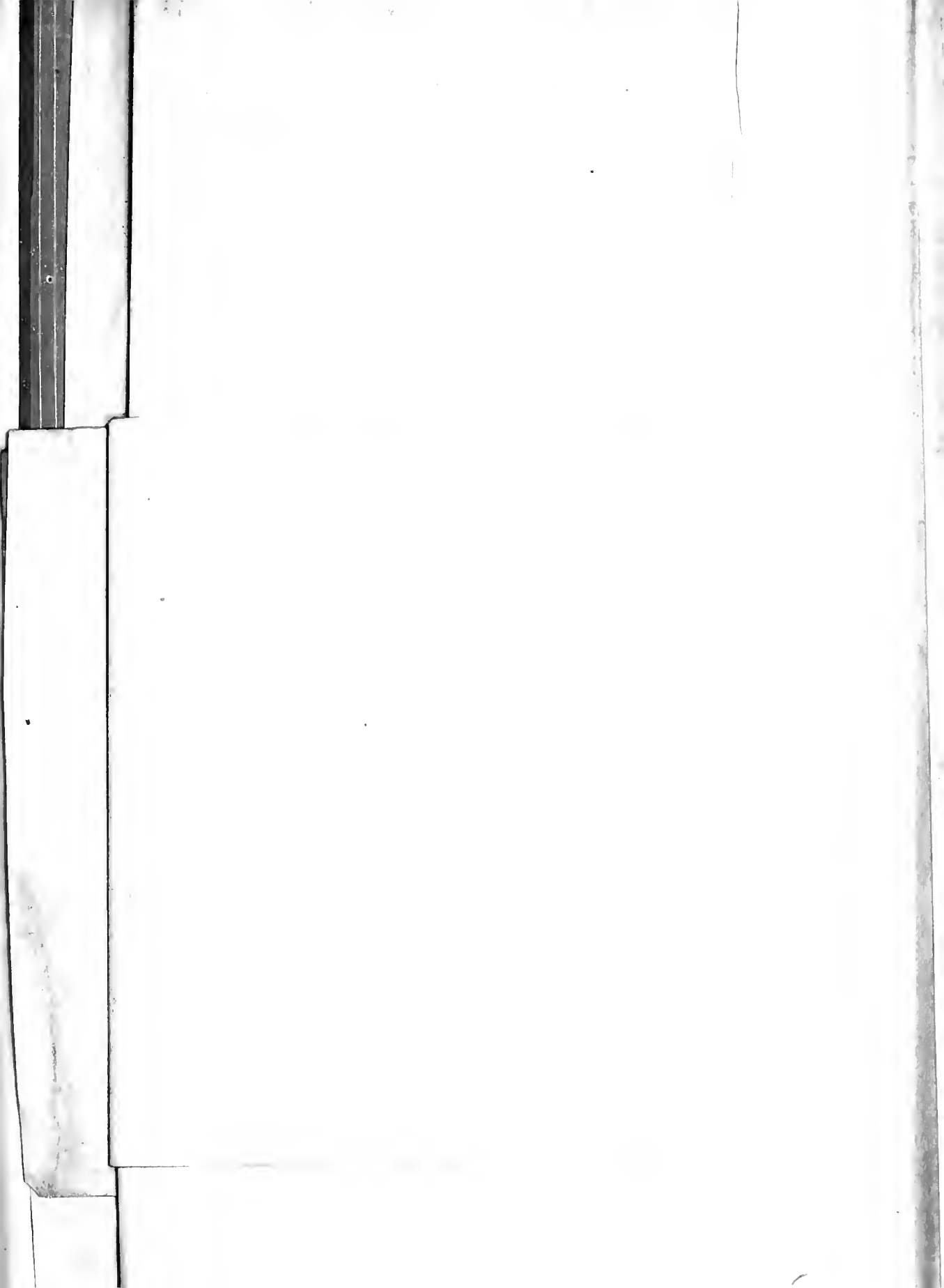




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ENGINEERING DEPARTMENT UNIVERSITY OF CALIFORNIA	
Name of Student No. of Student Section of Class Date of Submission	Title of Project Name of Instructor Date of Completion
Signature of Student Date	Signature of Instructor Date



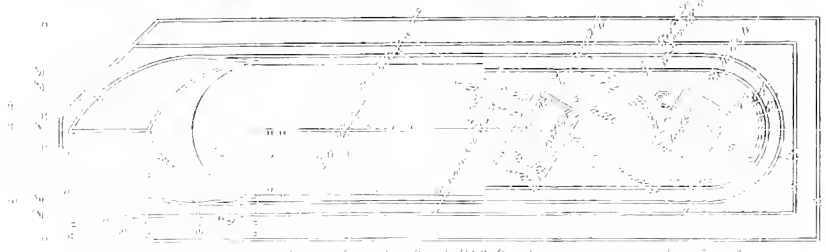


Fig. 1

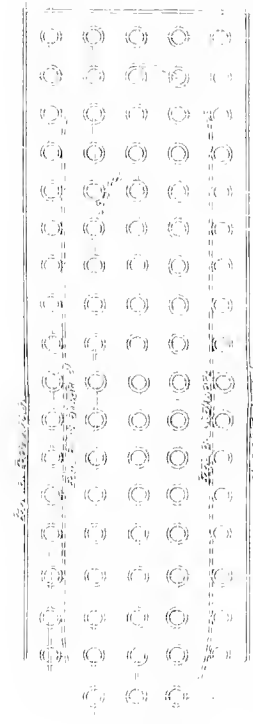
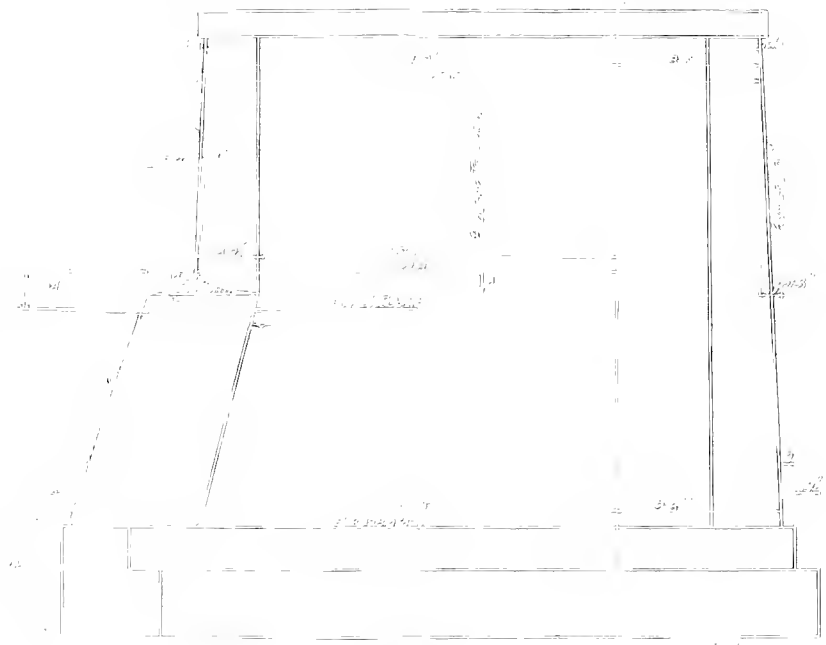


Fig. 2

Fig. 3

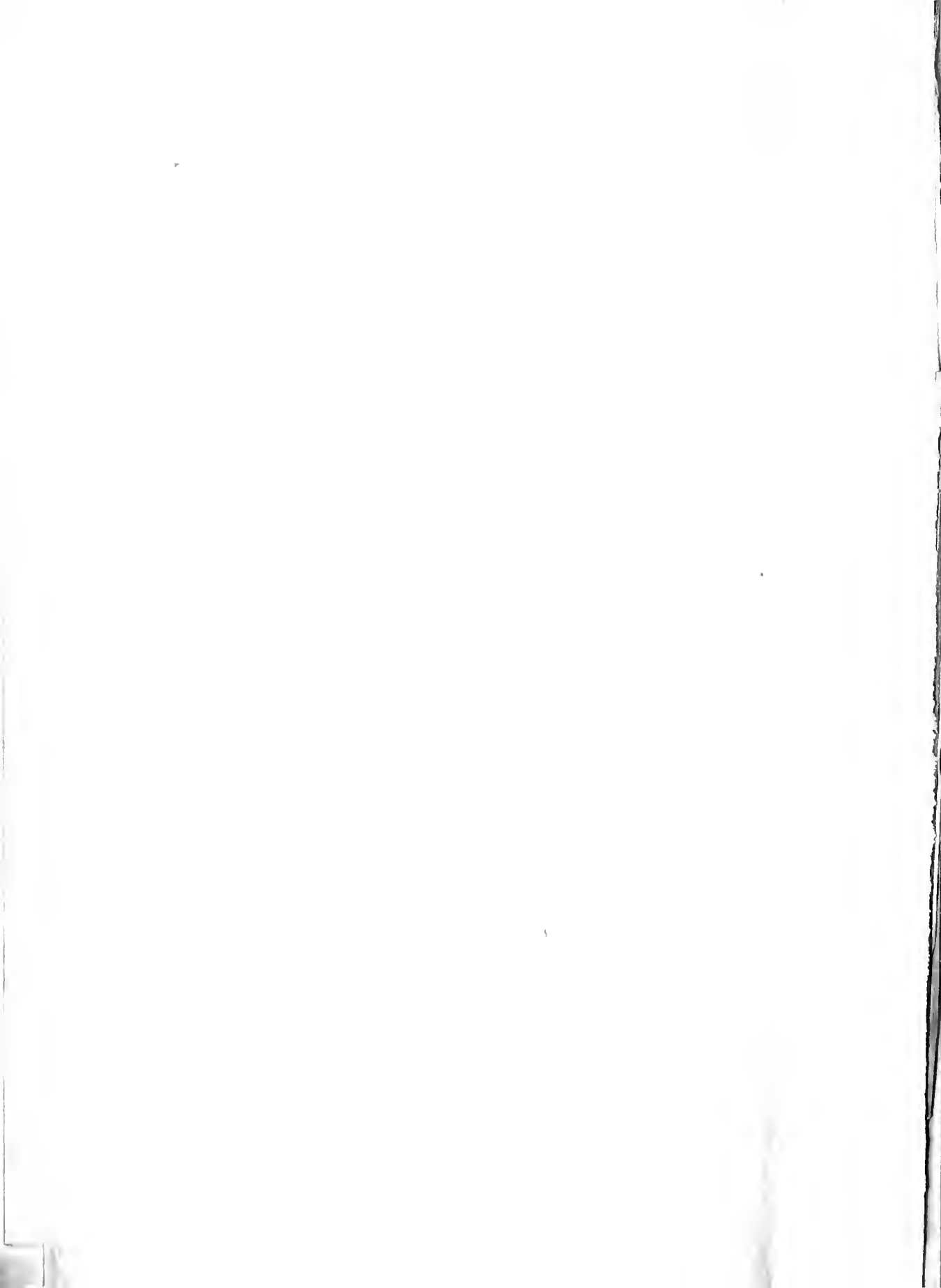
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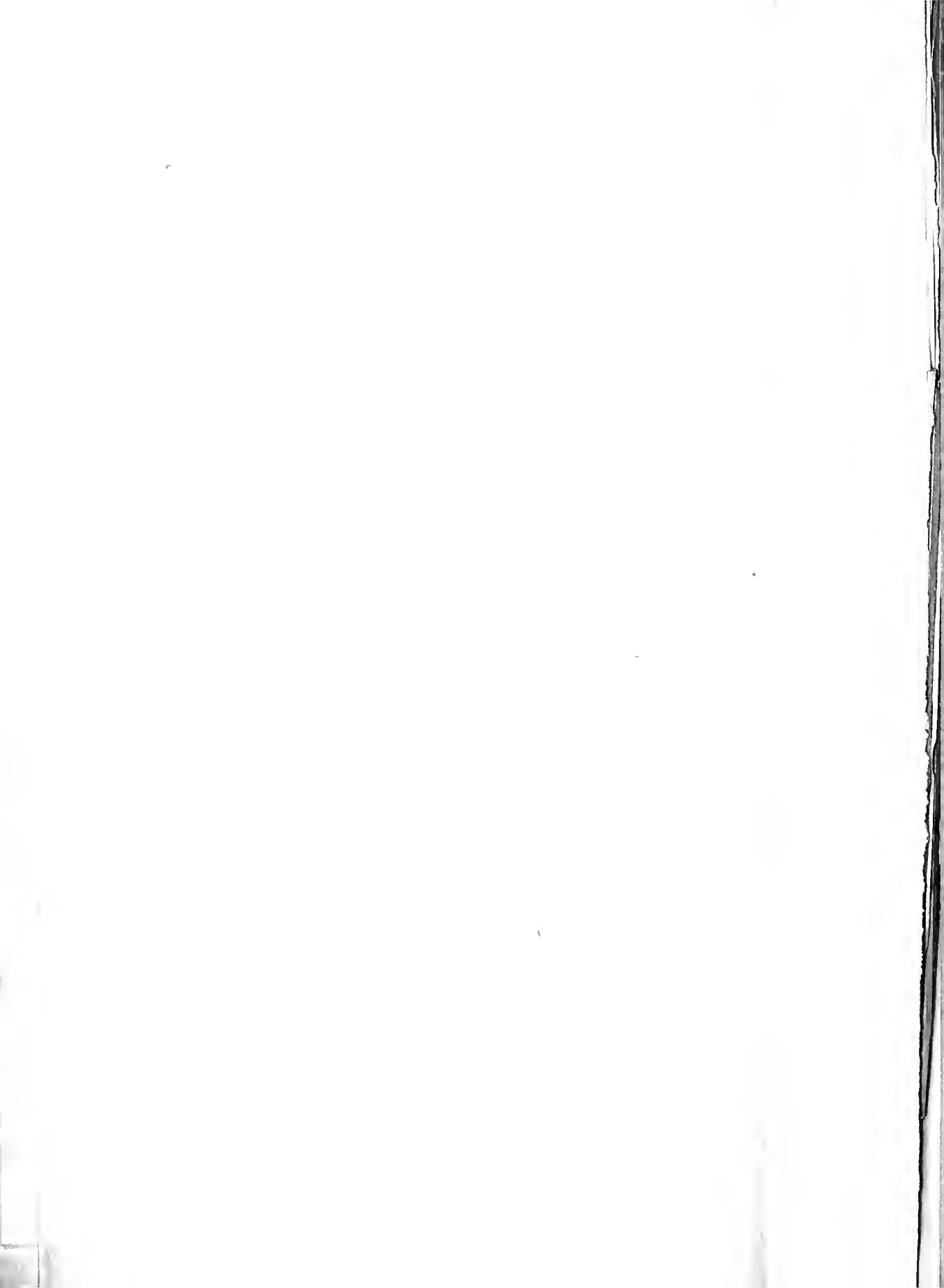
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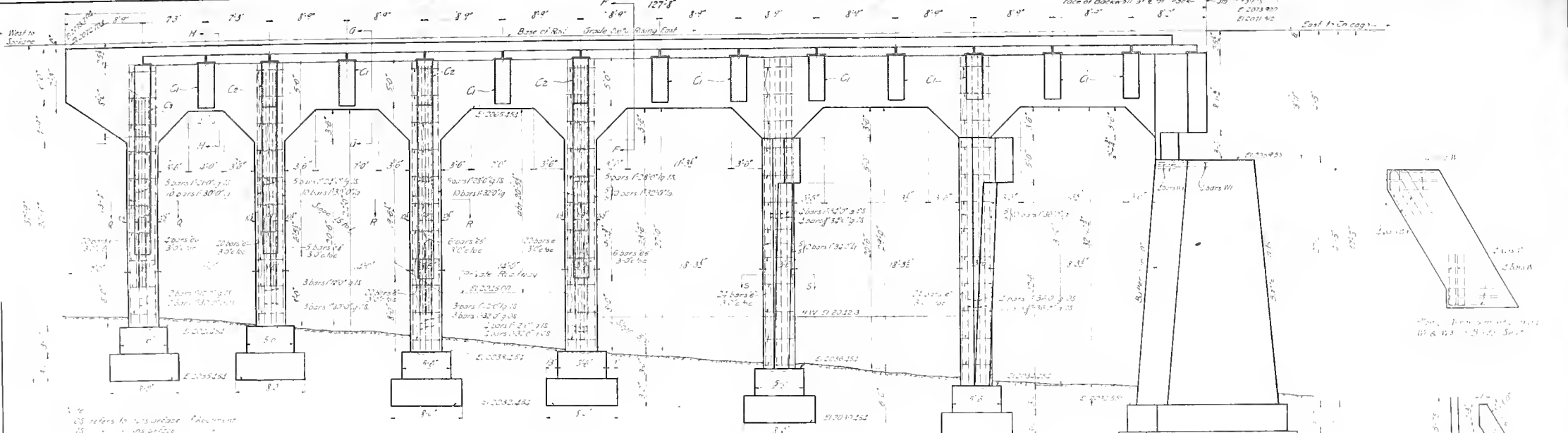


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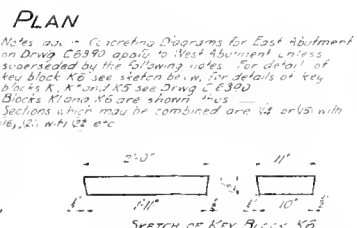
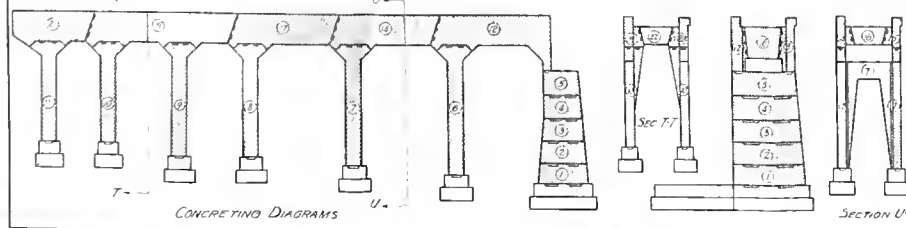
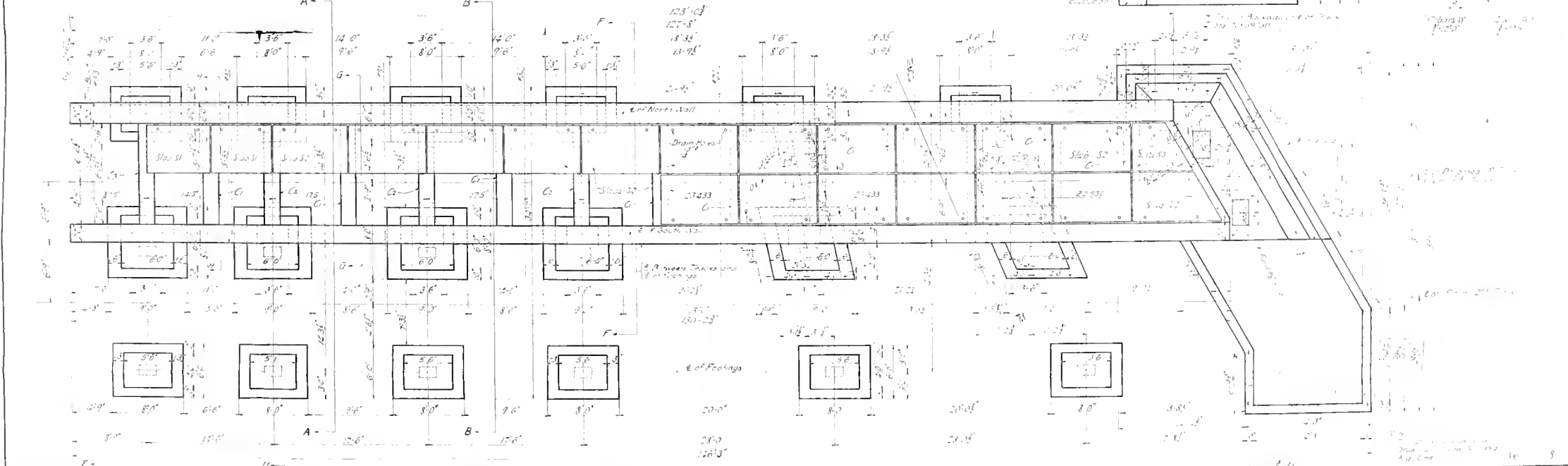


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SECTION ON E OF FIRST TRACK



Notes as in Concrete Diagrams for East Abutment
 superseded by the following notes for details of key
 blocks K6, K7 and K8 see Drawg. C-390
 Blocks K9 and K10 are shown, but
 sections which may be combined are 14 or 15 with
 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

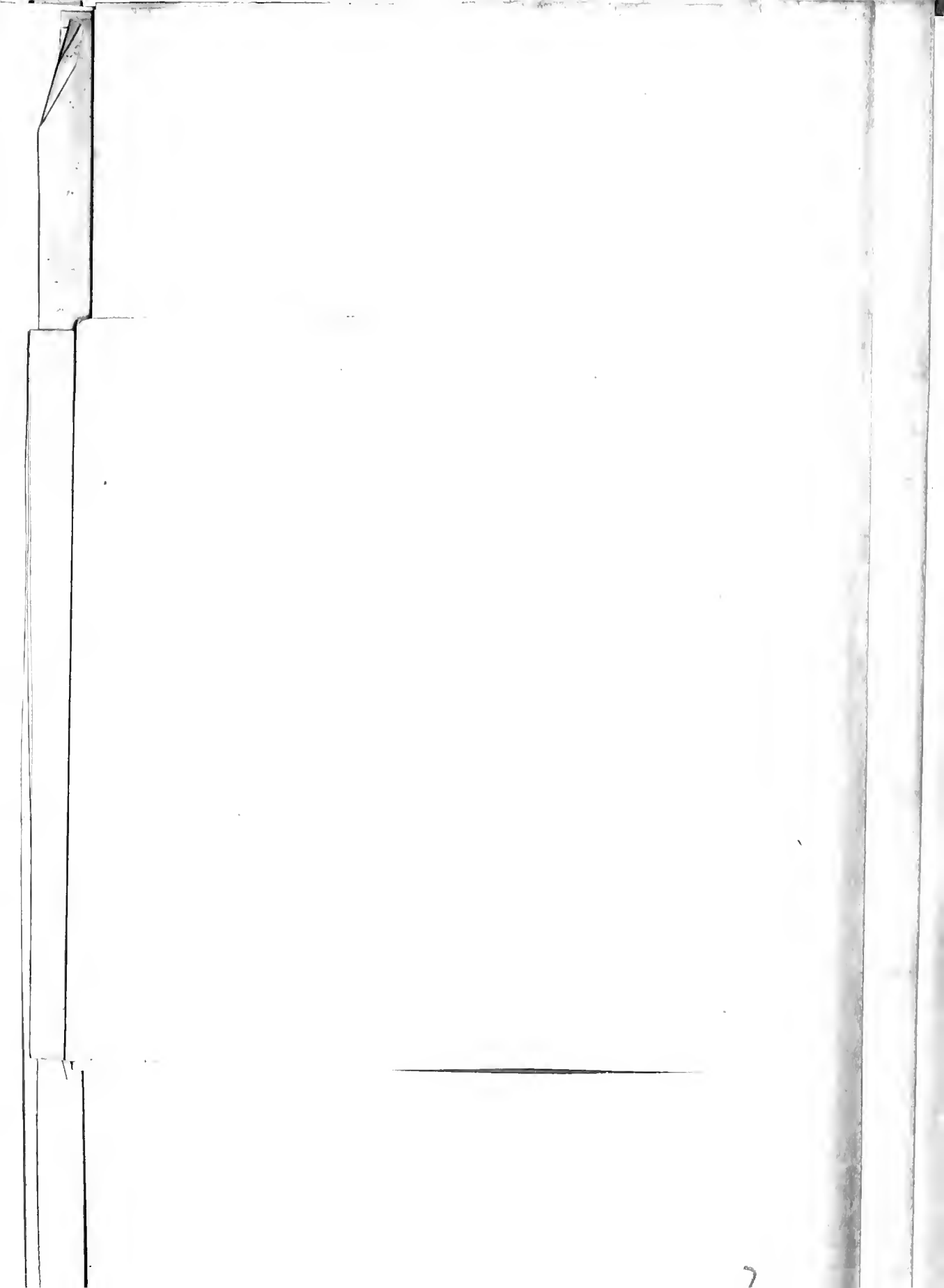
C.M. & P.S.R.Y.
 BRIDGE AND BUILDING DEPARTMENT

SPOKANE RIVER BRIDGE
 COEUR D'ALENE LINE — COLUMBIA DIVISION
 WEST ABUTMENT — PLAN & ELEVATION
 CHICAGO, AUG 27, 1910

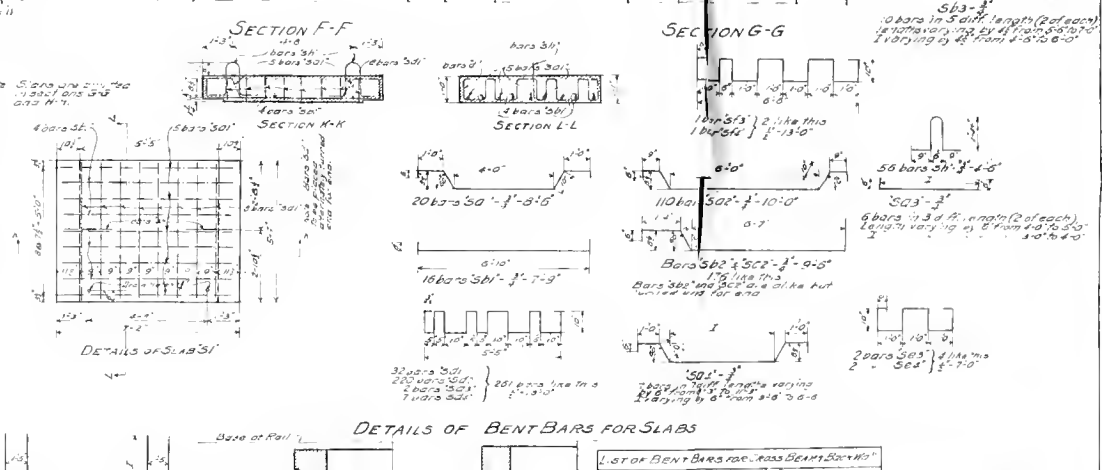
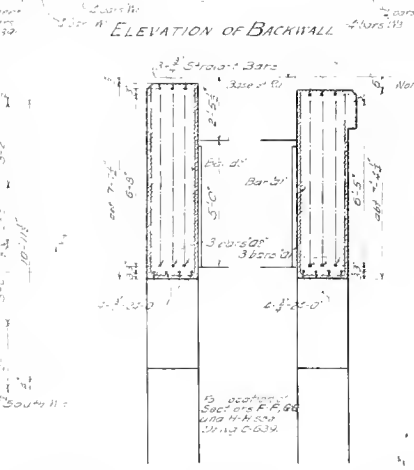
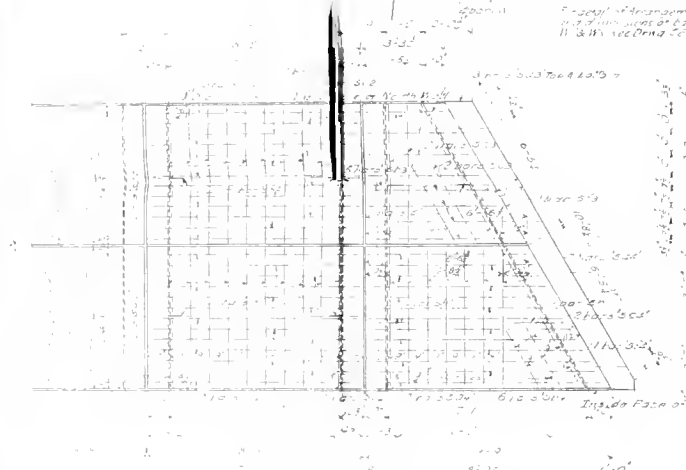
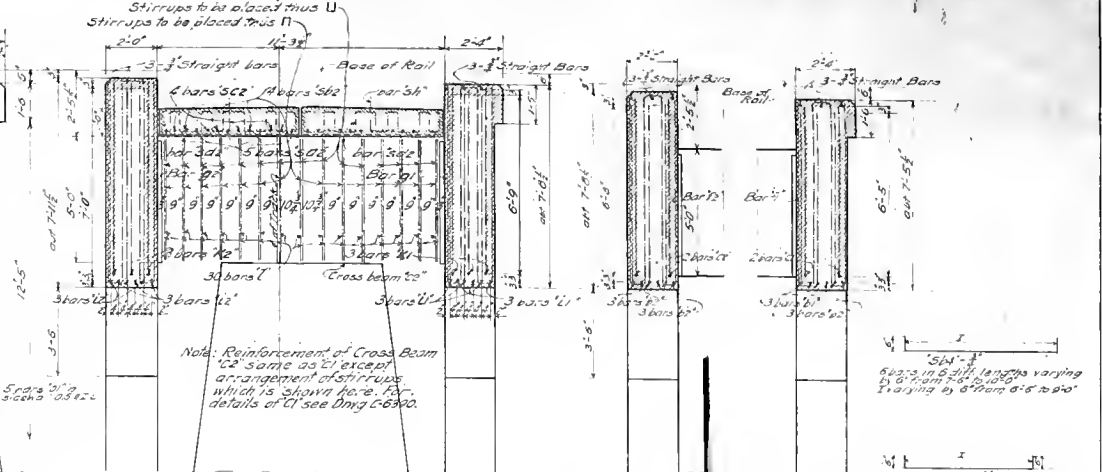
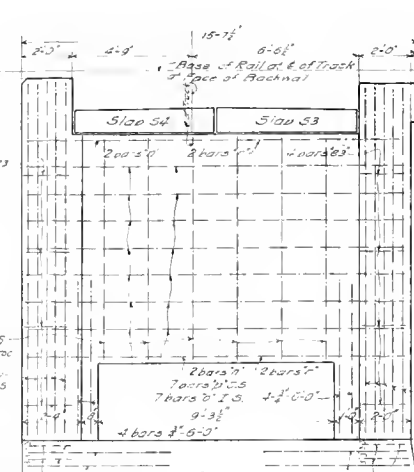
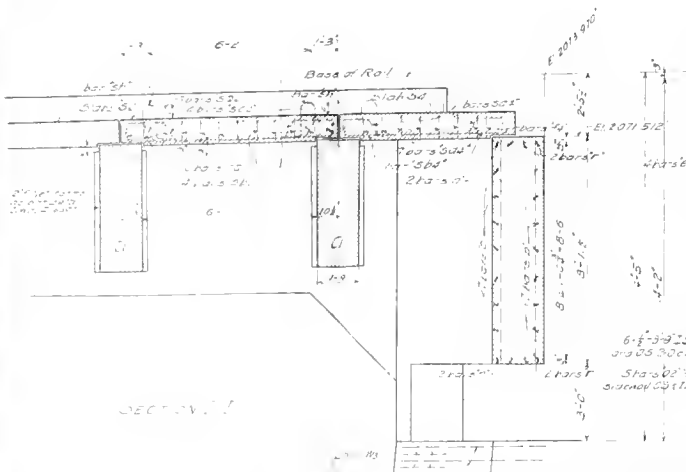
DRAWING NO. C-391
 APPROVED

ASST. ENGR. ENGR. Supt. B.A.B.





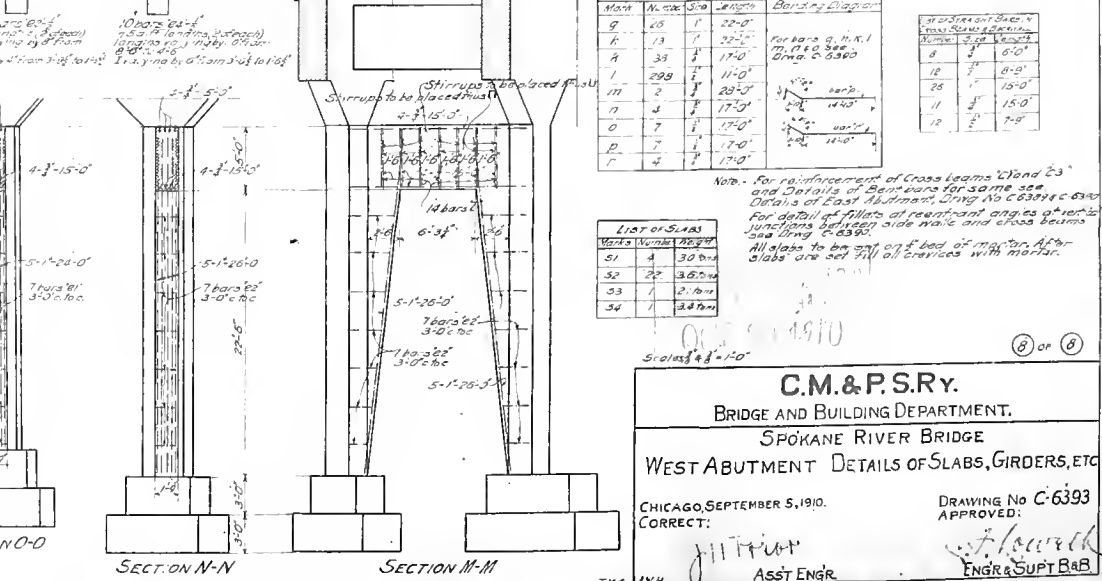
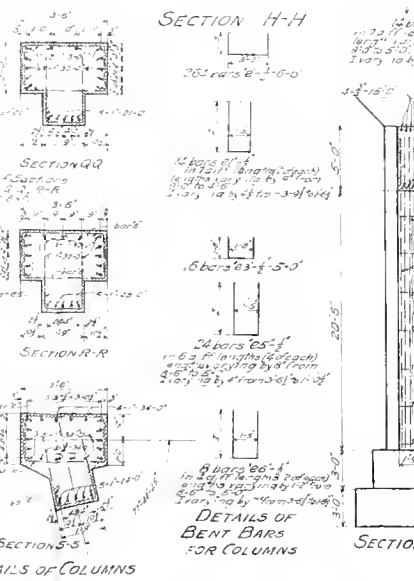




PLAN

Bill of Material

Item	Description	Quantity	Unit	Notes
1	Concrete	100	cu yd	
2	Reinforcing Steel	100	lb	
3	Stirrups	100	lb	
4	Formwork	100	sq ft	
5	Gravel	100	cu yd	
6	Sand	100	cu yd	
7	Water	100	gal	
8	Oil	100	gal	
9	Paint	100	gal	
10	Other	100	lb	



LIST OF BENT BARS FOR CROSS BEAMS

Mark	No.	Size	Length	Bending Diagram
1	25	7"	22'-0"	For bars 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

LIST OF SLABS

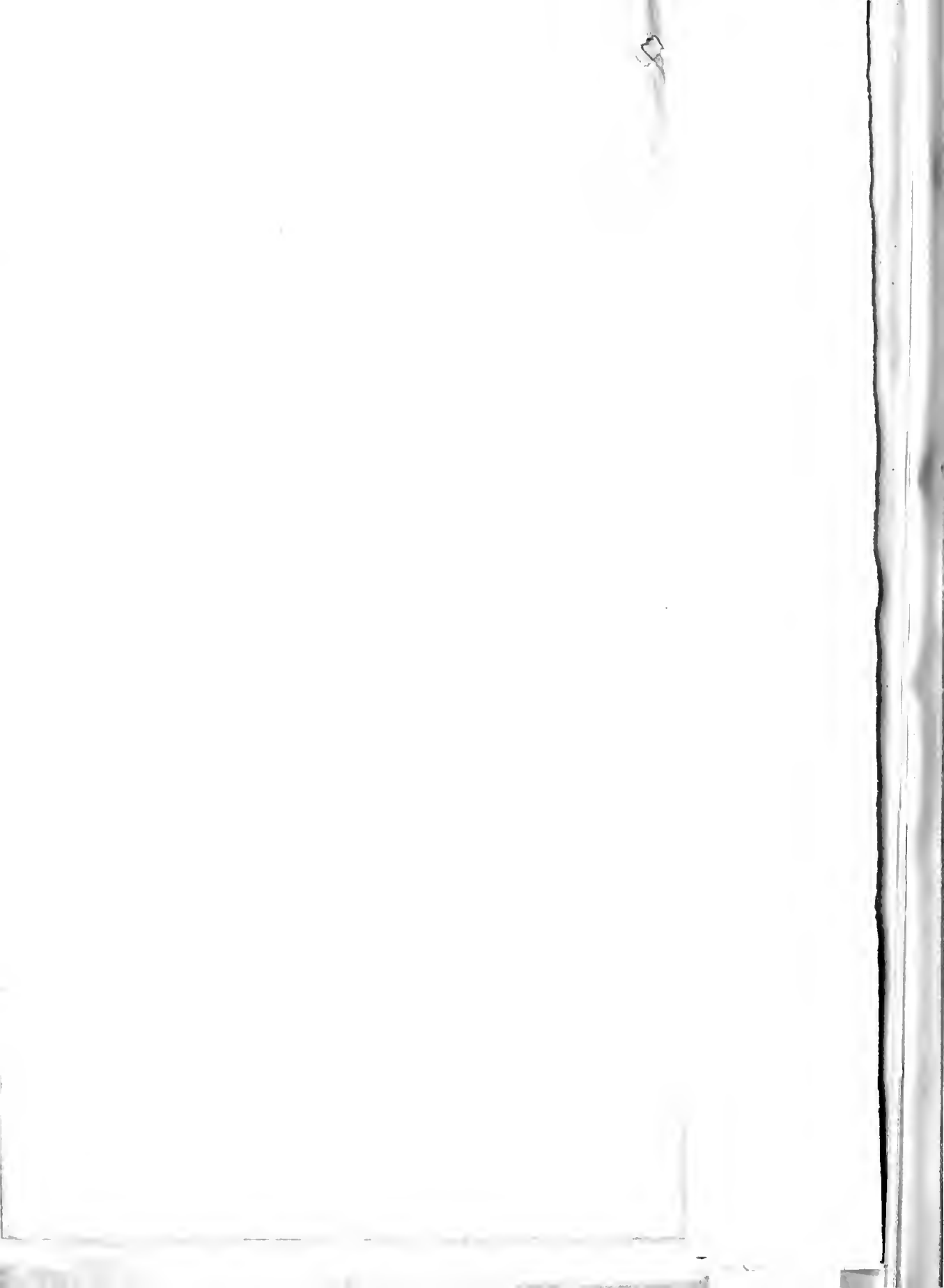
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3	3	2"	30' 0"
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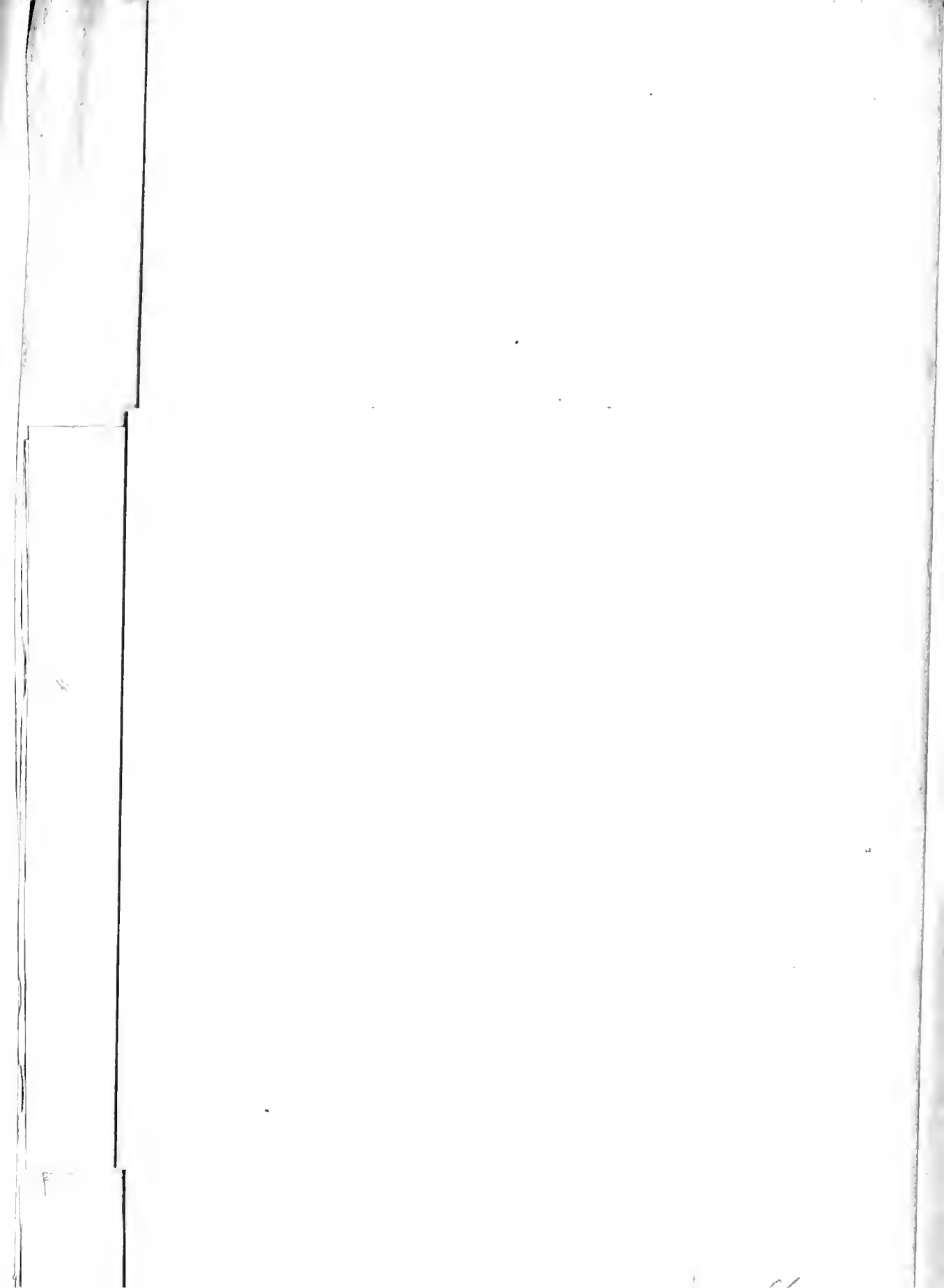
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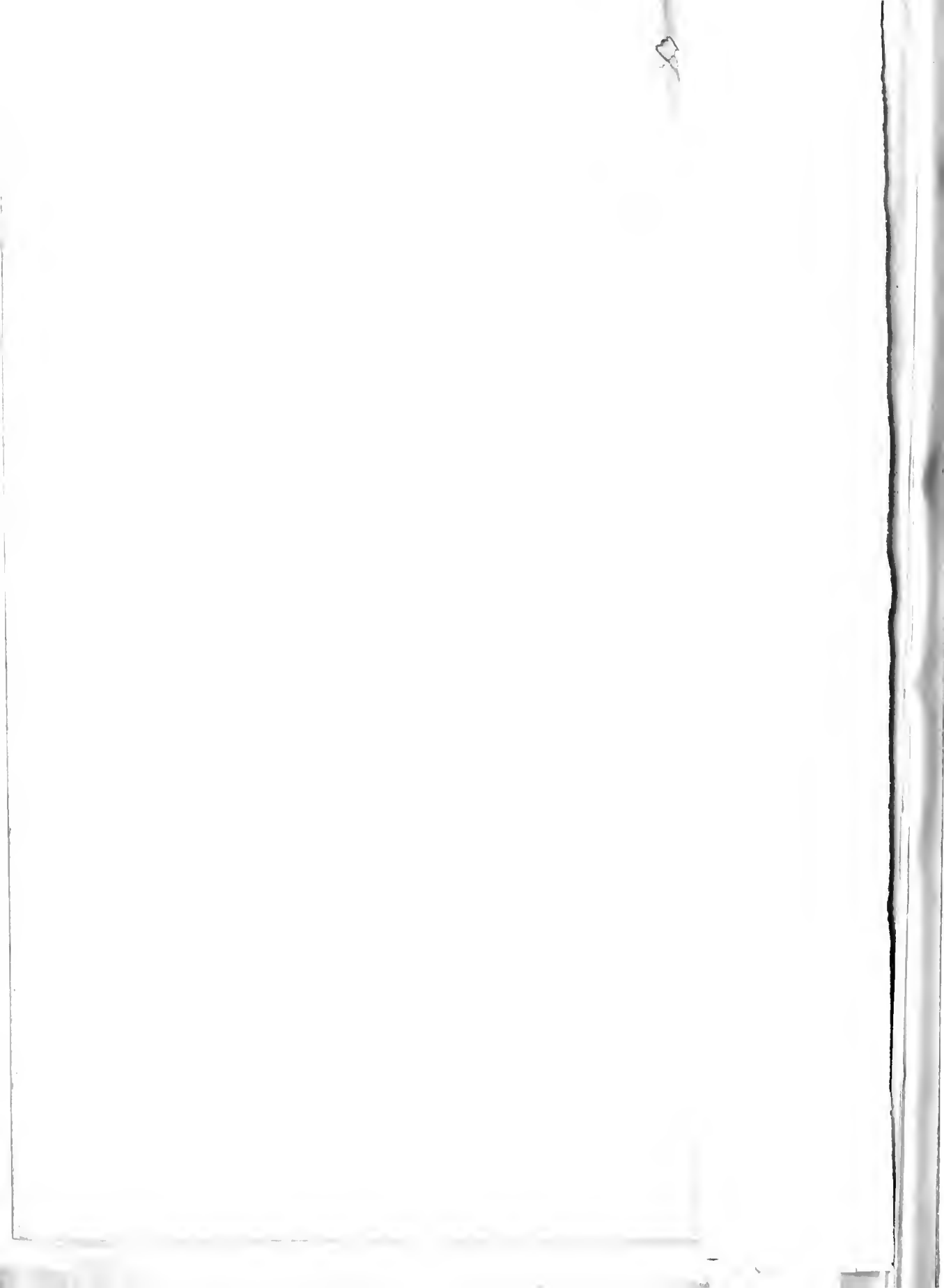
C.M.&P.S.R.Y.
BRIDGE AND BUILDING DEPARTMENT.
SPOKANE RIVER BRIDGE
WEST ABUTMENT DETAILS OF SLABS, GIRDERS, ETC

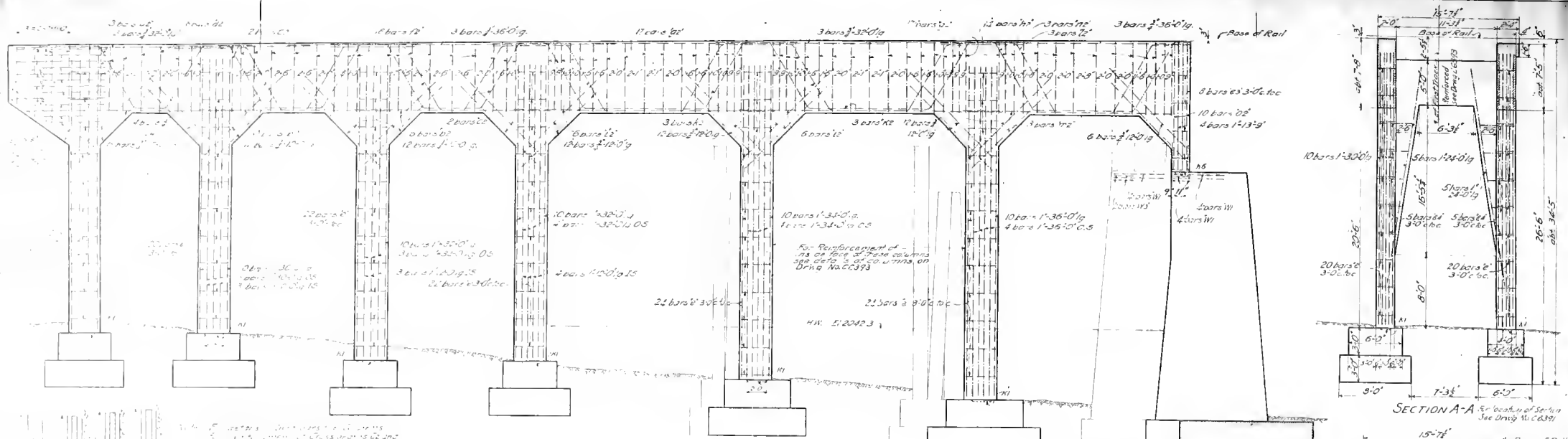
CHICAGO, SEPTEMBER 5, 1910.
CORRECT:

ASST ENGR
ENGR & SUPT BAB



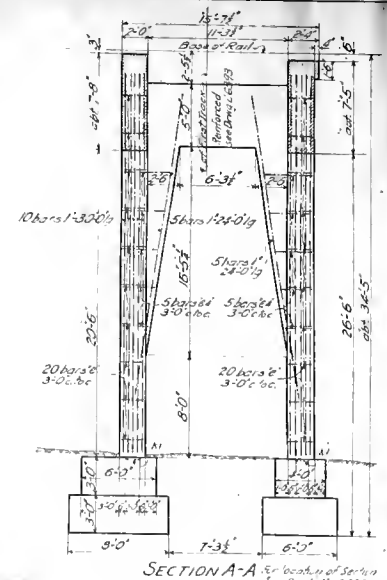




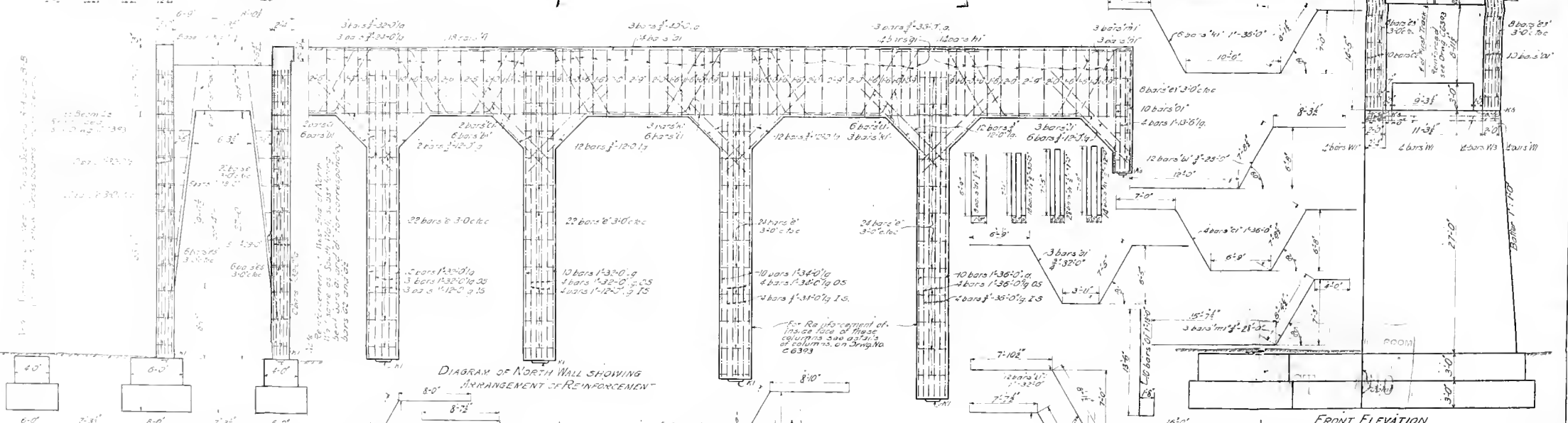


SECTION ON E OF SECOND TRACK & ELEVATION OF SOUTH WALL

For details of cross beams C1 and C2 see Drwg C6370
 For details of cross beams C3 and C4 see Drwg C6370
 For details of cross beams C5 and C6 see Drwg C6370
 For details of cross beams C7 and C8 see Drwg C6370
 For details of cross beams C9 and C10 see Drwg C6370
 For details of cross beams C11 and C12 see Drwg C6370
 For details of cross beams C13 and C14 see Drwg C6370
 For details of cross beams C15 and C16 see Drwg C6370
 For details of cross beams C17 and C18 see Drwg C6370
 For details of cross beams C19 and C20 see Drwg C6370
 For details of cross beams C21 and C22 see Drwg C6370
 For details of cross beams C23 and C24 see Drwg C6370
 For details of cross beams C25 and C26 see Drwg C6370
 For details of cross beams C27 and C28 see Drwg C6370
 For details of cross beams C29 and C30 see Drwg C6370
 For details of cross beams C31 and C32 see Drwg C6370
 For details of cross beams C33 and C34 see Drwg C6370
 For details of cross beams C35 and C36 see Drwg C6370
 For details of cross beams C37 and C38 see Drwg C6370
 For details of cross beams C39 and C40 see Drwg C6370
 For details of cross beams C41 and C42 see Drwg C6370
 For details of cross beams C43 and C44 see Drwg C6370
 For details of cross beams C45 and C46 see Drwg C6370
 For details of cross beams C47 and C48 see Drwg C6370
 For details of cross beams C49 and C50 see Drwg C6370
 For details of cross beams C51 and C52 see Drwg C6370
 For details of cross beams C53 and C54 see Drwg C6370
 For details of cross beams C55 and C56 see Drwg C6370
 For details of cross beams C57 and C58 see Drwg C6370
 For details of cross beams C59 and C60 see Drwg C6370
 For details of cross beams C61 and C62 see Drwg C6370
 For details of cross beams C63 and C64 see Drwg C6370
 For details of cross beams C65 and C66 see Drwg C6370
 For details of cross beams C67 and C68 see Drwg C6370
 For details of cross beams C69 and C70 see Drwg C6370
 For details of cross beams C71 and C72 see Drwg C6370
 For details of cross beams C73 and C74 see Drwg C6370
 For details of cross beams C75 and C76 see Drwg C6370
 For details of cross beams C77 and C78 see Drwg C6370
 For details of cross beams C79 and C80 see Drwg C6370
 For details of cross beams C81 and C82 see Drwg C6370
 For details of cross beams C83 and C84 see Drwg C6370
 For details of cross beams C85 and C86 see Drwg C6370
 For details of cross beams C87 and C88 see Drwg C6370
 For details of cross beams C89 and C90 see Drwg C6370
 For details of cross beams C91 and C92 see Drwg C6370
 For details of cross beams C93 and C94 see Drwg C6370
 For details of cross beams C95 and C96 see Drwg C6370
 For details of cross beams C97 and C98 see Drwg C6370
 For details of cross beams C99 and C100 see Drwg C6370



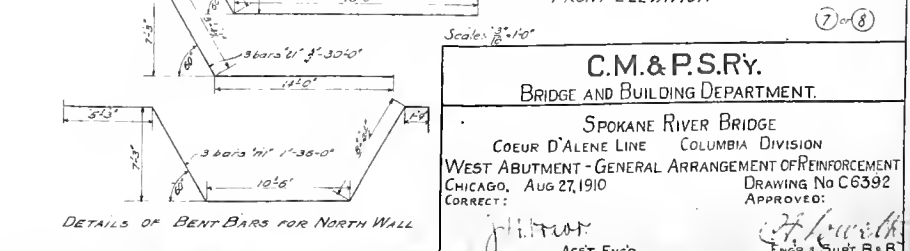
SECTION A-A



FRONT ELEVATION



DETAILS OF BENT BARS FOR SOUTH WALL



DETAILS OF BENT BARS FOR NORTH WALL

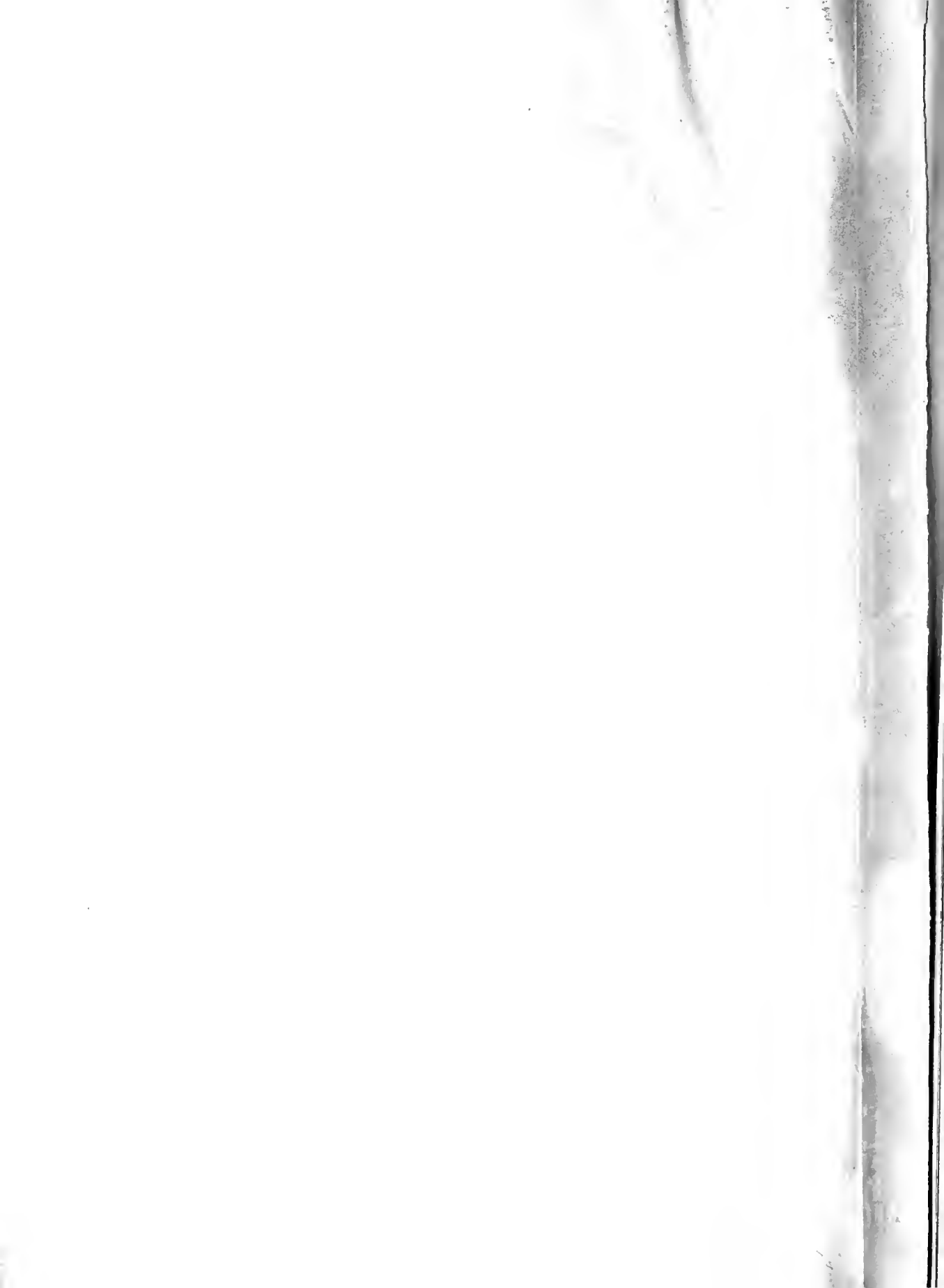
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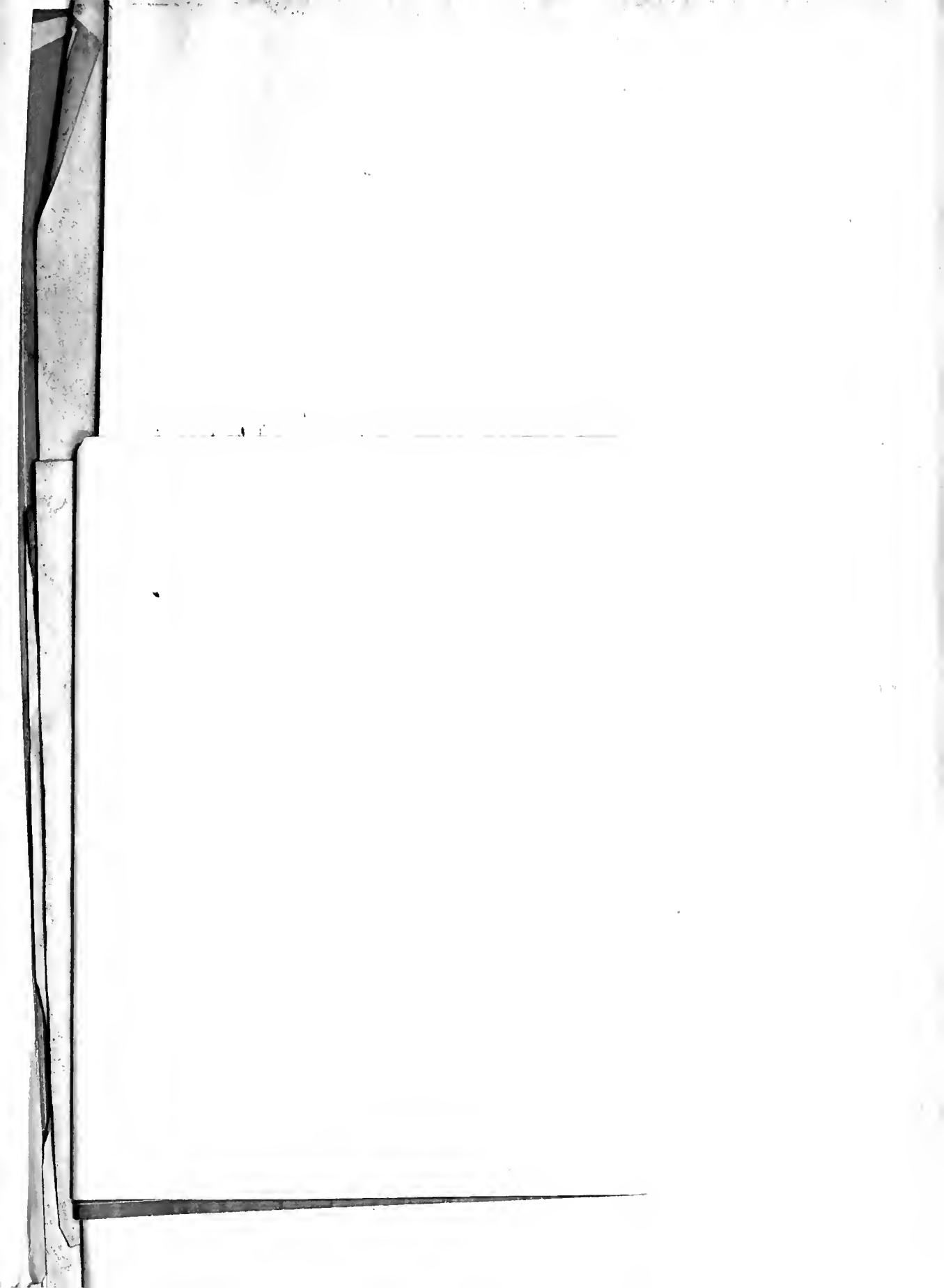
C.M. & P.S.R.Y.
 BRIDGE AND BUILDING DEPARTMENT.

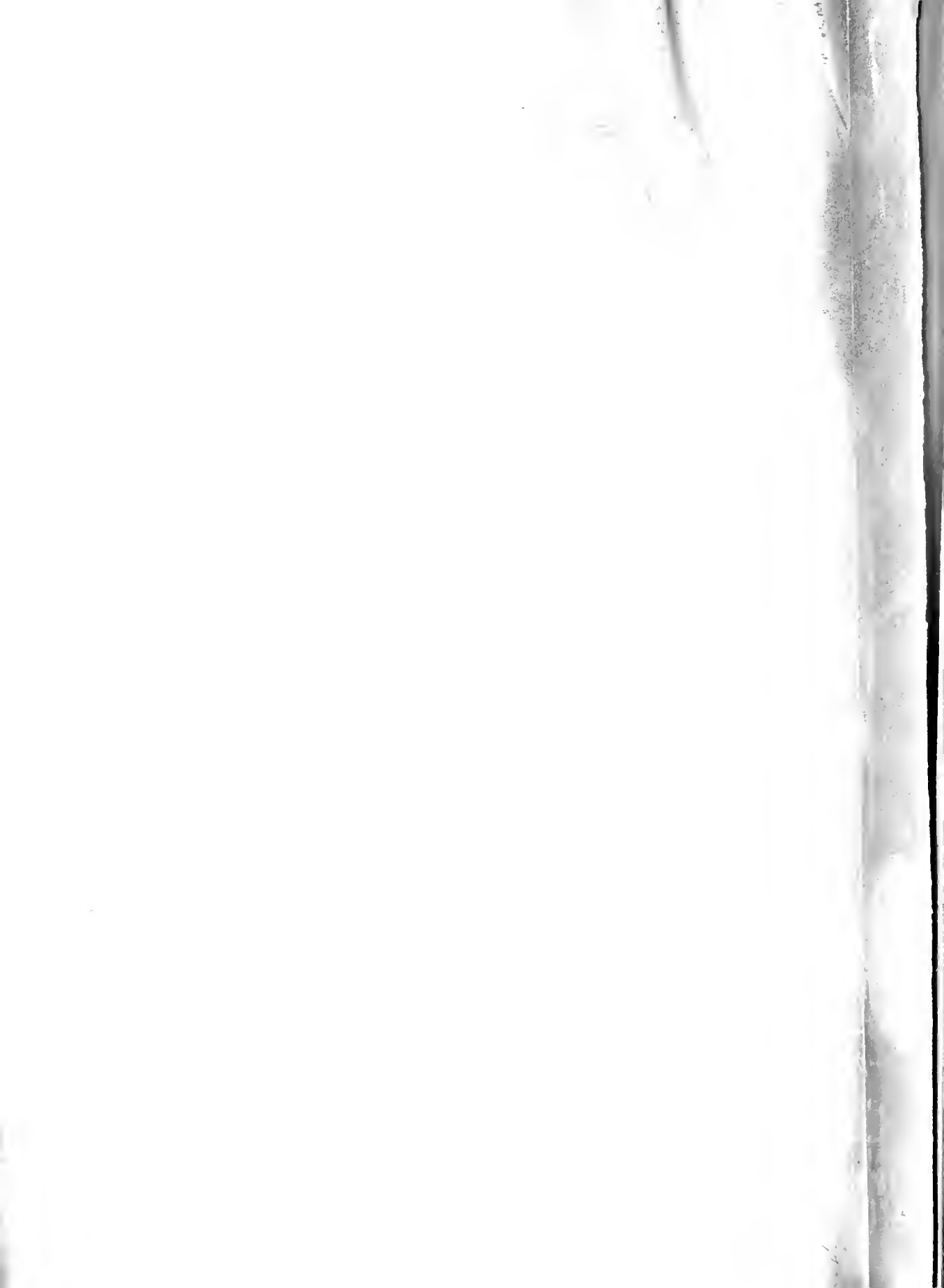
SPOKANE RIVER BRIDGE
 COEUR D'ALENE LINE COLUMBIA DIVISION
 WEST ABUTMENT - GENERAL ARRANGEMENT OF REINFORCEMENT
 CHICAGO, AUG 27, 1910
 CORRECT: APPROVED:

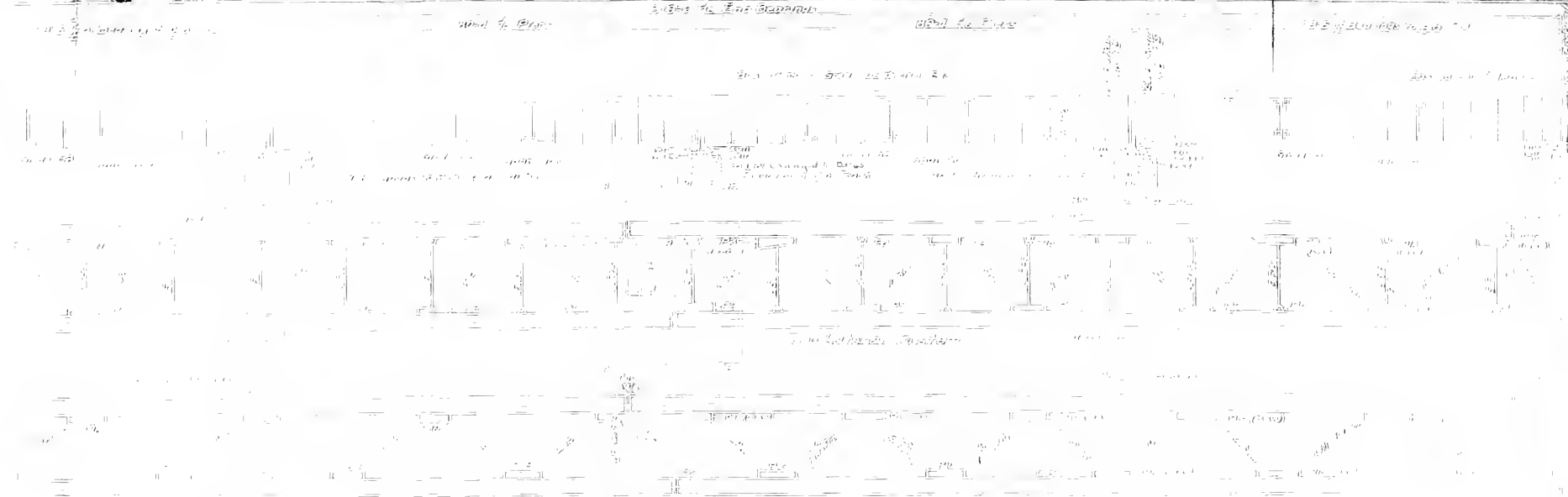
J. H. ...
 ASST ENGR

H. ...
 ENGR & SUPT. B.A.B.









Room Schedule		Room Schedule		Room Schedule		Room Schedule		Room Schedule	
No.	Description	No.	Description	No.	Description	No.	Description	No.	Description
1	Office	11	Office	21	Office	31	Office	41	Office
2	Office	12	Office	22	Office	32	Office	42	Office
3	Office	13	Office	23	Office	33	Office	43	Office
4	Office	14	Office	24	Office	34	Office	44	Office
5	Office	15	Office	25	Office	35	Office	45	Office
6	Office	16	Office	26	Office	36	Office	46	Office
7	Office	17	Office	27	Office	37	Office	47	Office
8	Office	18	Office	28	Office	38	Office	48	Office
9	Office	19	Office	29	Office	39	Office	49	Office
10	Office	20	Office	30	Office	40	Office	50	Office
11	Office	21	Office	31	Office	41	Office	51	Office
12	Office	22	Office	32	Office	42	Office	52	Office
13	Office	23	Office	33	Office	43	Office	53	Office
14	Office	24	Office	34	Office	44	Office	54	Office
15	Office	25	Office	35	Office	45	Office	55	Office
16	Office	26	Office	36	Office	46	Office	56	Office
17	Office	27	Office	37	Office	47	Office	57	Office
18	Office	28	Office	38	Office	48	Office	58	Office
19	Office	29	Office	39	Office	49	Office	59	Office
20	Office	30	Office	40	Office	50	Office	60	Office

C.M.A.P.'S R.

SCHEDULE AND SPECIFICATIONS

FOR THE

CONSTRUCTION OF

THE

BUILDING

AT

[Location]

[Date]

[Signature]



