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GHQ/SCAP Records (RG 331, National Archives and Records Service)

Description of contents

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(2) Folder title/number: (5)
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(3) Date: Oct. 1945 - Nov. 1945

(4) Subject:

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(5) Item description and comment:
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(6) Reproduction: (Yes) No

(7) Film no. Sheet no.

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file

HEADQUARTERS SIXTH ARMY
Military Government Section
APO 442

3 November 1945

SUBJECT: Permission to Commence Manufacture of Fibers and Cloth at Factory in Bofu, Yanaguchi Ken.

TO : Dr. Shozo Tachikawa,
Ohtsu Zeze - Nakanosho 465.

1. On 2 November 1945, representatives of the Tachikawa Institute called at this Headquarters, seeking permission to resume manufacture of staple fibers and cloths.

2. It is understood that the Tachikawa Institute has, itself, not previously produced this product commercially, but that the Institute is taking over an already existing factory located at Bofu in Yamaguchi Prefecture.

3. It is further understood that the subject factory was, during the war, seized and operated by the Japanese Government to produce fibers and cloth for the exclusive use of the Japanese Army and Navy. The factory was used in the fiber and cloth production both before the war and after its seizure by the Government.

4. The presently contemplated production plan involves no problem of conversion other than a few adjustments to accomplish the improved techniques of production developed by Tachikawa research activities. It is understood that only staple fibers and cloths, which the factory is already equipped to produce, will be manufactured.

5. The proposed plan involves no conversion from production of a prohibited item as defined in paragraph 4, Directive No. 3 issued to the Japanese Imperial Government under date of 22 September 1945, and no undertaking covered in paragraph 3 of General Order No. 3 dated 2 October 1945. Consequently, no permission to resume production is actually required. However, it is understood that the managers of the enterprise desire a written permit for their own protection.

6. Accordingly, permission to commence manufacture of staple fibers and cloth at the factory in Bofu, Yamaguchi Ken is hereby granted.

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7. It is to be understood by the applicants that this permission applies only to resumption of production. Any questions of title to plant facilities or allocation of raw material stocks must be handled by the applicants through regular Japanese Governmental channels.

GEORGE D. SEARS,
Colonel, Infantry,
Military Government Officer

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Oct. 1945

Remark; Tachikawa research institute is managed with the private expense of Dr. Tachikawa, except deposits such as the subsidy or the trust money for research.

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Oct. , 1945.

An application for opening of production in the staple fibre factory.

Dr. S. Tachikawa

Dr. Shozo Tachikawa,
the representative of
Tachikawa research
institute, Kyoto.

1. Purport of the application:

The factory as the subject of this application hitherto has belonged to the army and its main parts are equipments for production of staple fibres which are prepared for instant production of 15 tons staple fibres a day. The applicant will open production immediately with increasing of capital after this factory being disposed of.

Although the applicant, Tachikawa research institute, has no actual results of production of staple fibres before or during the war, it has many remarkable researches in technics of manufacture of staple fibres and holds many technical experts. So the applicant will dare open production of artificial fibres as following, breaking away from the monopolistic regulation by existing others of the same profession to date. The applicant entreates your ready permission after deliberation on the matter.

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2. The seat and the history of the factory and contents of its equipment.

Bofu, Yamaguchi prefecture is the seat of the factory. The factory belonged to Kanegafuchi-Kogyo Co. and in the war was under the jurisdiction of government wollen mill. The equipments have capacity of about 15 ton a day for production of staple fibres. Though all factories of artificial silk and staple fibres in Japan turned almost of their equipments for production of war supplies, this factory maintains its equipments as they are for production of staple fibres. Therefore, not only immediate production is possible but with a little supplemental repairs production of 60 tons a day may be possible. It is the greatest and best factory with both buildings and equipments.

3. Preparation for opening of production:

Tachikawa research institute is prepared to establish a new company and to open production as soon as the factory with all of its equipments being disposed of.
Labours and raw materials for production may be used under their existing condition in principle and one part of them may be prepared which is able to get locally. ~~F~~or the present, the special staple fibres with nigh strength may be produced 10 tons a day and they may be aimed at private supplies especially for underclothes and others to wash.

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4. Specialities of technics of manufacture:

In operation of this production, the technics of manufacture are entirely different to the former ones. As in the subjoined gone into details, these technics are the epochmaking ones which have been achieved by the applicant's new idea for production of artificial fibres of high polymerisationdegree after 10 year's special researches and industrial trials. Wonderful simplification of process and superiority of products may be guaranteed, and with remarkably small consumption of heat and medicals these technics may be confirmed to rank first as industry for private supplies in Japan.

5. The anticedents of the applicant:

Dr. Shozo Tachikawa, the representative of Tachikawa research institute, was during past twenty years the managing director of technics in Asahi Bemberg-Kenshi Co. which was the greatest company of production of artificial fibres in Japan and was engaged in managing factories and taking the leadership of research. Since the year before last till to-day he is engaged in discovery of new process for production of artificial fibres at Research institute of engineering Kyoto imperial university. At the present Tachikawa research institute have more than ten technical managing staff formerly of Asahibemoergkenshi Co. and a few co-operators.

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and is giving its energy to prepare for the industrial production of new artificial fibres.

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An outline of the plan for manufacture of artificial fibres of highpolymerisation degree.

By Dr. Shozo Tachikawa.

The thought, through which foundamental defects recognised in qualities of artificial silk or staple fibres shall be improved thoroughly by enlargement of molecules which compose them, i.e., by elevation of polymerisationdegree of molecules and artificial fibres surpassing natural fibres shall be acquired, has been noticed in the world, especially early in Germany. After efforts for twenty years he has attained to its industrial production, but due to difficulties in production and errors in the idea, its perfect achievement is yet and no actual developments in qualities of products also have been realized.

Last year, by explaining the author's idea for the production of artificial fibres of highpolymerisationdegree, "Vereinigte Glanzstoff" and "I.G. Farbenindustrie", two great factories of artificial fibres in Germany, decided to replace their research and method for production with the author's method for "Toramomen" and for its rapid operation they requested the author's permission and direction regarding its industrial production, but the matters have been stopped temporarily since the defeat.

As the center of the fut ure textile industries in Japan, the production of artificial fibres of highpolymerisationdegree is a national enterprice and cooperation and direction by

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technical interchange not only with Germany but also with America, a chief habitat of cotton, may be possible necessarily. Therefore by completion of the author's manufacture of artificial fibres of highpolymerisationdegree in Japan the leading industry of the first class in the world may be composed.

The details are reserved in another description or explanation and the points are enumerated as follows.

(1) differences in qualities:

Due to be composed of macromolecular cellulose with high energy, durability of yarns or fabrics made from the author's artificial fibres is remarkably great, for examples, as in the table or in the figures, "Toramomen" has the same fibrill structure as natural fibres and weak points of artificial fibres till to-day are shown theoretically.

	Strength gr/D		Wet strength/	elongation%		strength in 6% alkali gr/D
	dry	wet	drystrength	dry	wet	
Cotton	3.4	3.3	96	8.2	8.7	2.8
Pulp	--	--	--	--		--
"Toramomen"	3.8	3.3	87	8.6	9.6	1.4
ordinary artificial fibre	3.0	2.1	70	18.4	25.3	0.6
"Duraflox"	3.1	2.0	64	22.4	27.4	0.7
"Bemberg silk"	2.1	1.3	61	12.2	13.4	0.6

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lities:
macromolecular cellulose with high
or fabrics made from the author's
ibly great, for examples, as in
"Toramomen" has the same fibrill
and weak points of artificial
theoretically.

th gr/D wet	Wet strength/ drystrength	elongation% dry	elongation% wet	strength in 6% alkali gr/D	polymerisation-degree
3.3	96	8.2	8.7	2.8	2560
--	--	--		--	940
3.3	87	8.6	9.6	1.4	520
2.1	70	18.4	25.3	0.6	240
2.0	64	22.4	27.4	0.7	270
1.3	61	12.2	13.4	0.6	530

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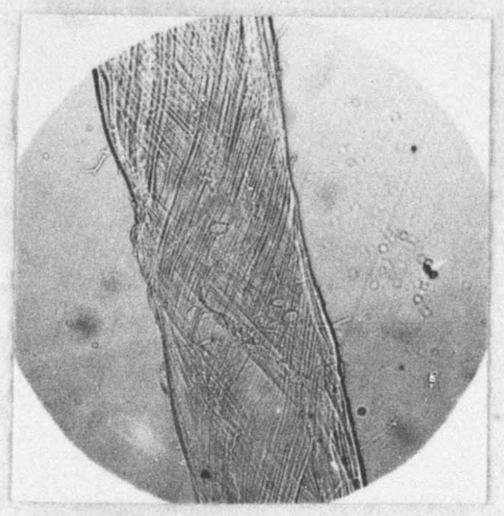
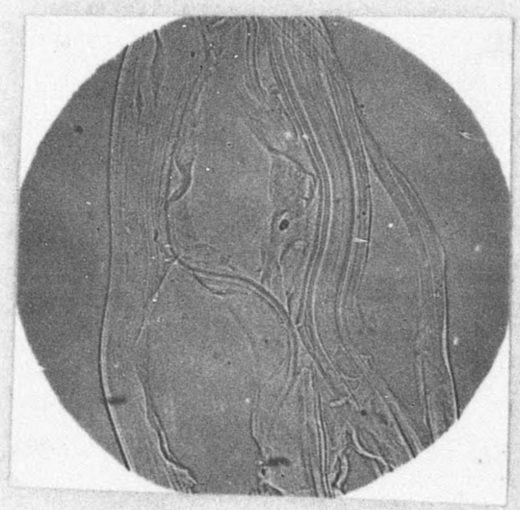
Pulp



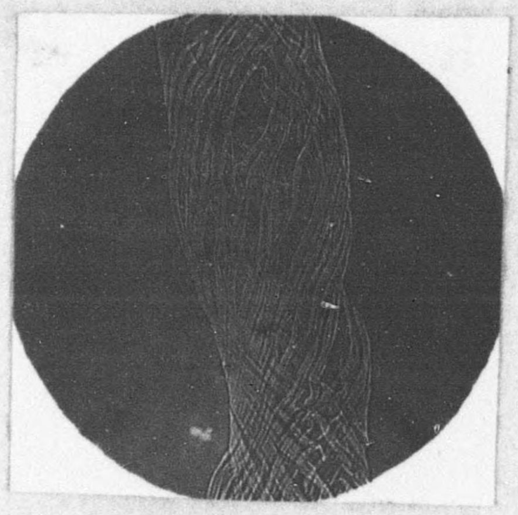
polymerisation degree
700

ordinary artificial fibre



polymerisation degree
250

"Toramomen"



polymerisation degree
500

Furthermore, "ultra Toramomen" is produced from linter as its raw materials and its fibrill structure is shown in the next figure.

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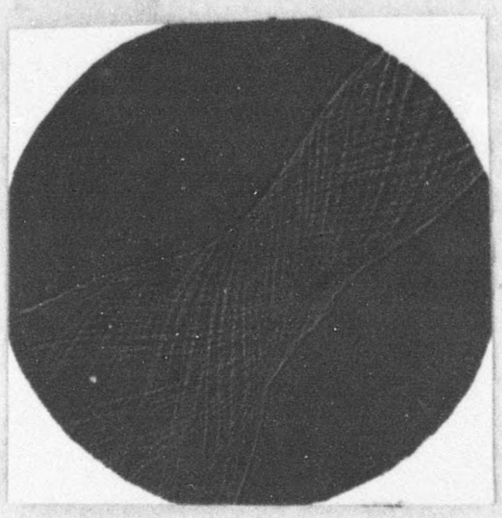
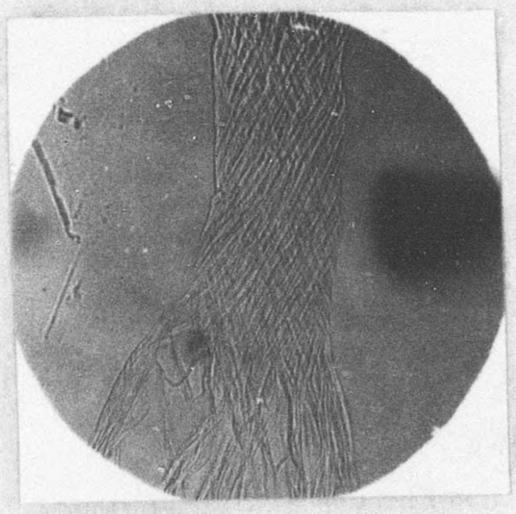
Cotton



"ultra Toramomen"



Thus changing raw materials from pulp to linter, not only in polymerisationdegree but also in qualities of fibres there are epoch making developments, and their cultural meaning is in substituting crude linter for cotton of highclass, i.e., artificial fibres with the same qualities, such as fineness and length as Egypt cotton are created by human.

(2) differences in methods of production:

In dissolution and regeneration of cellulose methodes of production till to-day require much heat and medicals and

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therefore qualities of products are wrong and weak, being small molecules with little energy. According to the author's methodes, amounts of such heat or medicals are remarkably reduced, time spensed for process is shortened from 60 - 80 hours to 15 hours, with enlargement of molecules retained energy becomes great, and therefore durability and feeling of products approaches to cotton. Except in drying of end products, every heating operations are unnecessary, amounts of caustic soda and sulfuric acid used are very small, evaporation and recovery of spinning liquor is also unnecessary, lead-construction of spinning bath is of no use, filterclothes and other filtering materials are unnecessary. Thus the author's methodes are very suitable in Japan at the time when every raw materials are in want.

(3) differences in equipments:

From differences in methodes of production as above mentioned, large parts of equipments used hitherto in factories are almost unnecessary, such as alkali storage tanks, alkali-filters, fore ageing machines and rooms, heating equipments, cooling equipments, viscose tanks, filters, recovery equipments for spinning liquor, desulfurising equipments. Though sulfuring machine, recovery equipments for carbonbisulfide and alkali are increased to 150 - 180%, ice machines and steam boilers are enough with a third. As buildings of factory decrease to half, it is possible to produce more than 150% with supplement of some parts of machines.

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(4) differences in production-costs;

Recently, for improvements of qualities of artificial fibres consumption of heat and medicals has been increased ultimately here and abroad, and cost and price of products has been advanced. The matters conflict with the significance of existence of artificial fibres. As above mentioned, remarkable decrease in consumption of heat and medicals result inevitably lowering of cost and in comparison to ordinary methodes it is insured by 10 yen per 100 lbs, and by fitting management of production lowering of cost will be more than 20 yen. Next table was introduced to Germany in the year before last.

Tables of cost in comparison (March 1943)

	unit price	"ToramomenI"		"Totamomen II"	
		amount of use	price	amounts of use	price
	per 100 kg				
Pulp	Y 39.60	120 kg	47.52	120 kg	47.52
NaOH	30.50	60	18.30	50	15.25
CS_2	27.70	40	11.08	40	11.08
H_2SO_4	4.10	200	8.20	100	4.10
$ZnSO_4$	16.50	--	--	--	--
Na_2S	25.00	--	--	--	--
Fatts			.80		.80
	1 K.W.H.	K.W.H.		K.W.H.	
Power	0.023	360	8.28	360	8.28
Fuel	3.00	200	6.00	200	6.00
	per head	person		person	
labour cost	2.75	6	16.50	6	16.50
indirect expense			58.60		58.60
total sum		per 100 kg products	175.20		168.13

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ordinarz staple fibres		"ultra Toramomen"	
amounts of use	price	amounts of use	price
120 kg	47.52	120 kg	47.52
100	30.50	20	6.10
38	10.53	20	5.54
140	5.74	30	3.60
20	3.30	--	--
2	.50	--	--
	.80		.80
K.W.H.		K.W.H.	
300	6.90	360	8.28
700	21.00	200	6.00
erson		person	
5	13.75	3	8.25
	58.60		58.60
	199.14		144.60

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(5) differences in construction cost:

In construction cost, decrease due to simplification of equipments above mentioned may be cancelled by necessary supplement like kneader or recovery equipments for carbon bisulfide. Therefore, in comparison to construction cost of staple fibre factory hitherto, being about 450,000 yen per ton a day, in the case of establishment, with consideration of the case of buying existing equipments and of costs of goods today, five times may be necessary, i.e., 45,000,000 yen per 20 tons a day.

(6) differences in profit:

The profit (without refunding) of this process may be 20 - 30 yen per 100 lbs., on an average 25 yen, assuming the price of product as same as ordinary fibres whose profit is 10 yen. Therefore it may be admitted to be sure to get 337,500 yen per month or 4,000,000 yen per year.

(7) about the establishment of company:

For rapid supply of textiles of superior qualities in Japan the army, who has understood the object of this plan, is prepared to give permission of the use of the factory to Dr. Tachikawa before disposal of factory equipments as government property according to resolution of committee as soon as permission by the headquater of Allied Forces is given. Capital about 4,000,000 yen necessary for borrowing and operation of equipments may be raised by the private debt of Tachikawa research institute, and at the same time the new company "Nippon

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Cellulose Industry Company Ltd." may be established and the application for its sanction also is prepared. This sanction may be possible with the permission by the headquarter of the Allied Forces. The increase of capital by ten times at the dicision of disposal may be offered for public subscription in principle.

References:

1. Is "Toramomen" staple fibres? May 1943.
2. "Toramomen", macromolecular artificial fibres by Tachikawa system (part I) Oct. 1943.
3. do. (part II) Dec. 1943.
4. The plan of the factory (preparing)

Remarks: 2, and 3 is for the explanation of the new idea for the production to Germany at the end of Jan. 1944.

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Dr S. Tachikawa

Research in the production of artificial fibres of high polymerisationdegree.

By Dr. S. Tachikawa.

Research institute of
engineering, Kyoto
Imperial University.

This research concerns the production of artificial fibres of high polymerisation by viscose-process.

In the nature of things, there are two main factors which decide properties of artificial fibres. One concerns the nature of materials composing artificial fibres, and the other the way of organisation of materials. According to the general idea of cellulose-chemistry of to-day, the nature of materials in artificial fibres from cellulose as their raw materials can be indicated by polymerisationdegree of that cellulose. Therefore, to superior artificial fibres it is required to be high polymerisationdegree and it seems very easy matter to attain this subject at production of artificial fibres by viscose process. Namely, it is sufficient if ageing of alkalicellulose is entirely foregone together with lowering temperature of its disintegration and shortening its duration. But in many cases, notwithstanding high polymerisationdegree thus produced artificial fibres cannot satisfy various points which their qualities demand of high polymerisationdegree and are little better than, rather fall below artificial fibres

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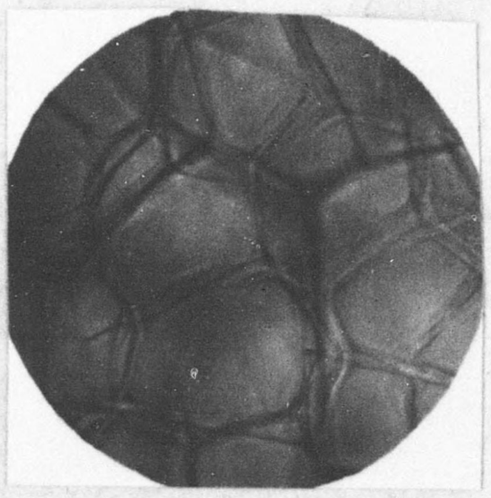
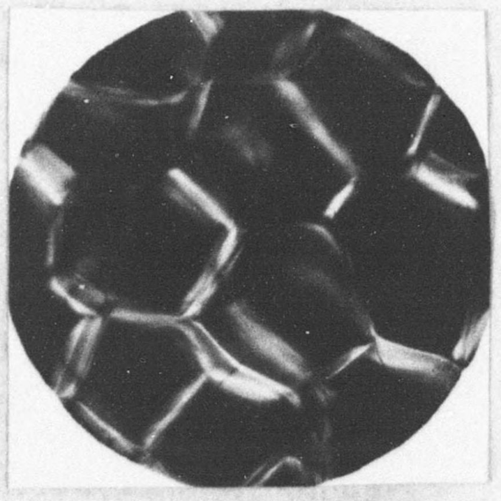
of low polymerisationdegree. These matters result from entirely neglecting the way of organisation of materials as the other factor. The author has been able to prove experimentally that the right way of organisation of materials is regeneration of the crystalline structure of natural cellulose asit is in artificial fibres produced. For examples, decomposing with acid viscose solution from alkalicellulose with various ageing-degrees, next figures are obtained by microscopie observation in the ordinary and polarised light.

	ordinary light	polarised light
polymerisation-degree		
640		
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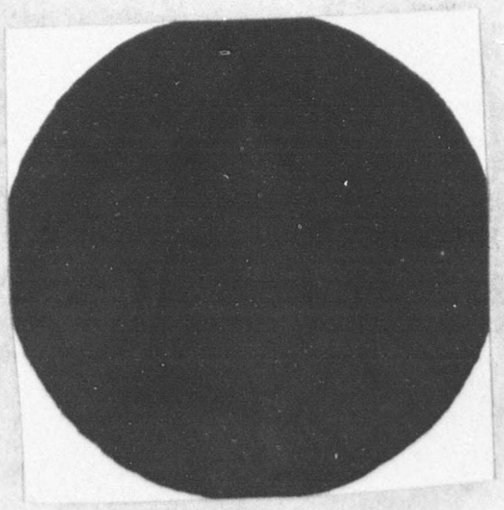
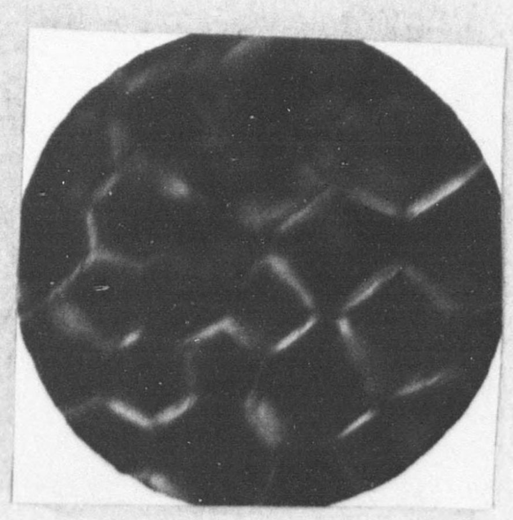
414		

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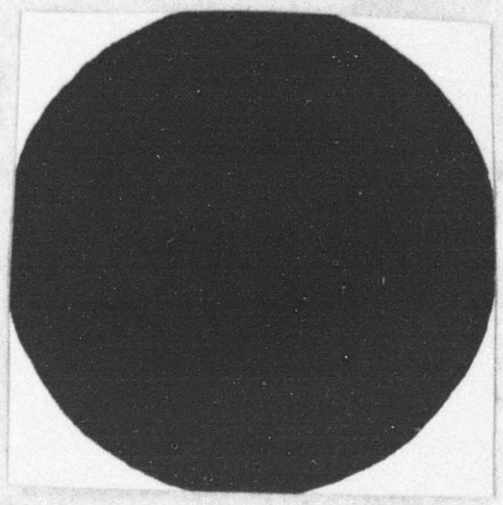

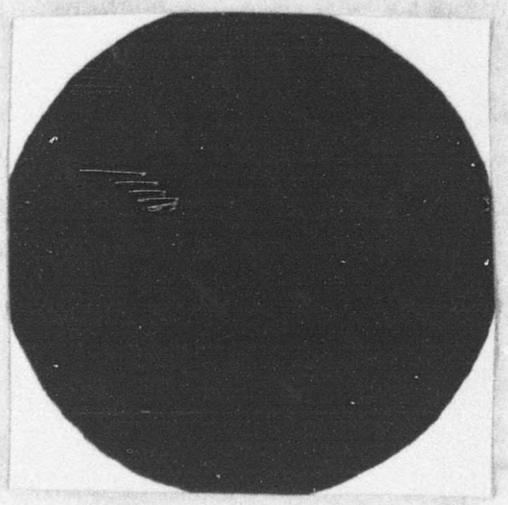

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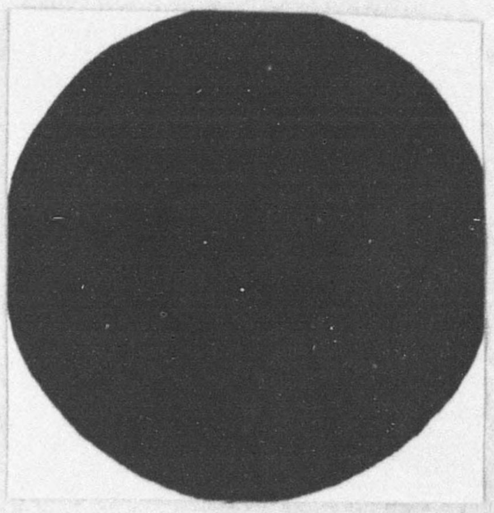

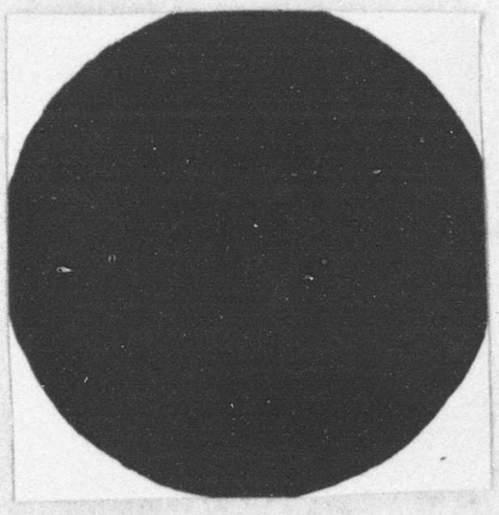

As regenerated cellulose from alkalicellulose of short ageing maintains the undamaged state of natural cellulose it is natural that it shows the splendid crystalline structure and also the right way of organization of regenerated cellulose can be expected from such conditions as regenerate the crystalline structure. Therefore, by means of such observation the author

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has inspected in order each course of production of artificial fibres by viscose process and has decided their conditions as follows:

(1) Ageing of alkalicellulose should be abolished.

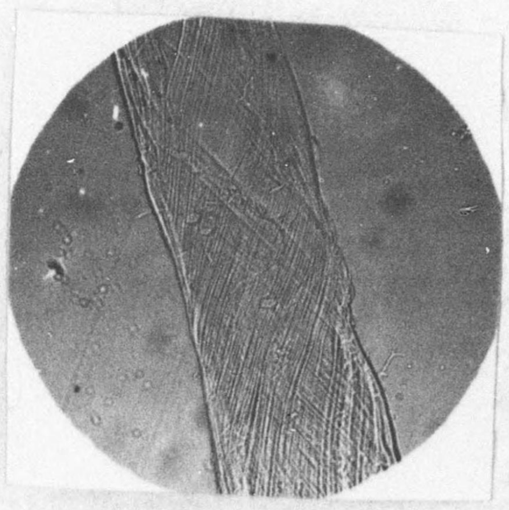
(2) Alkali content of viscose should be as small as possible.

(3) After ageing of viscose should be abolished.

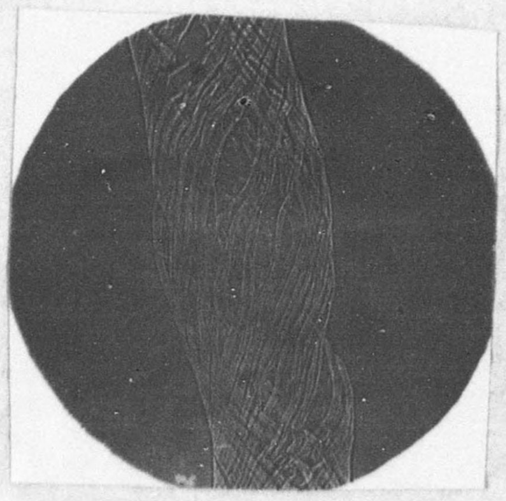
(4) Cellulose content of viscose should be as large as possible.

(5) Viscose should be decomposed and regenerated by dilute acid solution of low temperature and presence of so-called coagulationagent, e.g. zinc sulphate or sodium sulphate should not be permitted.

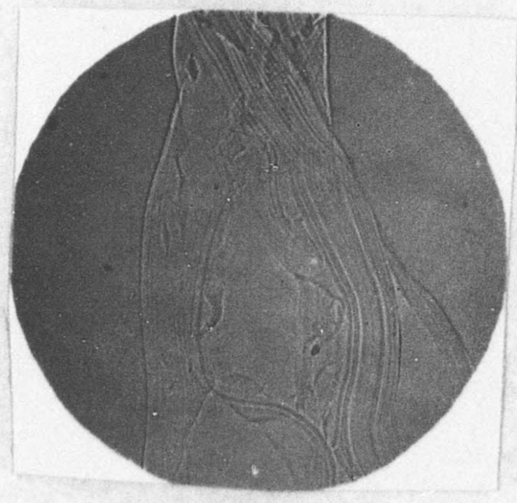
Thus artificial fibres obtained by fulfilment of these conditions possess such fibrillstructure as in natural fibres. Following figures show fibrillstructure of various fibres.



fibrill of pulp



fibrill of new artificial fibre



fibrill of ordinary artificial fibre.

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Properly speaking researches in the effect of fibrill-structure of fibres are practically nil hitherto. The author has studyed this point by textile engineering especially and has conformed that fibrillstructure is the origin of the tissue-energy of fibres, (its experimental explanation is ommitted) and also has proved that the tissue-energy of fibres decides almost all qualities necessary to textile fibres, not only durability of fabric but also strength, elasticity and etc. Therefore, the satisfactory tissue-energy of fires depend on entirely their fibrillstructure and the embodiment of fibrill-structure is decided by various conditions of production as described above. Thus from this research, possibility for production of artificial fibres from cellulose as raw materials whose tissue-energy depending upon conditions of production may be expected to have such effects as of not only cotton or hemp but also wool or silk, whose chemical constitution is quite different from cellulose, has been discovered. In other words artificial fibres by this new process are not simple substitutes for natural fibres, but are entirely new creation.

The author has now completed the industrial production of the new artificial fibres of polymerisationdegree about 500 under the new idea as above mentioned and has proved their practical effects at various fabrics. Some data concerning the new artificial fibres are shown in the next table.

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	strength gr/D dry	strength gr/D wet	wet strength/ dry strength (%)	elongation (%) dry	elongation (%) wet	st a
cotton	3.4	3.3	96	8.2	8.7	
pulp	--	--	--	--	--	
new artificial fibre	3.8	3.3	87	8.6	9.6	
ordinary artificial fibre	3.0	2.1	70	18.4	23.3	

As industrial merits in production of the new artificial fibre their consumption of caustic alkali amounts to only 60% of products though for ordinary artificial fibres it attains to 90% of them, and their consumption of heat is also half of latters, and extreme simplification of equipments can be obtained by their reduction of process in production.

The author is studying now the new artificial fibres aiming at polymerisationdegree about 800 - 1000. Outline of this study is as follows.

In viscose-process the origin of lowering polymerisationdegree of cellulose is on action of alkali, so alkalicontent in viscose solution must be as little as possible. For that purpose the ratio of alkali to cellulose in composition of alkalicellulose must be most small. According to opinion till to-day, as alkali-cellulose is produced by 17% alkali, alkalicellulose must be

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rength in 6% lkali gr/D	polymerisation-degree
2.8	2560
--	940
1.4	520
0.6	240

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pressed firmly for the purpose of small ratio in its composition above mentioned. Though this operation is very easy as everyone knows, sulfuration of such firmly pressed alkalicellulose is very difficult to get perfect viscose solution. The author has discovered concrete solution of this problem. According to this, whether use of 17% caustic alkali in production of alkalicellulose is absolutely necessary is a question, and it may be possible to obtain perfect viscose solution from alkalicellulose steeped in 10% caustic alkali. Therefore the ratio of alkali to cellulose could be lowered to 1:4, to say nothing of 1:3. (at ordinary artificial fibres this ratio is more than 1:1.5.)

Now on the other hand, it is impossible to spin such viscose of high polymerisationdegree and of high viscosity by usual spinning system. The author has the opinion on this subject as follows: so far as the natural crystalline structure of dissolved cellulose is not damaged -- that is, unless lowering of polymerisationdegree -- these dissolved cellulose may maintain their ability to form fibrillstructure by self-cohesion. Therefore, wholly new spinning system which depends upon entirely free motion of cellulose crystal must be adopted on doing away with usual spinning system in which dissolved cellulose are coagulated by compulsion of external force. Such ability may be maintained in cellulose molecule of high polymerisationdegree.

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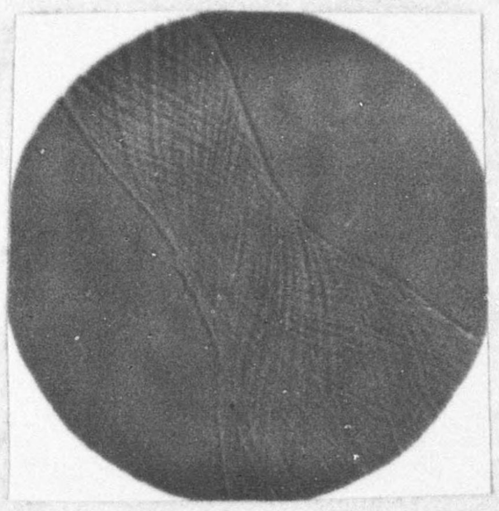
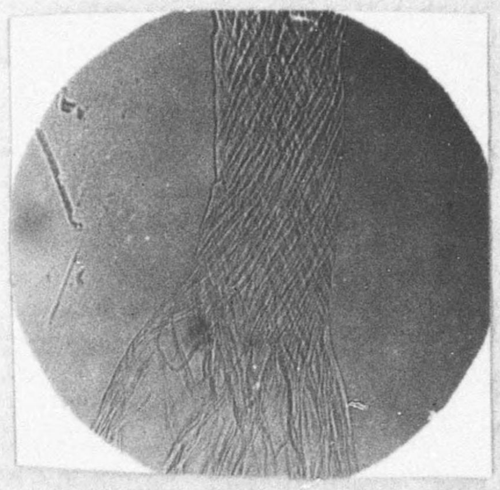
As polymerisationdegree of cellulose materials for this research must be as high as possible, it is suitable for this purpose to use linter rather than pulp of high polymerisation-degree. It is said that in ordinary viscose process cotton or linter is not superior to pulp, but this is the case of artificial fibres of low polymerisationdegree. On the principle of this research, such cellulose of high polymerisationdegree as linter is naturally necessary and by reflecting of superior qualities of such cellulose of high polymerisationdegree directly upon the products, it is possible to obtain artificial fibres of tissue-energy not found in products from pulp. For examples, as trial manufacture such as in next figure is obtained.



fibrill of cotton



fibrill of new fibre of ultrahigh polymerisation degree

Under above mentioned progress and idea, the author is engaged in completion of the production of new artificial fibres.

-- End --

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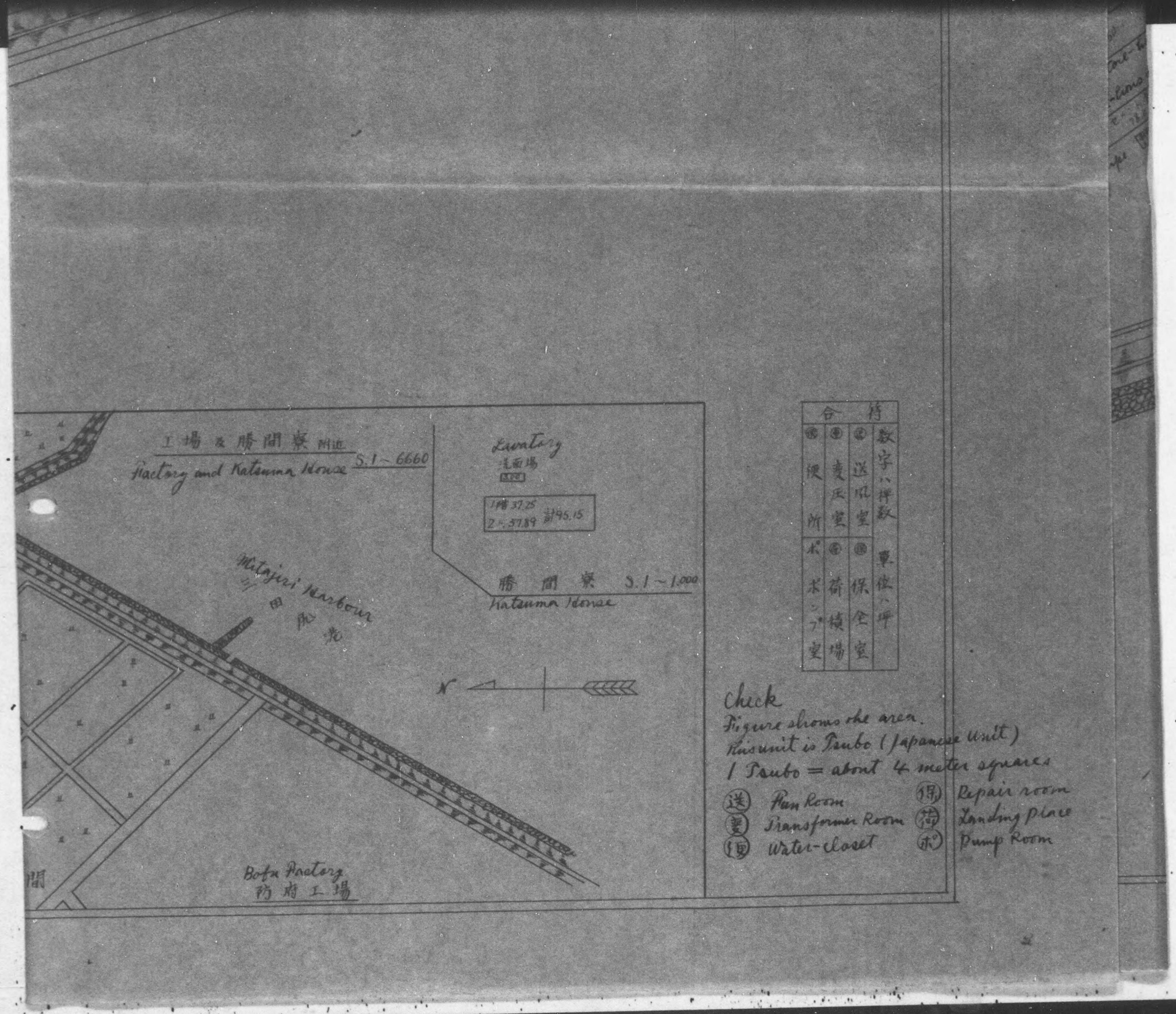

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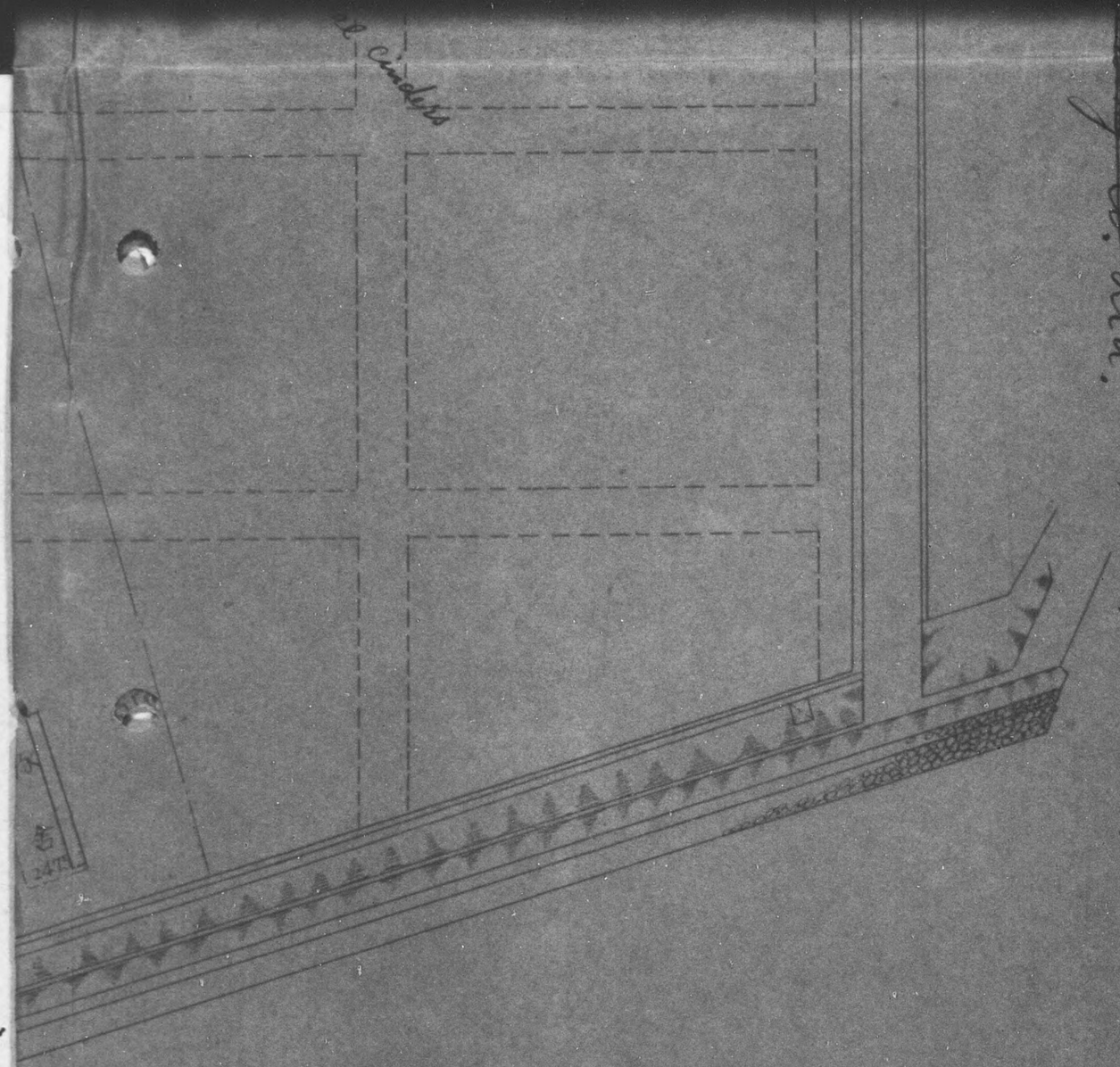
置圖

縮尺千貳百分之壹

Scale, 1-1,200.



合符			
數	通	通	數

工場及勝間察附近

Lavatory

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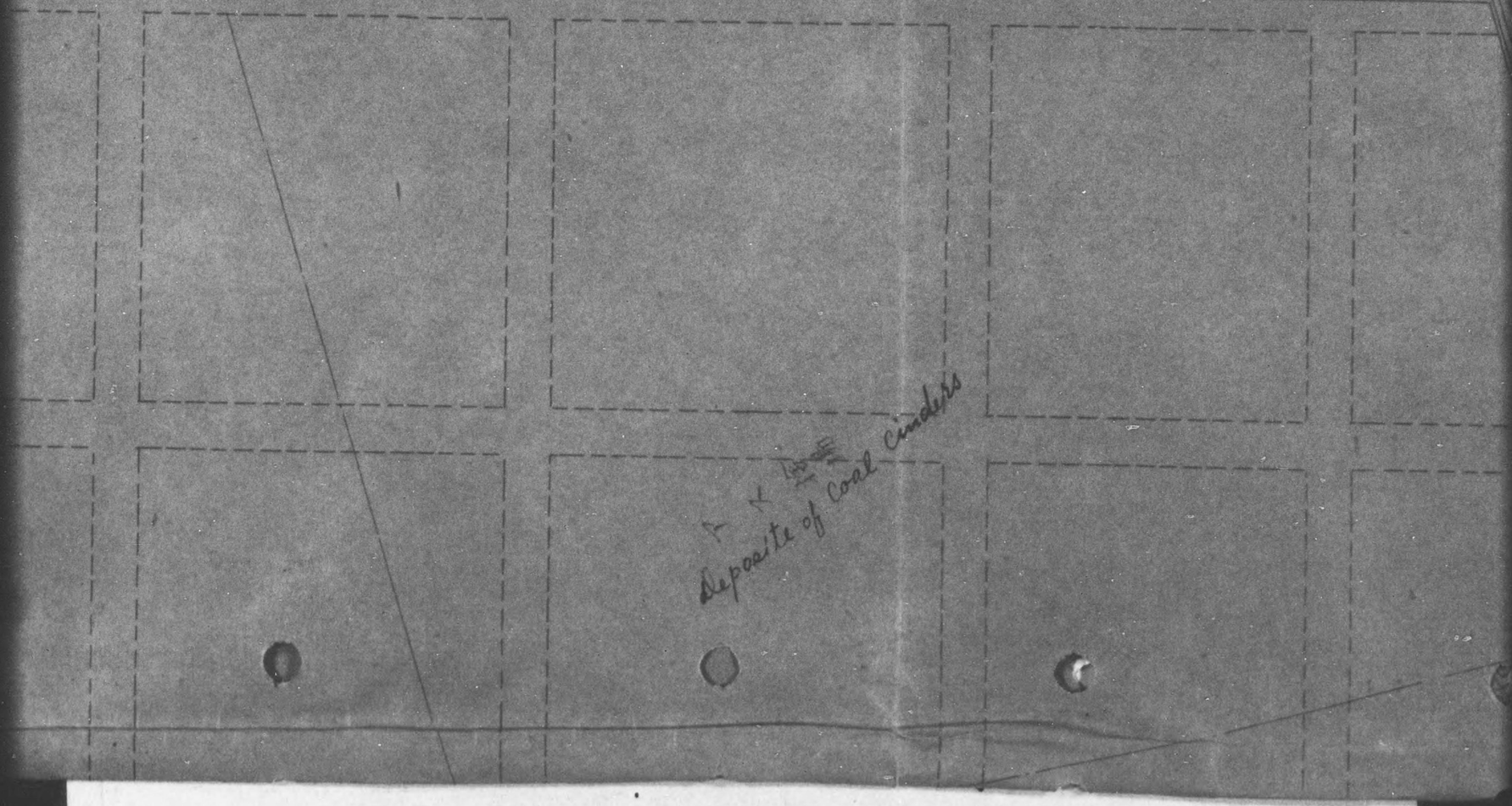
種防府工場建物配置圖

縮尺千貳百分

Bofu Factory, ~~Kanegafuchi Spinning Co. Ltd.~~

Scale, 1



Deposite of coal cinders

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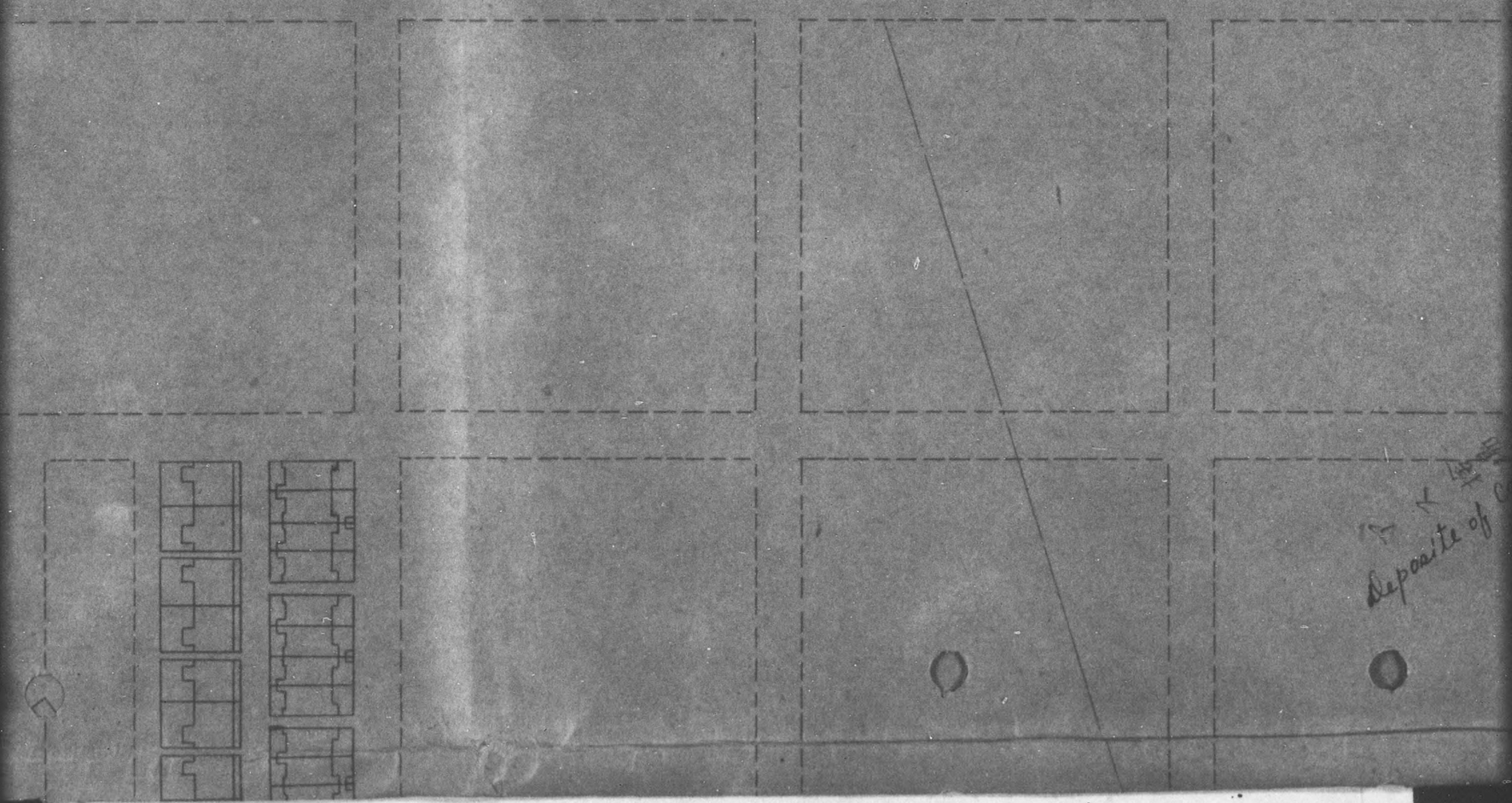
十 [illegible]

~~[illegible]紡績株式會社~~防府工場建物配

for disposition of Building at Bofu Factory, ~~Kanegafuchi Sp~~



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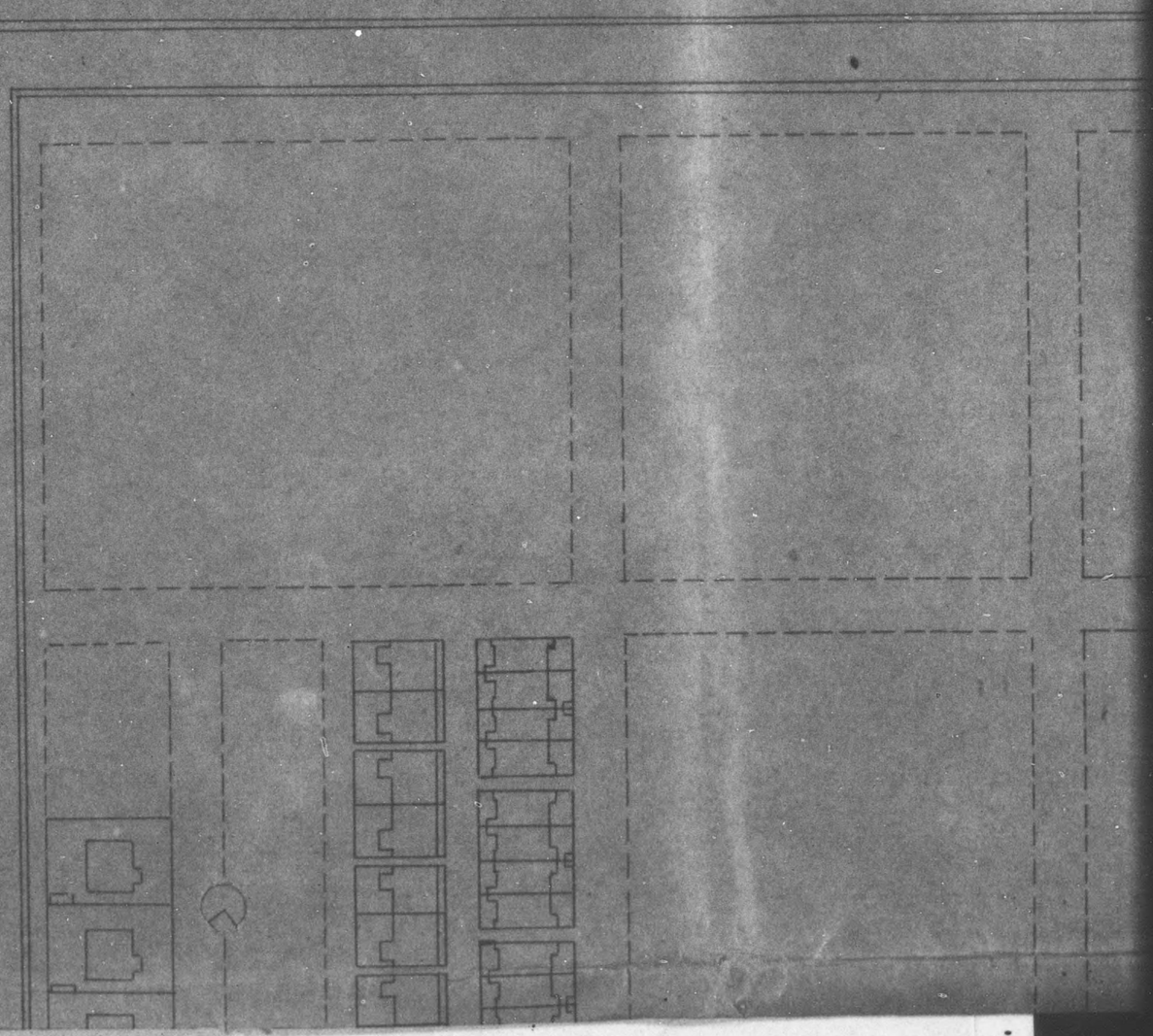
(2) 陸軍[illegible]

~~[illegible]~~

(2) Drawing for disposition of Building at Bofu



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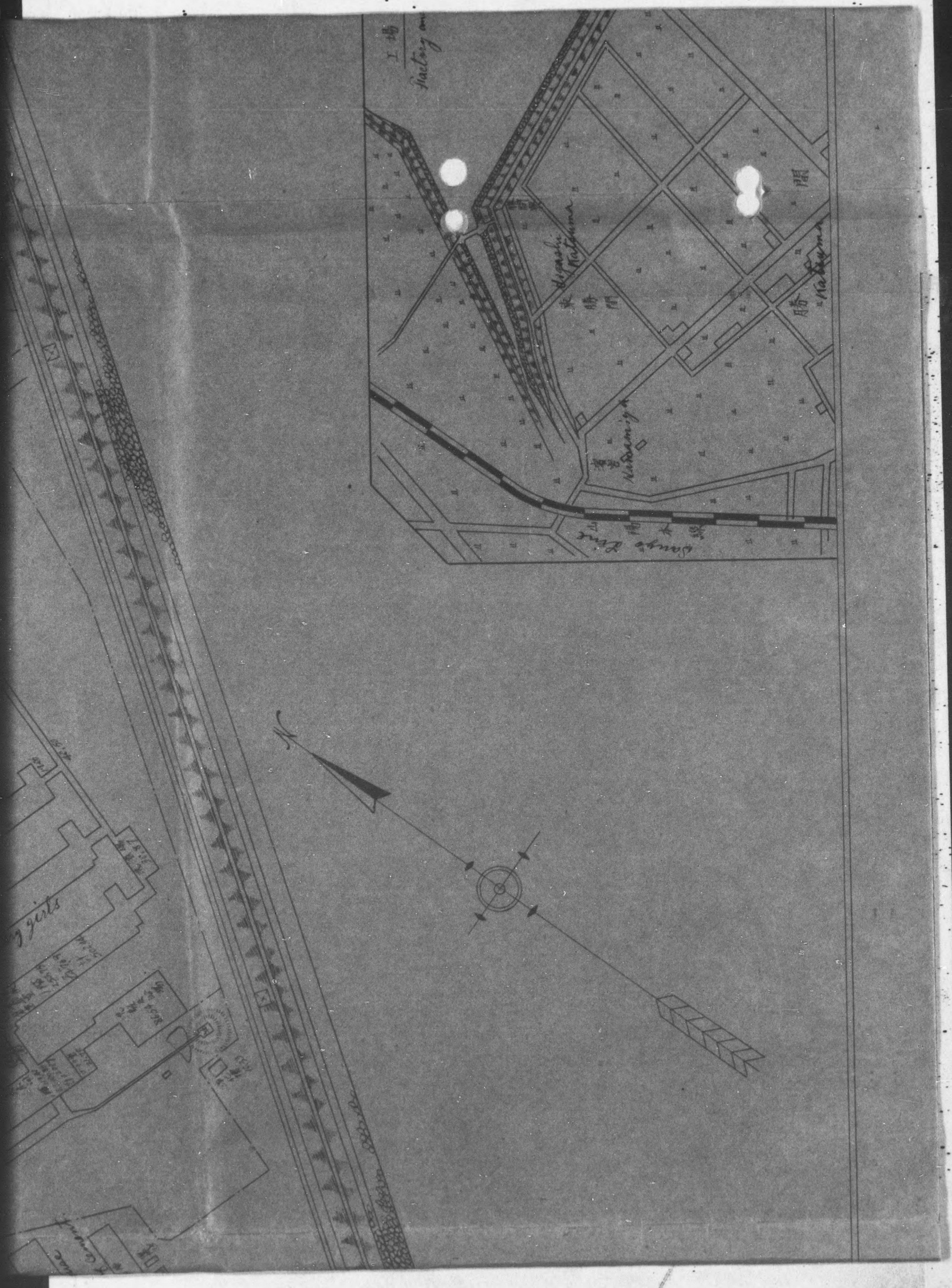

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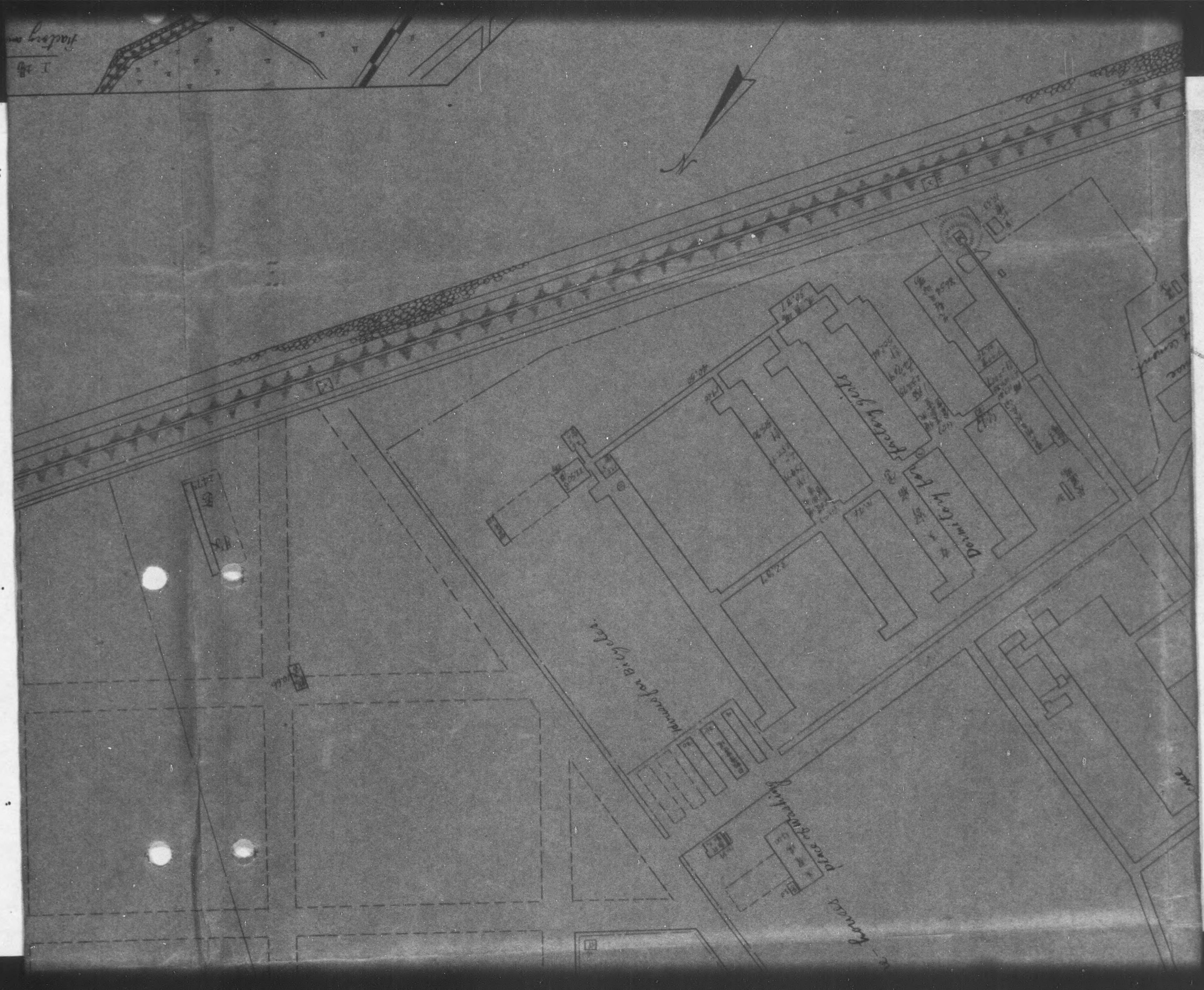
Pennsylvania Railroad
Pennsylvania Railroad
Pennsylvania Railroad

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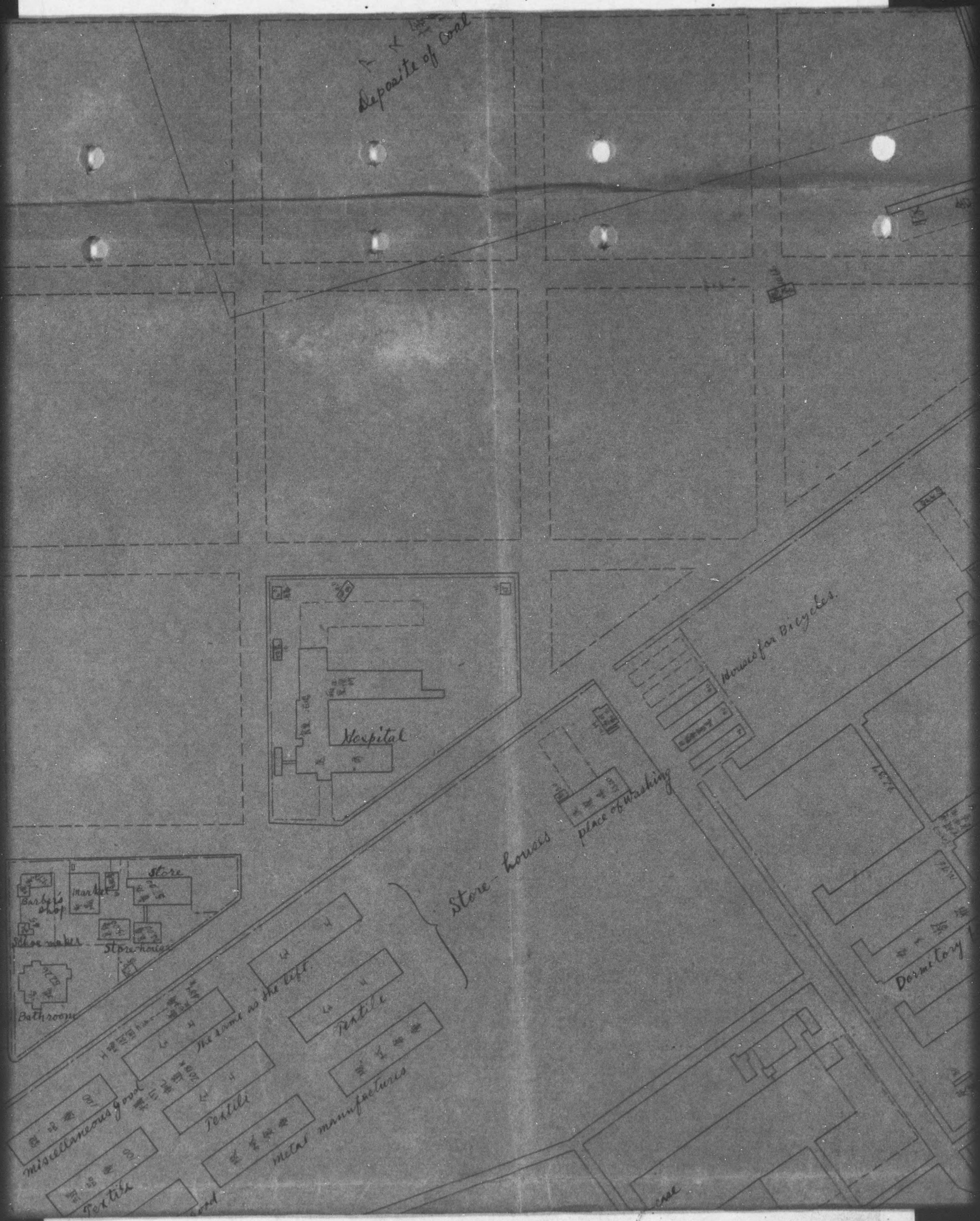

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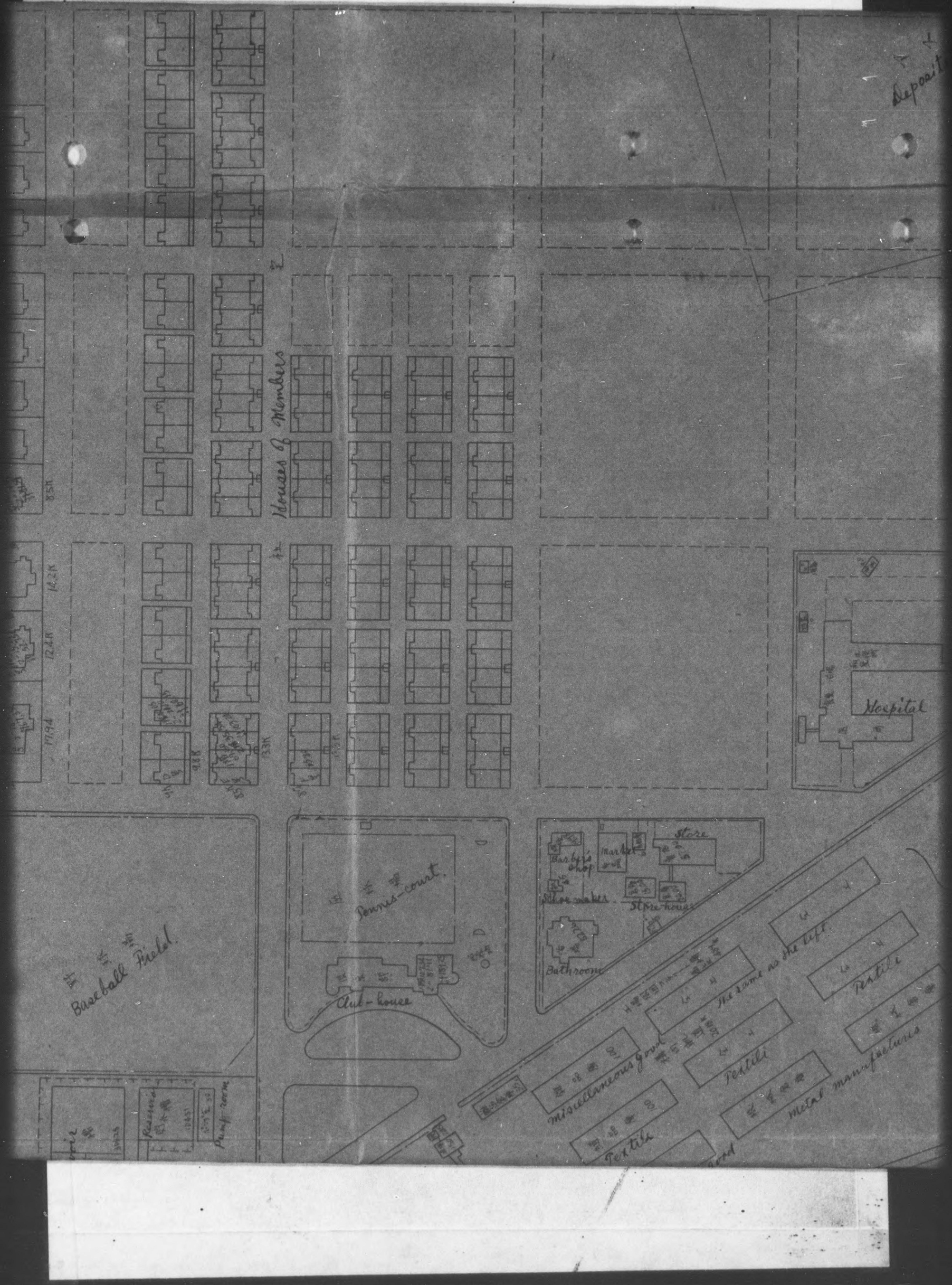

Baseball Field
Reservoir
Pump-room
Houses of Members
Club-house
Tennis-court
17.94
12.4K
14.2K
8.5K
9.8K
13.3K

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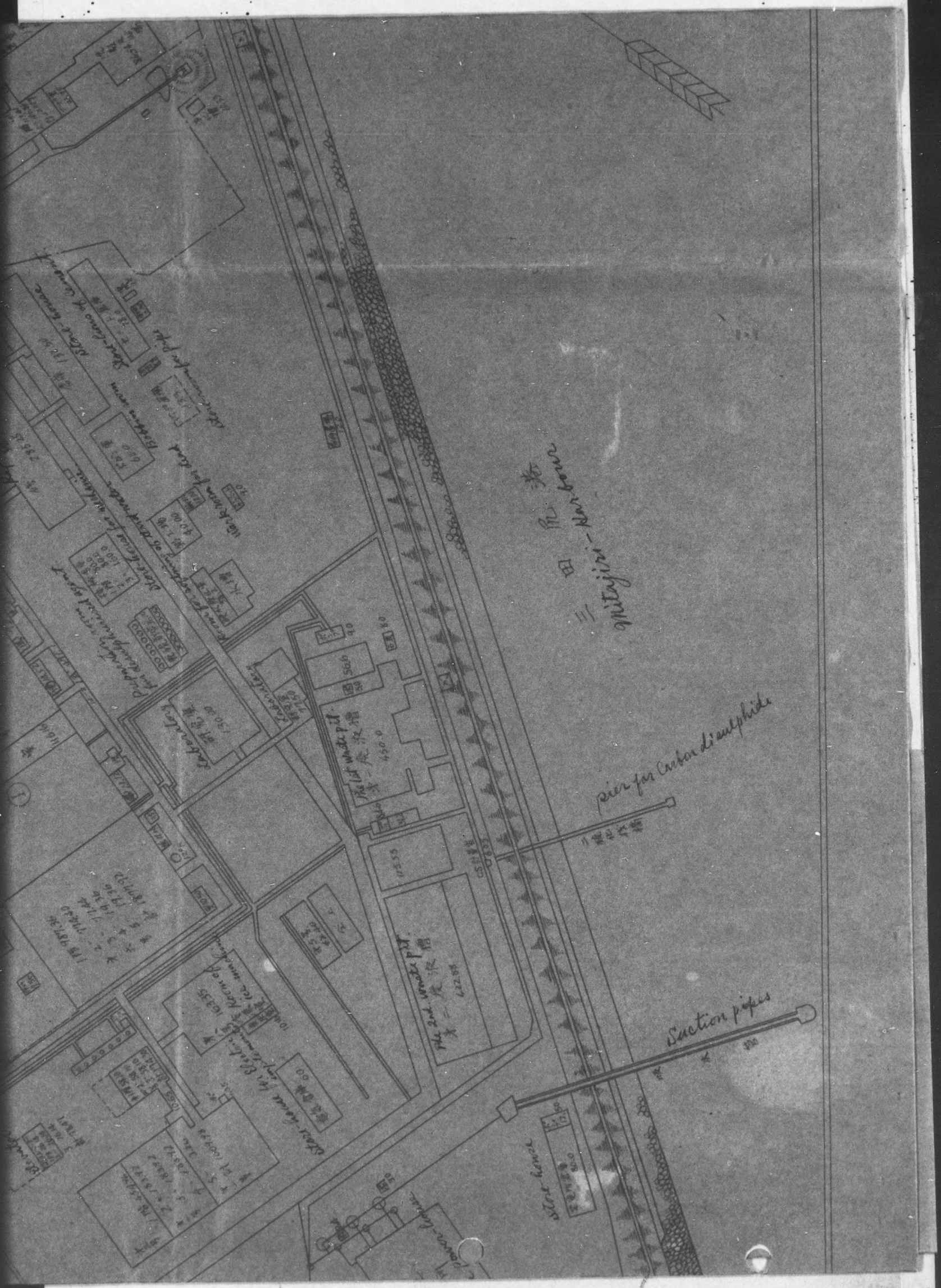

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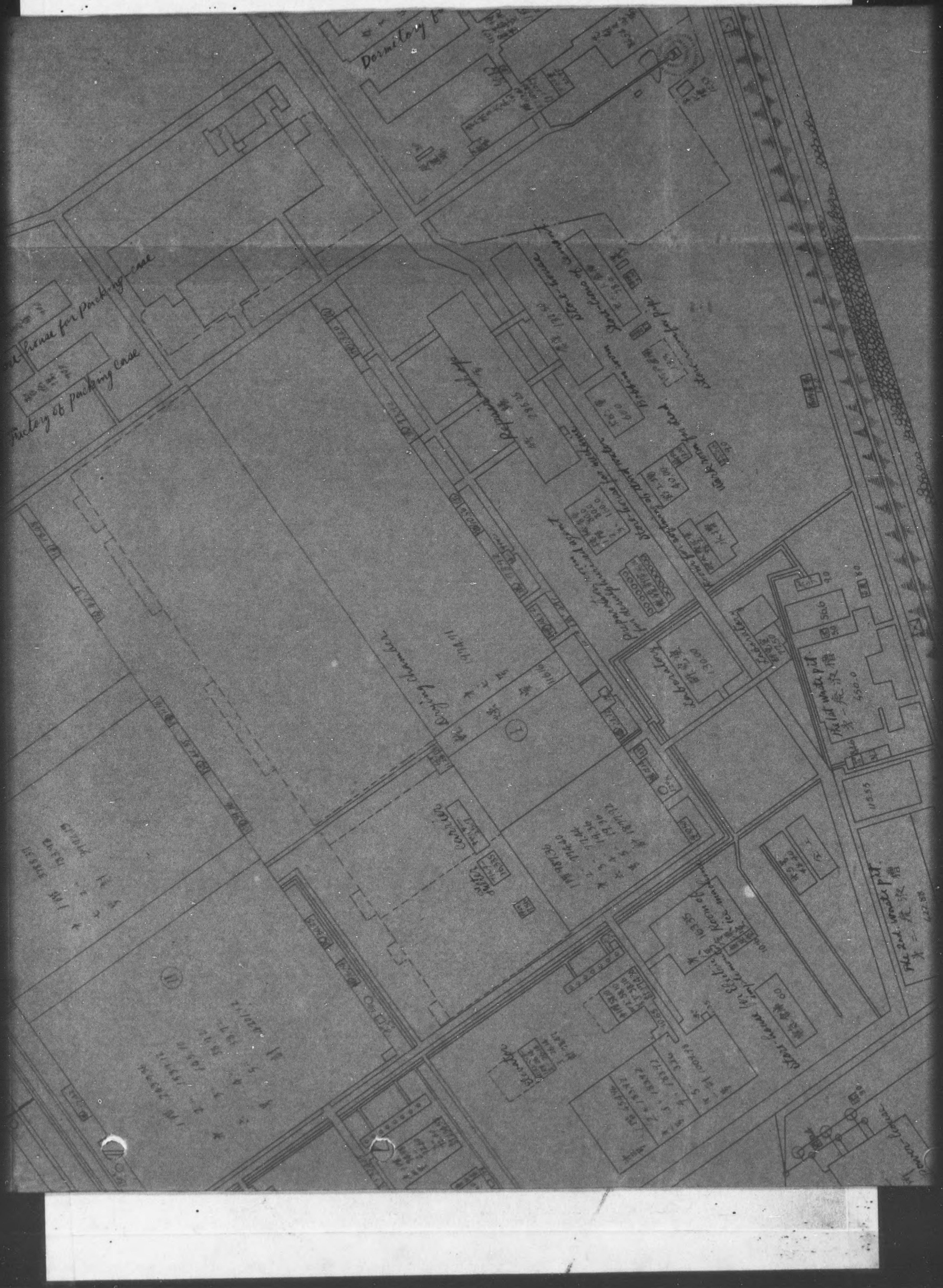

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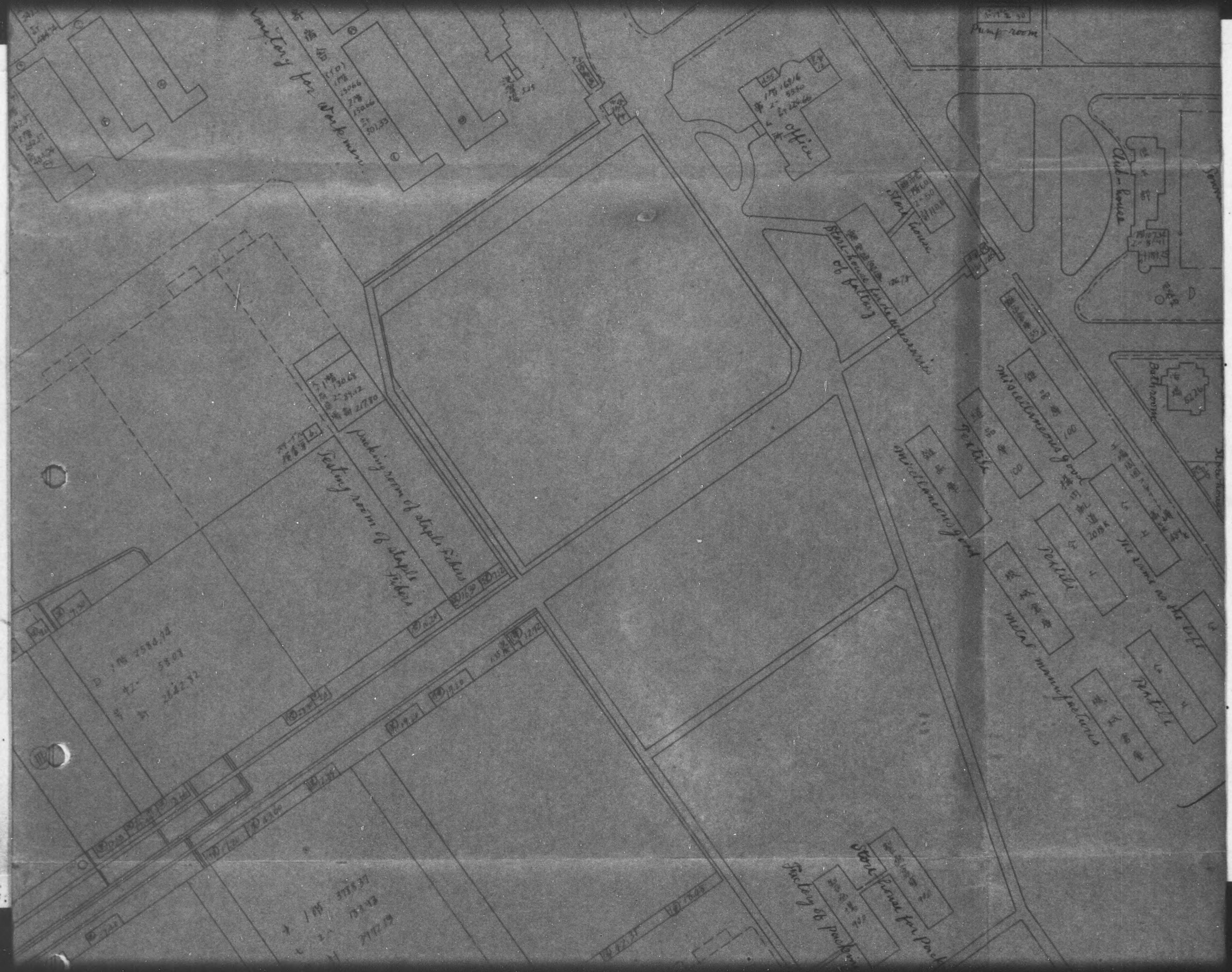
Pump-room
Office
Store house
Store-house for the necessaries of factory
Club-house
Bathroom
Miscellaneous good
Textile
Textile
Textile
Metal manufactures
Store house for pack
Factory of packing
Packing room of staple fibers
Testing room of staple fibers
Sanitary for workmen

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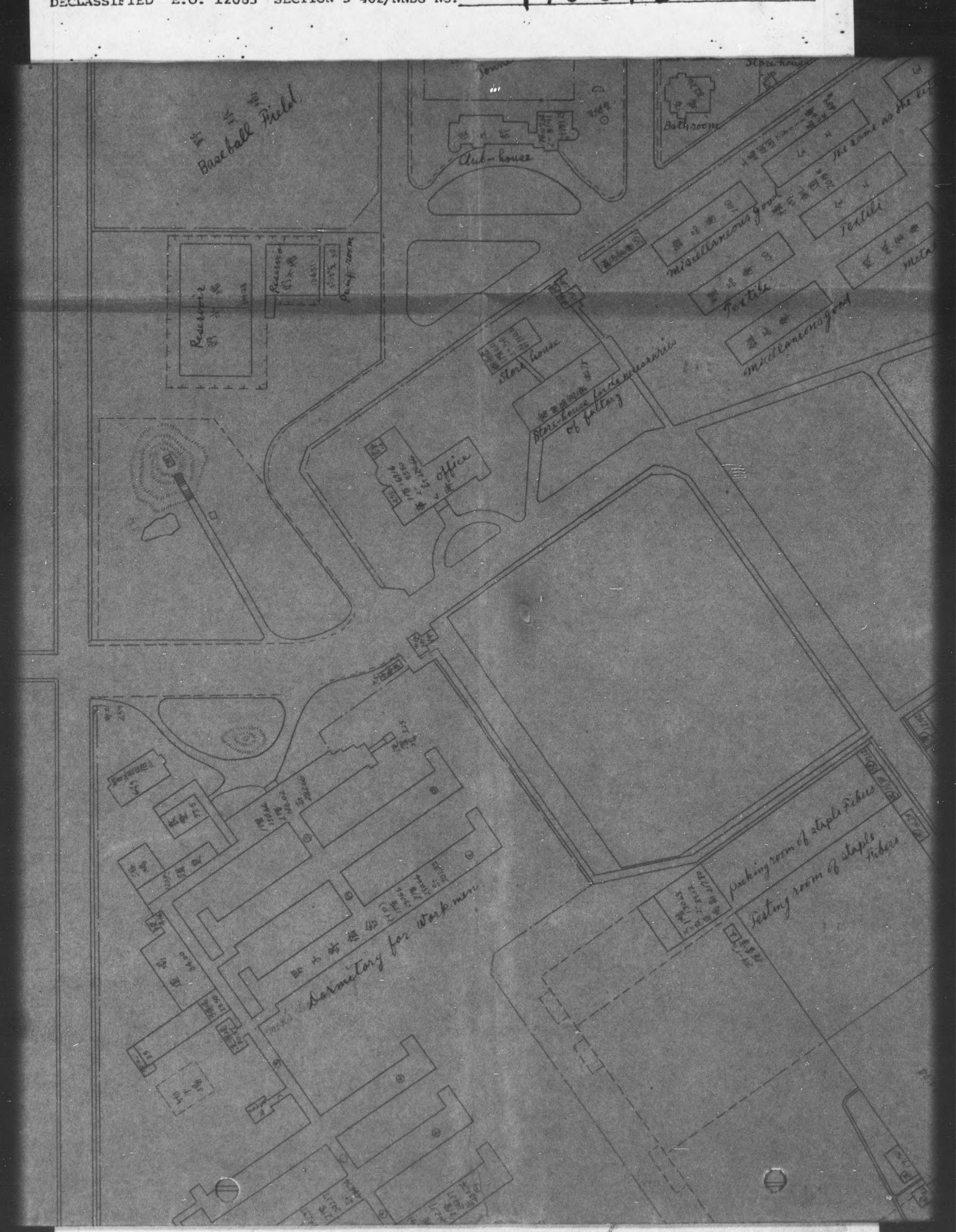

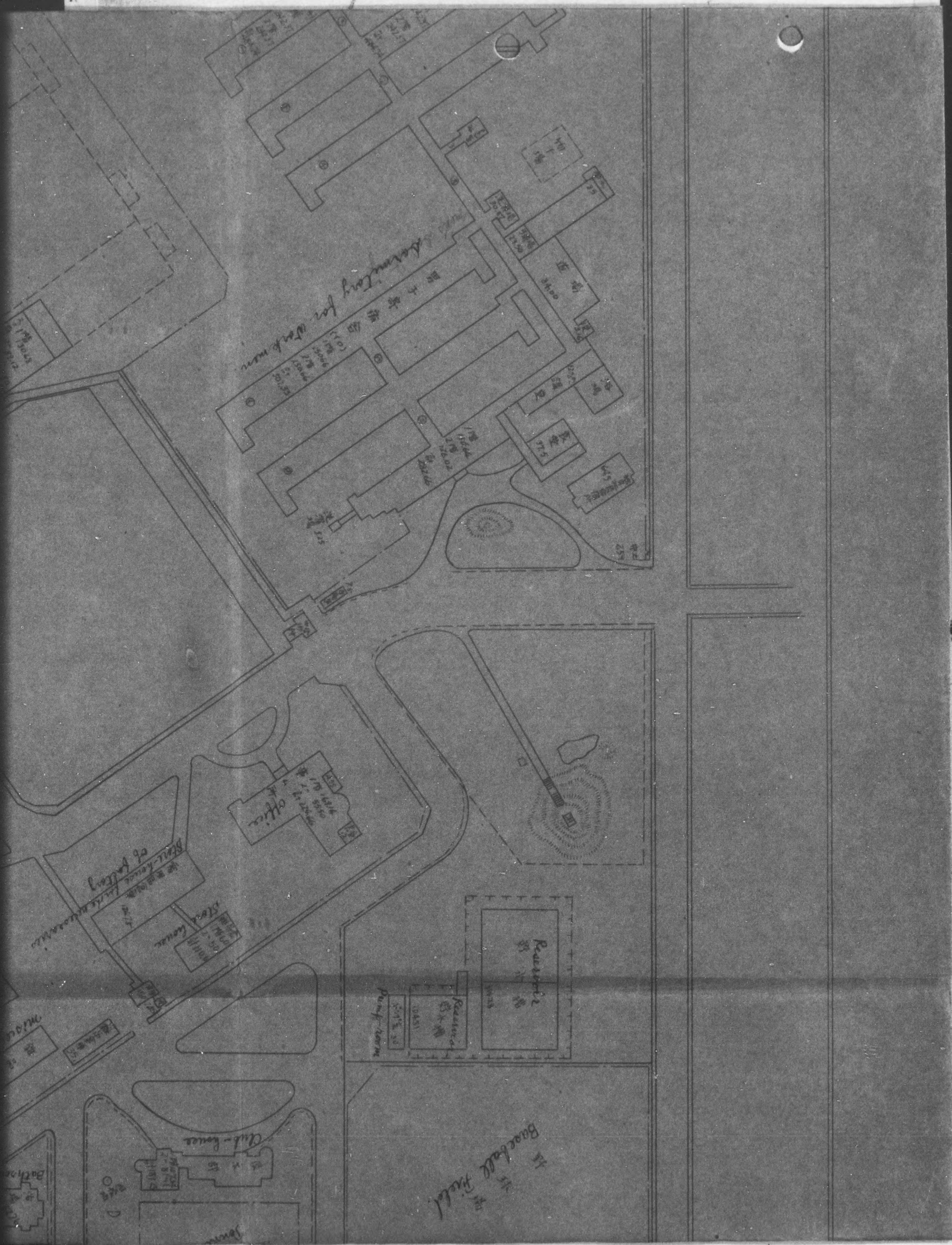
Baseball Field
Club-house
Store house
Store-house furnishing
Office
Reservoir
Pump-room

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