R E P O R T

on

SUGGESTED REPAIRS AND IMPROVEMENTS

to

SEWAGE DISPOSAL SYSTEM

KAMLOOPS INDUSTRIAL SCHOOL

KAMLOOPS AGENCY

by

W. C. WARREN

Vancouver, B. C.,
August 20, 1937.

Vancouver, B. C.,
August 20, 1937.

KAMLOOPS INDUSTRIAL SCHOOL
SEWAGE DISPOSAL

Sir:-

I made an examination of conditions existing at the above school in respect to sewage disposal, during June, 1937.

Following is a report in this connection.

KAMLOOPS INDUSTRIAL SCHOOL

The accompanying plan Appendix "A" shows the location of the school. The school building is situated at the southern extremity of a low ridge projecting from the hills to the north, and is at an elevation of about 25 feet above the bank of the South Thompson river. To the south and west are extensive river flats, most of which are covered with water at flood stage of the Thompson river.

Occupying a considerable area of the School

the location of the school. The school building is situated at the southern extremity of a low ridge projecting from the hills to the north, and is at an elevation of about 25 feet above the bank of the South Thompson river. To the south and west are extensive river flats, most of which are covered with water at flood stage of the Thompson river.

Occupying a considerable area of the School property on the river flats is a small lake used for bathing purposes by the school children. The lake surface varies in elevation four or five feet at medium and high stages of the river, when river and lake are directly connected by a small channel. At such times the lake area increases more than 50%.

PRESENT SEWAGE DISPOSAL SYSTEM

Sewage disposal facilities consist of a septic tank of about 4,000 gallons capacity or about 13 gallons per head for the school population of approximately 325. The flow to the septic tank is approximately 12,000 gallons per day.

C.E.Webb, Esq.,
District Chief Engineer,
Dominion Water and Power Bureau,
VANCOUVER, B. C.

Effluent from the septic tank is discharged at about 200 feet from the tank and finds its way by an open ditch to a small pond at the foot of the garden.

When the sewage disposal system was first installed in 1924, it included a sub-irrigation system of about 0.35 acres to which was discharged the tank effluent. In 1930, however, the distribution pipes of the sub-irrigation system clogged up, were subsequently re-conditioned and operated successfully for two years when they again clogged and have not since functioned. The last time was due apparently to the fact that solids were passing from the settling chamber to the syphon chamber, as was evidenced by the condition of the pipes recently dug up.

The septic tank is in my opinion too small to accomodate the amount of debris which accumulates in a few months after being cleaned. The reduced capacity as a result of this accumulation causes an increased rate of flow through the tank resulting in decreased septization and the conveyance of solids to the syphon chamber. The function of the settling

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The septic tank is in my opinion too small to accomodate the amount of debris which accumulates in a few months after being cleaned. The reduced capacity as a result of this accumulation causes an increased rate of flow through the tank resulting in decreased septization and the conveyance of solids to the syphon chamber. The function of the settling chamber appears to be nullified by the grade of the inlet pipe which allows a high velocity inflow and keeps the tank contents in an agitated state.

It would appear desirable to have an enlarged settling chamber capacity at least twice the existing capacity, or sufficient to accomodate from 16 to 24 hours sewage.

The major problem, however, appears to be a satisfactory disposal of septic tank effluent and sludge.

The present method of disposal of septic tank effluent, to the pond at the foot of the garden, is very unsanitary as at times a considerable amount of the effluent accumulates and the area becomes a breeding ground for flies. The stench from the area has become very much of a nuisance.

METHODS OF SEWAGE DISPOSAL

In addition to the inspection of the existing plant, I investigated the possibility of alternative methods of disposal of sewage both in a raw condition and after treatment.

Sewage in a raw state, from Kamloops School, may not be disposed of other than by emptying into the North Thompson river. To do this would require the construction of a pipeline about two and one-half miles in length. The pipeline grade, however, would be below the minimum for satisfactory conveyance.

On the attached plan are shown two projected sewer lines from the school to the Thompson river.

Line "A" as above mentioned would be unsatis-

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On the attached plan are shown two projected sewer lines from the school to the Thompson river.

Line "A" as above mentioned would be unsatisfactory due to insufficient grade. Line "B" would not be possible for raw sewage, due to location of C.N.R. pumphouse supplying Kamloops Junction, within a short distance of the projected sewer outfall.

For the discharge of treated or processed sewage to the South Thompson river, it would be desirable to have an outfall closer to the school and farther from the pump intakes, as dissemination in the river water would be more complete and the cost would be less.

The disposal of raw sewage by broad irrigation is not a practical possibility due to necessity of pumping to suitable ground and of using other methods

of disposal in winter.

It is probable that septic tank treatment of sewage at Kamloops School is preferable to any other process as it is as a rule the least expensive to operate, and provides an effluent easily disposed of and susceptible to subsequent treatment if found necessary. The sludge and detritus is reduced to a minimum and both are in a state readily and cheaply handled.

DISPOSAL OF SEPTIC TANK EFFLUENT

Effluent from septic tanks is not considered by most authorities to be free from disease producing bacteria, and for that reason subsequent treatment or disposal should be considered necessary at the Kamloops Industrial School, so as to preclude the possibility of endangering the health of the neighborhood.

The most readily available place of disposal would be the South Thompson river, where the low water flow would be sufficient to provide a dilution of about 1 in 62,000 -- authorities consider

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The most readily available place of disposal would be the South Thompson river, where the low water flow would be sufficient to provide a dilution of about 1 in 62,000 -- authorities consider that 1 in 50 to 100 is ample safeguard. However, it would probably be unwise to empty the septic tank effluent directly into the river even if subsequenty chlorinated or filtered owing to the proximity of the City of Kamloops and other users, at least until other reasonable expedients have been exhausted.

The system of disposal by sub-irrigation is the method most suitable for adoption at the school. It is likely to prove the cheapest to install and operate, and least likely to create a nuisance. The area suitable for the purpose is limited to about one to one and one-half acres close to the septic tank,

but at a desirable distance from the river.

SUGGESTED SEWAGE DISPOSAL SYSTEM

I would suggest that the existing sewage disposal system be re-constructed with minor alterations to function as was originally intended. The septic tank capacity should be increased to take care of present requirements, sub-irrigation beds provided for disposal of the effluent and facilities for removing accumulation of sludge and detritus installed. Such a reconstructed system with the improvements and facilities mentioned, is estimated to cost complete $6015.00 and is as shown on attached plan Appendix "B".

SUB-IRRIGATION DISPOSAL BEDS

Beds suitable for disposal of septic tank effluent by sub-irrigation may be constructed at an estimated cost of $3745.00. Such an installation should consist of two units aggregating about one acre in area and so connected with the septic tank as to permit of alternate applications of the effluent to the beds at intervals of about six hours.

Tile in the existing disposal beds is laid at a depth of 4½ feet. It is proposed that the new tile

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Tile in the existing disposal beds is laid at a depth of 4½ feet. It is proposed that the new tile be laid at a depth of about 3 feet, which is expected will be sufficient depth for frost protection. It will be less expensive to install new tile than to dig up the old tile, clean it, and refill the trench, as a shift from the ground used for the former beds is required.

SEPTIC TANK ALTERATIONS AND ADDITIONS

Proposals for the enlargement of the septic tank capacity, alterations to present tank, provision for sludge removal, alternating syphons, etc. are estimated to cost $2270.00.

Enlargement of capacity would be obtained by providing an additional settling chamber of approximately the same content as the present one, with connection to the syphon chamber and provision for proportionate distribution of sewage to the two settling chambers. The present syphon chamber would be re-equipped with alternating syphons discharging to sub-irrigation beds.

Provision for removal of sludge would consist of installation of hopper bottoms in settling tanks with 8-inch outlets and discharge pipes. The pipe outlet to be so located as to provide for discharge of sludge into a confined area in the garden to permit drying and subsequent removal.

The carrying out of the above alterations and enlargements should be undertaken during mid-summer school holidays, July or August, as the cost of the work would be at a minimum at that time and any interruption to the operation of the sewage disposal plant would not affect the school.

Regarding the employment of funds, presently

tanks with 8-inch outlets and discharge pipes. The pipe outlet to be so located as to provide for discharge of sludge into a confined area in the garden to permit drying and subsequent removal.

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Regarding the employment of funds, presently available, these could best be used in increasing the septic tank capacity and alterations to existing tank, estimated to cost $2270., to be followed by the installation, at a later date, of the disposal beds.

MAINTENANCE OF SYSTEM

Much of the difficulty in connection with the satisfactory operation of the sewage disposal system has probably been due to lack of familiarity of the school staff with the operation of such systems. It would be desirable that written instructions regard-

ing the functioning of the equipment and its maintenance be accessible to the school authorities and that the school staff charged with such duties be informed of what is required to maintain the system in good order and at a minimum of expense.

The system should function from 2 to 3 years without the necessity of cleaning the settling tank, and it should not be necessary to clean the disposal beds oftener than once in ten years. While it should be possible to clean the beds at a very reasonable cost, probably not exceeding $150.00, sometimes it is necessary to have the tile completely dug up, if the septic tank effluent carries much sludge, as the soil becomes clogged. Under such conditions the cost of cleaning is very much higher.

Your obedient servant,

W.C.Warren

W.C.Warren
Asst. Hydraulic Engineer

APPROVED:-

District Chief Engineer

ESTIMATE OF COST
RECONSTRUCTION KAMLOOPS SCHOOL
SEWAGE DISPOSAL PLANT

Based on Cost of Materials July, 1937

Alterations to Septic Tank and New Settling Chamber, provision for sludge disposal.

Material, cost estimate	$ 900.00
Labour, cost estimate	1370.00

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Diversion of sewer outlet and temporary cesspit		$ 40.00
Cleaning septic tank		30.00
Excavation for and backfilling new tank		125.00
Alterations to present tank		265.00
New Alternating syphons		185.00
Installing		45.00
New settling tank		800.00
Pipe connections etc.		65.00
Sludge disposal		
Drying basin, excavation 40' x 60'		52.00
325' 8" Vit. tile pipe 60¢		195.00
1 - 8" Ell		2.00
1 - 8" Y		2.00
Excavation, pipe laying & backfill		167.50
	$	1973.50
Supervision etc. 15%		296.05
	$	2269.55

ESTIMATE OF COST
RECONSTRUCTION KAMLOOPS SCHOOL
SEWAGE DISPOSAL PLANT

Based on Cost of Materials July, 1937

Construction of Sub-irrigation beds

Material cost, estimate	$ 1180.00
Labour cost, estimate	2565.00

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Unit No. 1

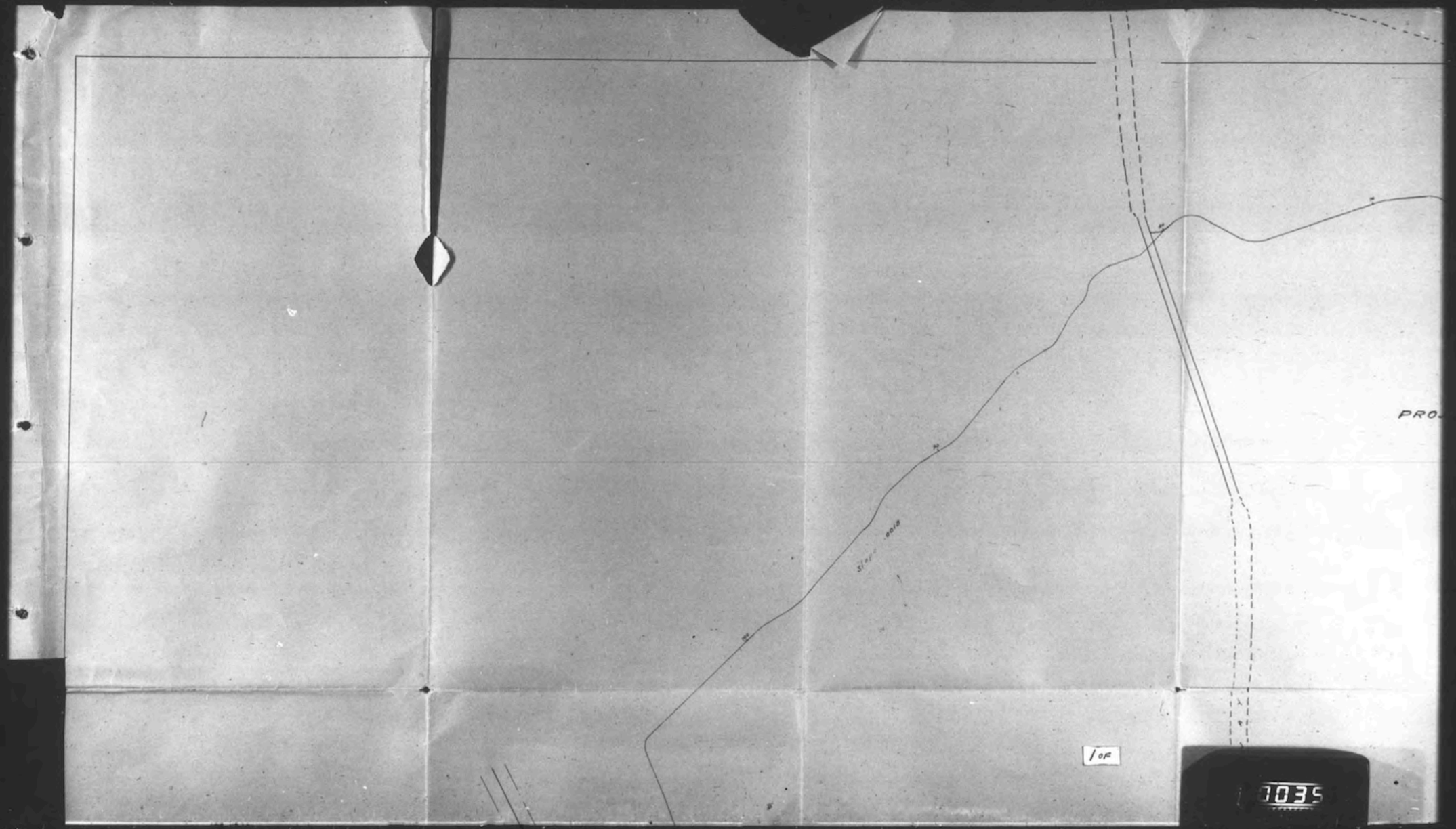
350'	6" Vit. tile pipe @ 45¢	$ 157.50
14	Y's 6" x 4" @ 1.80	25.20
7	L's 4" 1.00	7.00
3500'	4" Agricultural tile 8½¢	297.50
7	4" Vent pipes @ 3.25	22.75
	Roll roofing 1 ply $2.25	2.25
	Labour, excavation, laying & backfilling	987.50
		$1499.70

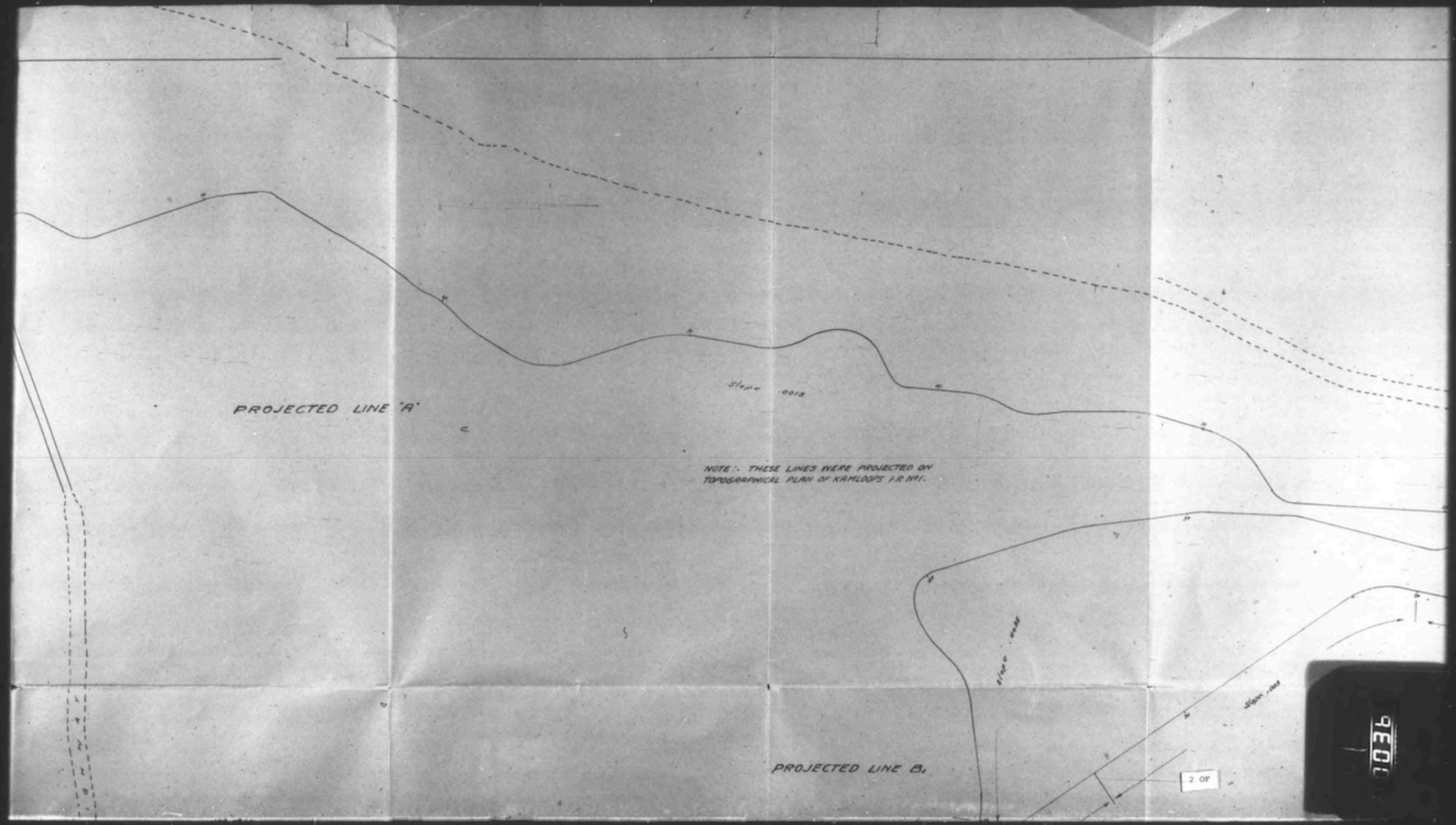
Unit No. 2

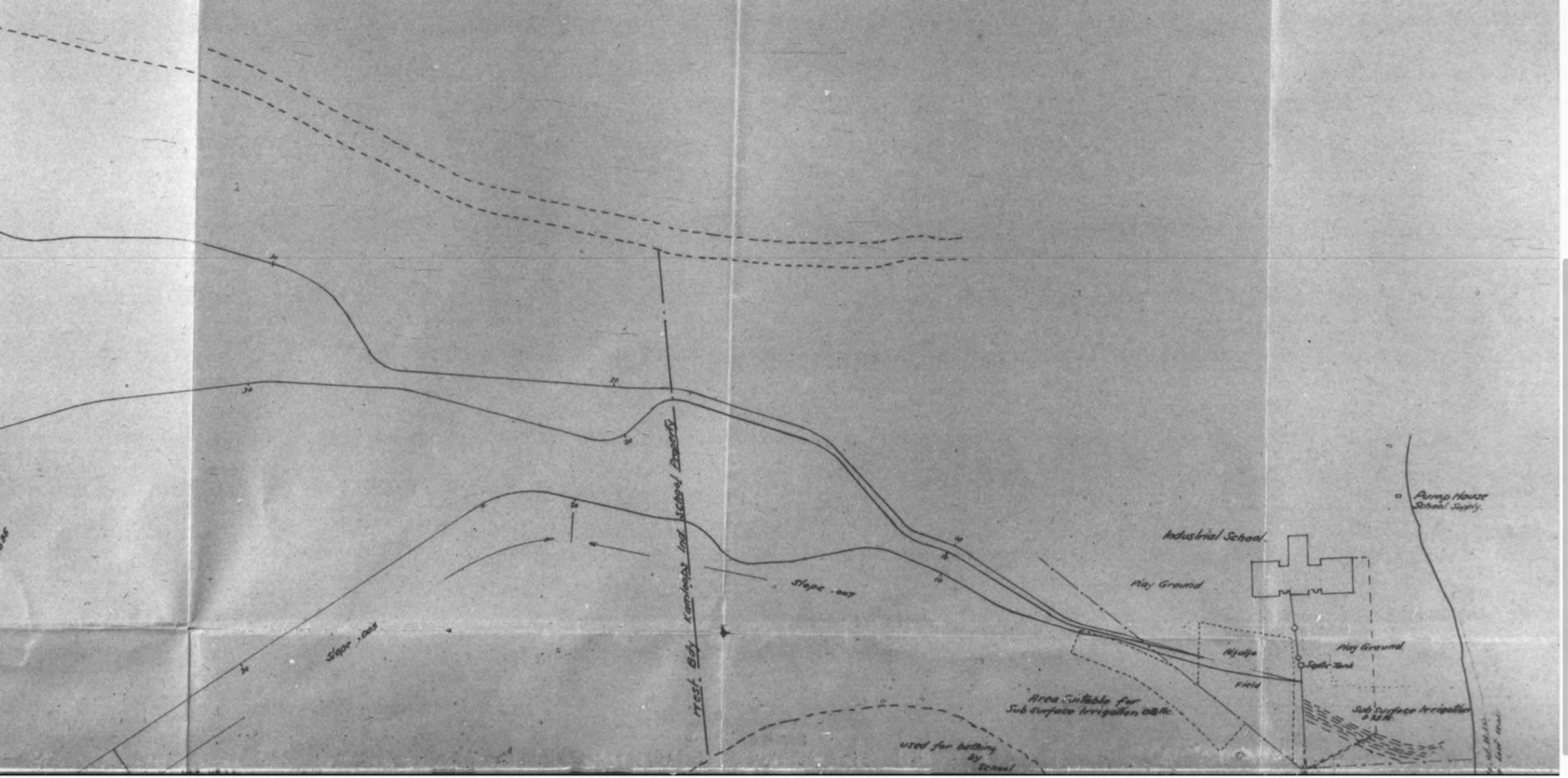
550'	6" Vit. tile pipe @ 45¢	$ 247.50
100'	4" " " " 28¢	28.00
14	Y's 6" x 4" 1.80	25.20
7	L's 4" 1.00	7.00
3500'	4" Agricultural tile 8½¢	297.50
14	4" Vent pipes $3.25	45.50
1	Roll 1 ply roofing $2.25	2.25
	Labour, excavation, laying & backfilling	1037.50
		$1690.45

Interchange valves & box	65.00
Grading surface of beds	150.00
Engineering supervision etc. 10%	340.50
	$3745.65

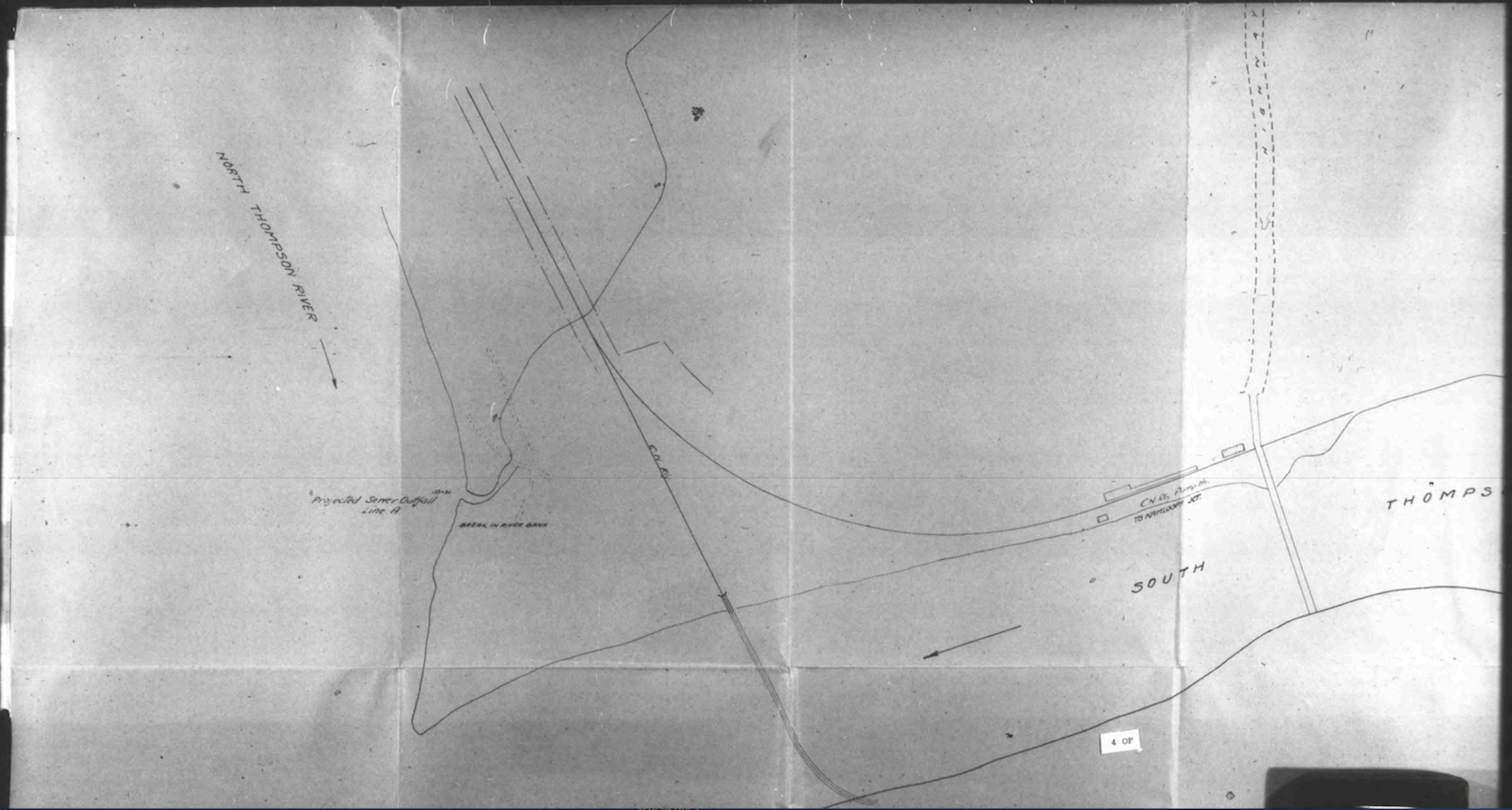
KODAK SAFETY FILM

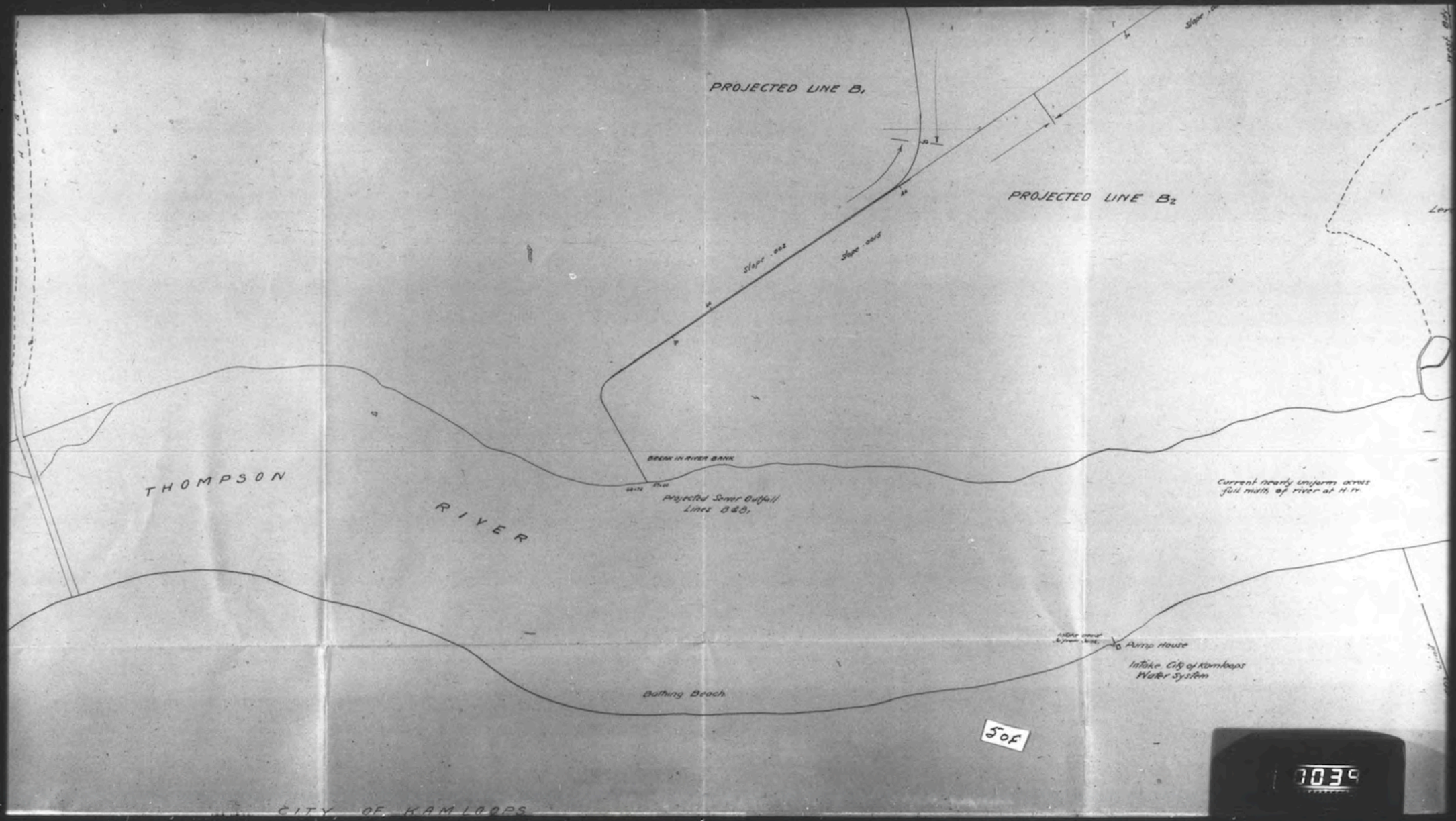


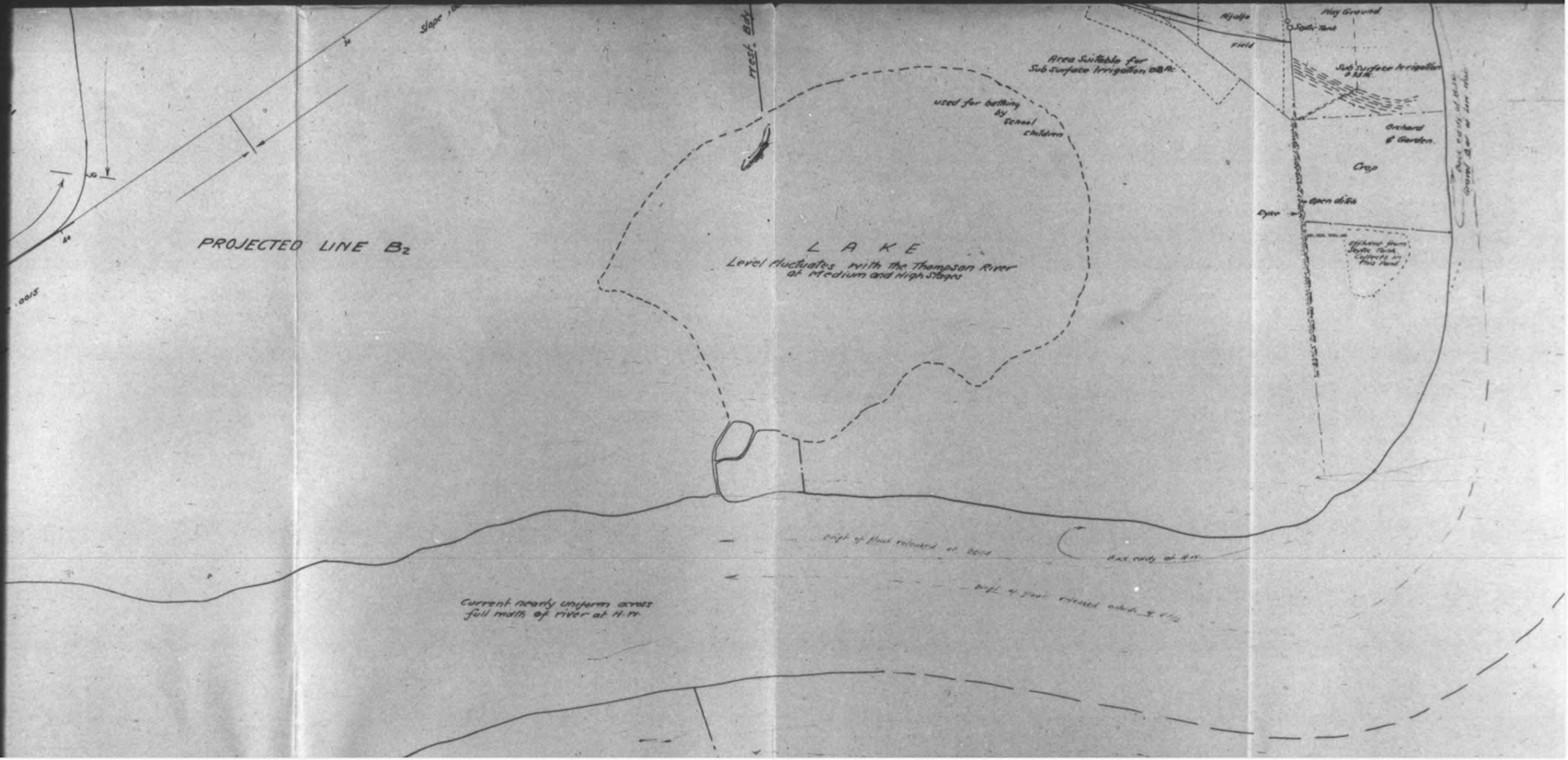

PROJECTED LINE "A"
Slope .0018
NOTE:- THESE LINES WERE PROJECTED ON TOPOGRAPHICAL PLAN OF KAMLOOPS I.R. No 1.
PROJECTED LINE B1
2 OF



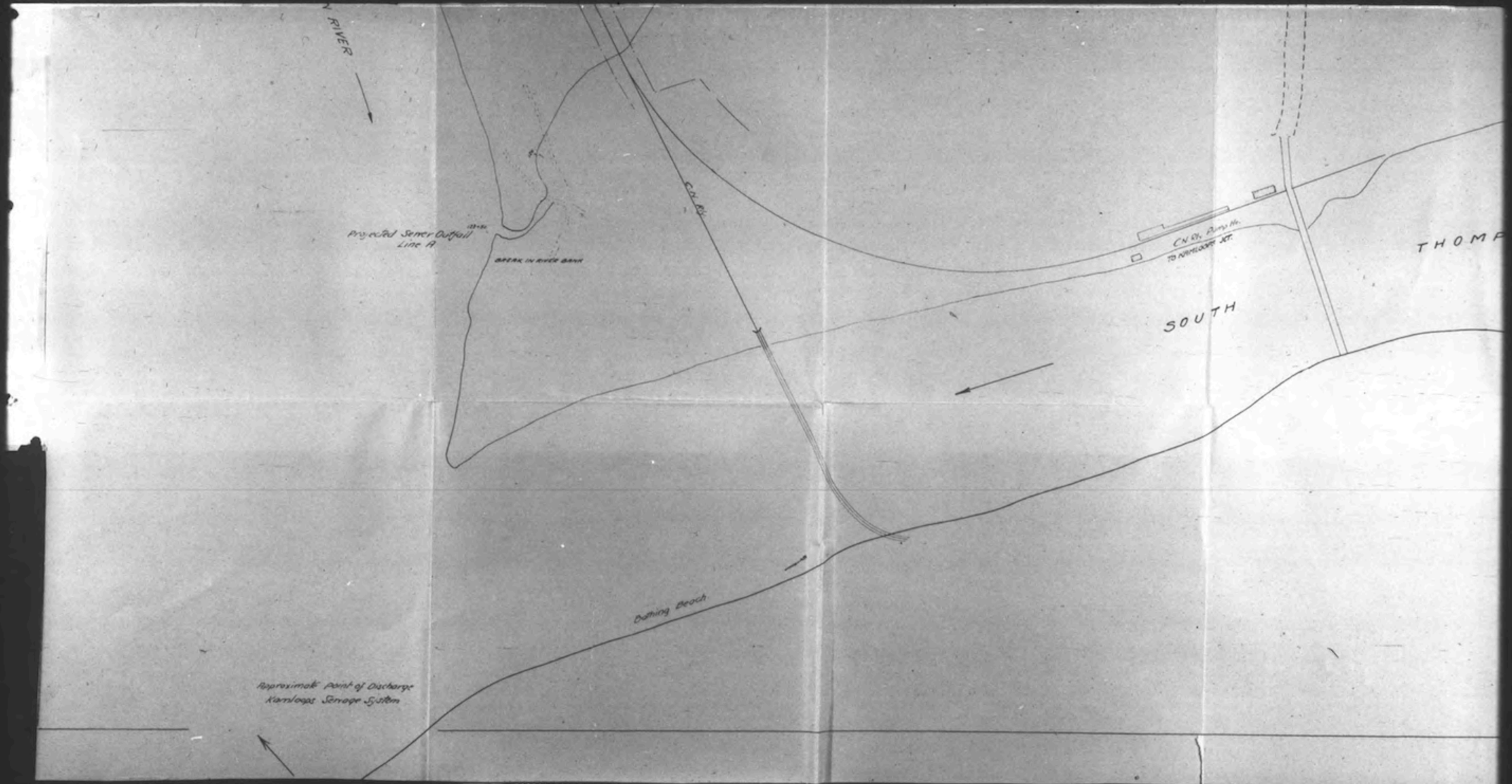
Pump House
School Supply
Industrial School
Play Ground
Play Ground
Alfalfa
Septic Tank
Field
Area Suitable for
Sub Surface Irrigation
Sub Surface Irrigation
used for bathing
by
School
Slope .007
Slope .005
West Bdy Kamloops Ind. School Property


NORTH THOMPSON RIVER
Projected Sewer Outfall
Line A
BREAK IN RIVER BANK
C.N. Ry.
C.N. Ry. Pump Ho.
TO KAMLOOPS JCT.
SOUTH
THOMPS
4 OF


PROJECTED LINE B1
PROJECTED LINE B2
Slope .005
Slope .005
BREAK IN RIVER BANK
THOMPSON
RIVER
Projected Sewer Outfall
Line C&D.
Current nearly uniform across
full width of river at H.T.
Pump House
Intake City of Kamloops
Water System
Bathing Beach
5 OF
CITY OF KAMLOOPS



Slope
West Bdy
Alfalfa
Play Ground
Septic Tank
Field
Area Suitable for Sub Surface Irrigation
Sub Surface Irrigation
used for bathing by School children
Orchard & Garden
Crop
Open ditch
Dyke
Effluent from Septic Tank Collects in this Pond
PROJECTED LINE B2
LAKE
Level fluctuates with the Thompson River at Medium and High Stages
Current nearly uniform across full width of river at H.W.



Indian Affairs. (RG 10, Volume 6585, File 1A-1772-1, Pt. 1)

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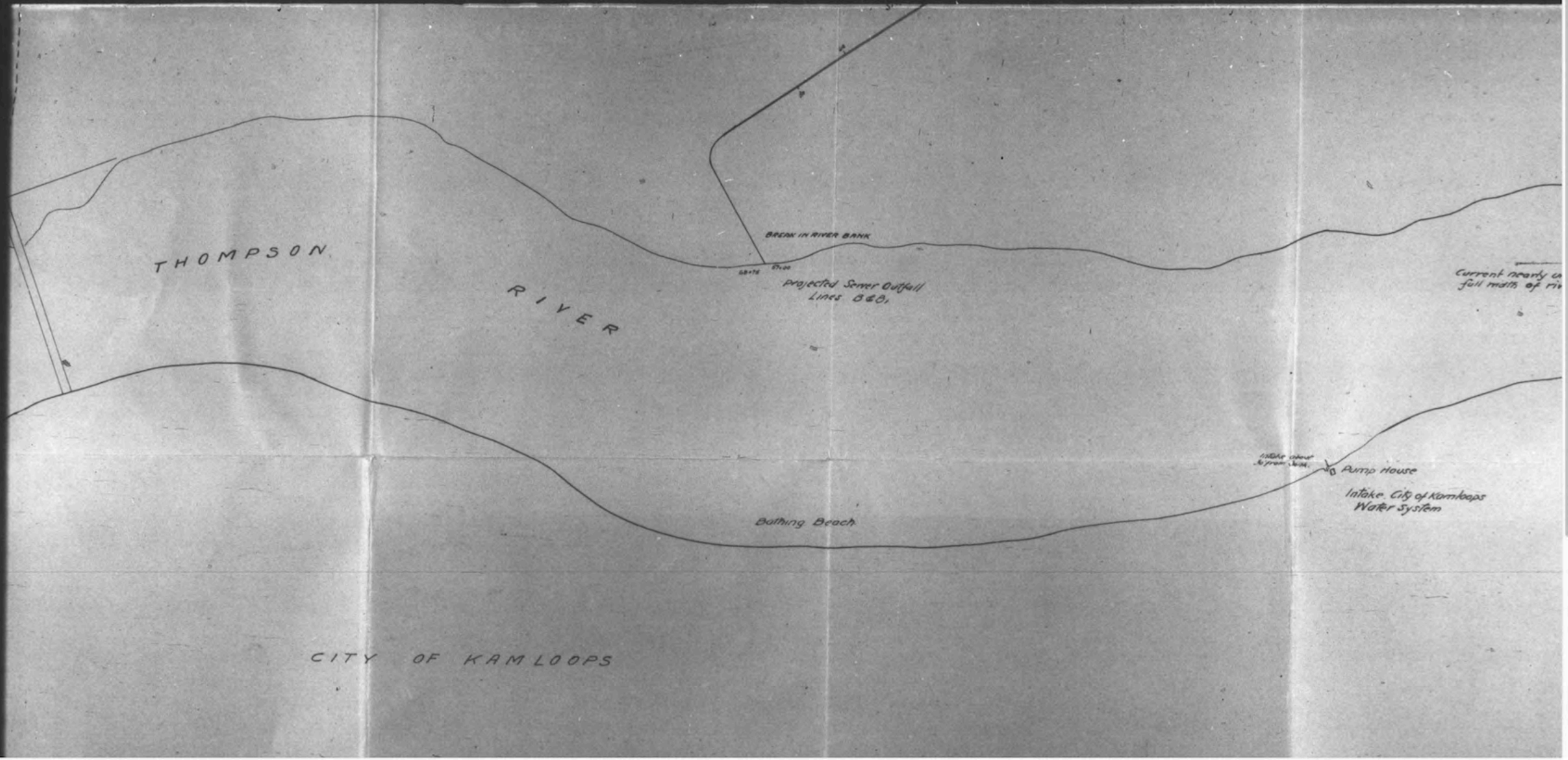
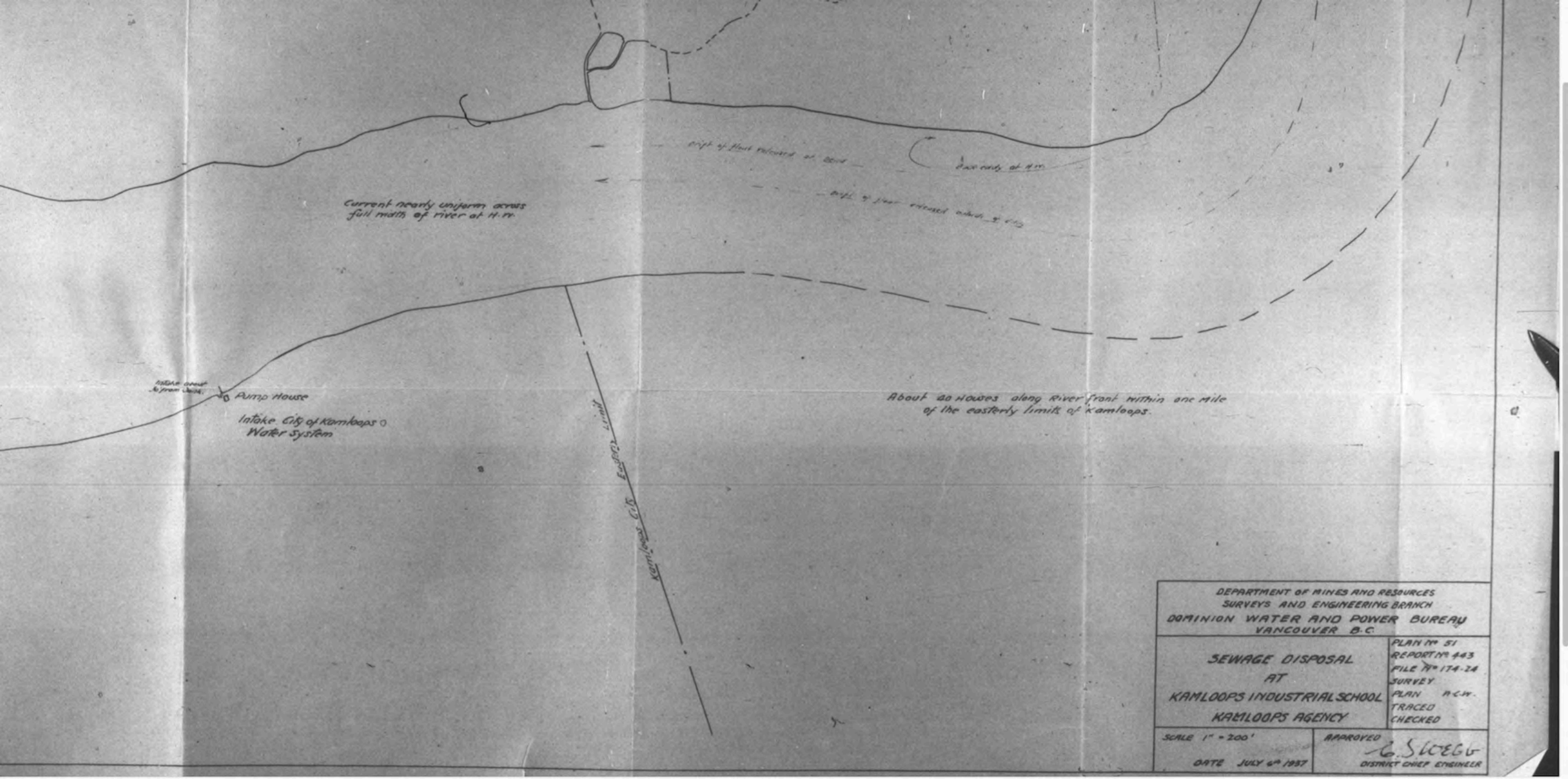
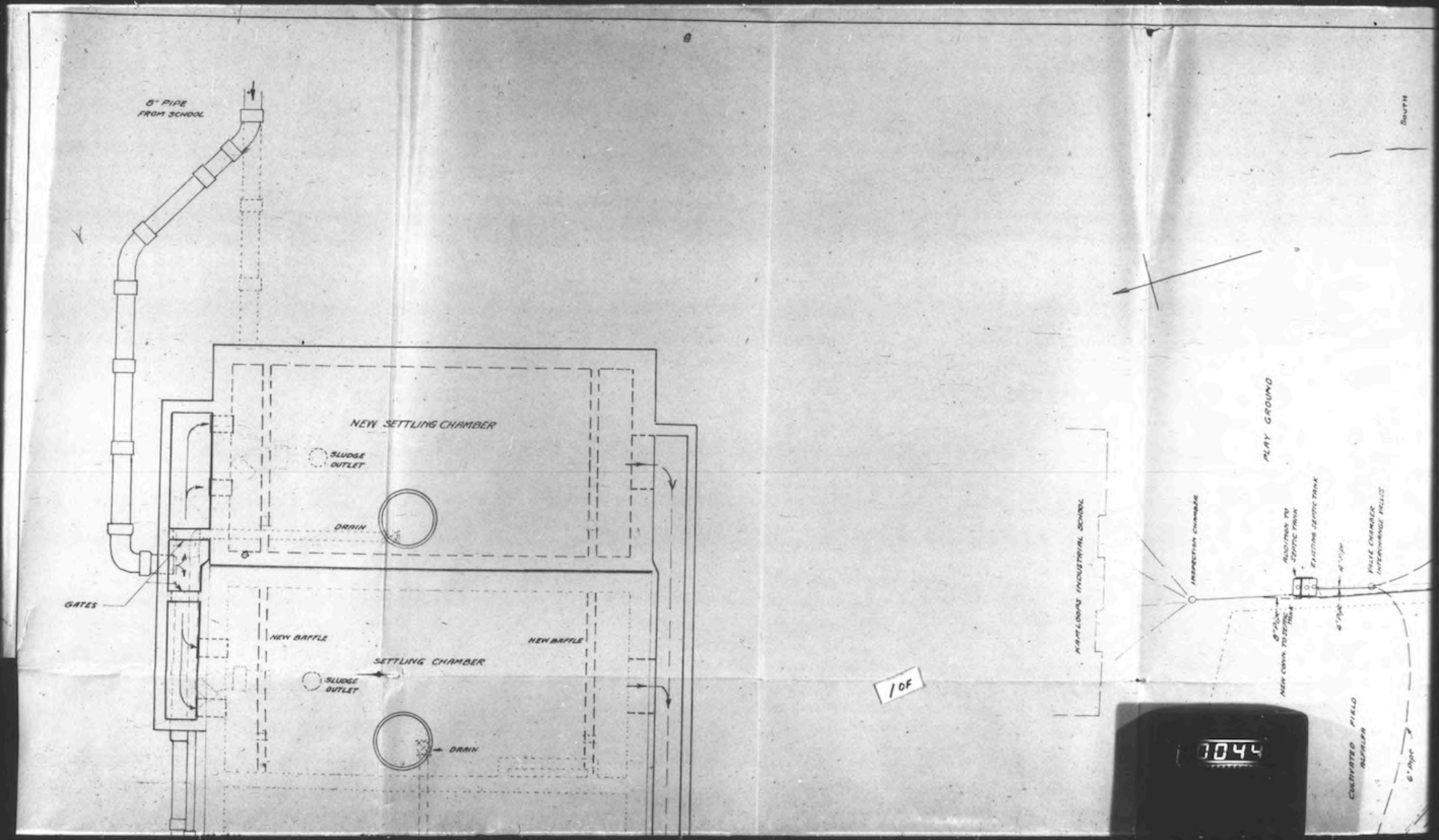
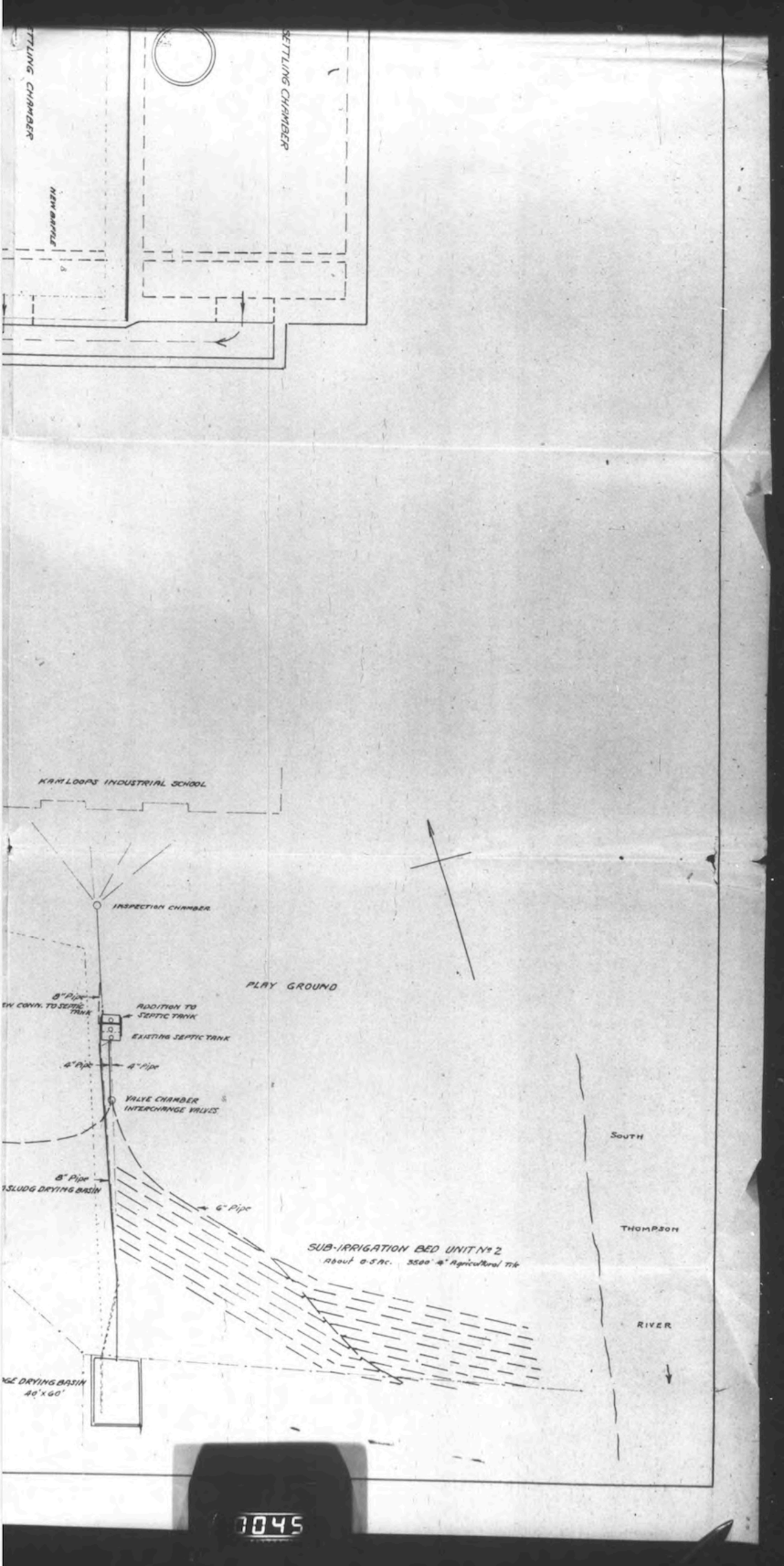

THOMPSON
RIVER
BREAK IN RIVER BANK
Projected Sewer Outfall
Lines 860,
Current nearly a
full width of ri
Pump House
Intake City of Kamloops
Water System
Bathing Beach
CITY OF KAMLOOPS

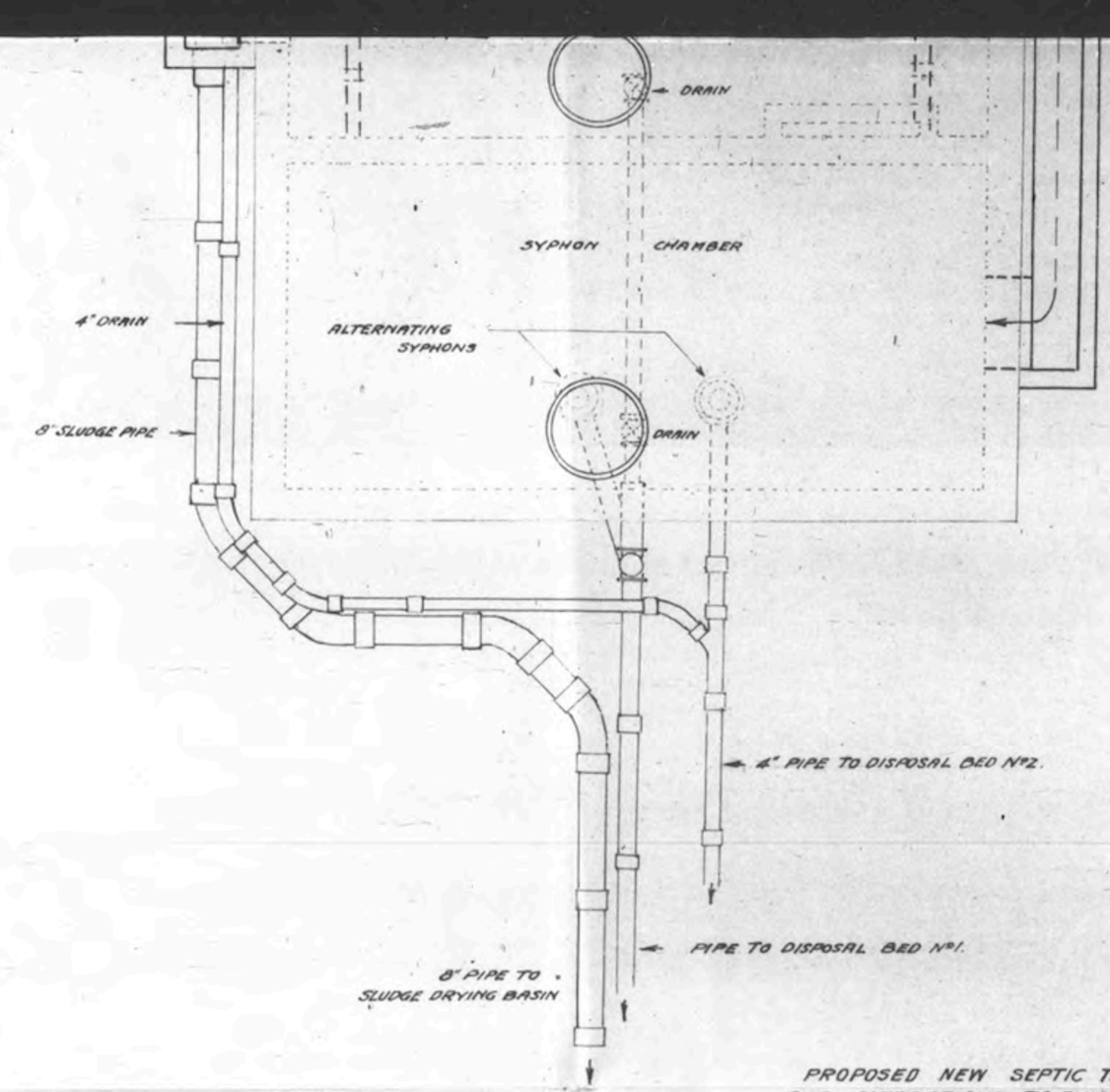

Current nearly uniform across full width of river at H.W.
Pump House
Intake City of Kamloops Water System
Kamloops City Easterly Limit
About 40 Houses along River front within one mile of the easterly limits of Kamloops.
DEPARTMENT OF MINES AND RESOURCES
SURVEYS AND ENGINEERING BRANCH
DOMINION WATER AND POWER BUREAU
VANCOUVER B.C.
SEWAGE DISPOSAL
AT
KAMLOOPS INDUSTRIAL SCHOOL
KAMLOOPS AGENCY
PLAN No 51
REPORT No 443
FILE No 174-24
SURVEY
PLAN N.C.W.
TRACED
CHECKED
SCALE 1" = 200'
DATE JULY 6th 1937
APPROVED
DISTRICT CHIEF ENGINEER


8" PIPE FROM SCHOOL
NEW SETTLING CHAMBER
SLUDGE OUTLET
DRAIN
GATES
NEW BAFFLE
NEW BAFFLE
SETTLING CHAMBER
SLUDGE OUTLET
DRAIN
KAMLOOPS INDUSTRIAL SCHOOL
PLAY GROUND
INSPECTION CHAMBER
ADDITION TO SEPTIC TANK
EXISTING SEPTIC TANK
VALVE CHAMBER INTERCHANGE VALVE
NEW CONN. TO SEPTIC TANK
CULTIVATED FIELD
SOUTH
1 OF


SETTLING CHAMBER
NEW BAFFLE
SETTLING CHAMBER
KAMLOOPS INDUSTRIAL SCHOOL
INSPECTION CHAMBER
PLAY GROUND
8" Pipe
EN CONN. TO SEPTIC TANK
ADDITION TO SEPTIC TANK
EXISTING SEPTIC TANK
4" Pipe
4" Pipe
VALVE CHAMBER INTERCHANGE VALVES
8" Pipe
SLUDG DRYING BASIN
6" Pipe
SUB-IRRIGATION BED UNIT No 2
About 0.5 Ac. 3500' 4" Agricultural Tile
SOUTH
THOMPSON
RIVER
GE DRYING BASIN
40'x60'

1045

KODAK SAFETY FILM CC



PROPOSED NEW SEPTIC TANK UNIT
AND ALTERATIONS TO EXISTING TANK
SCALE ONE INCH = TWO FEET.

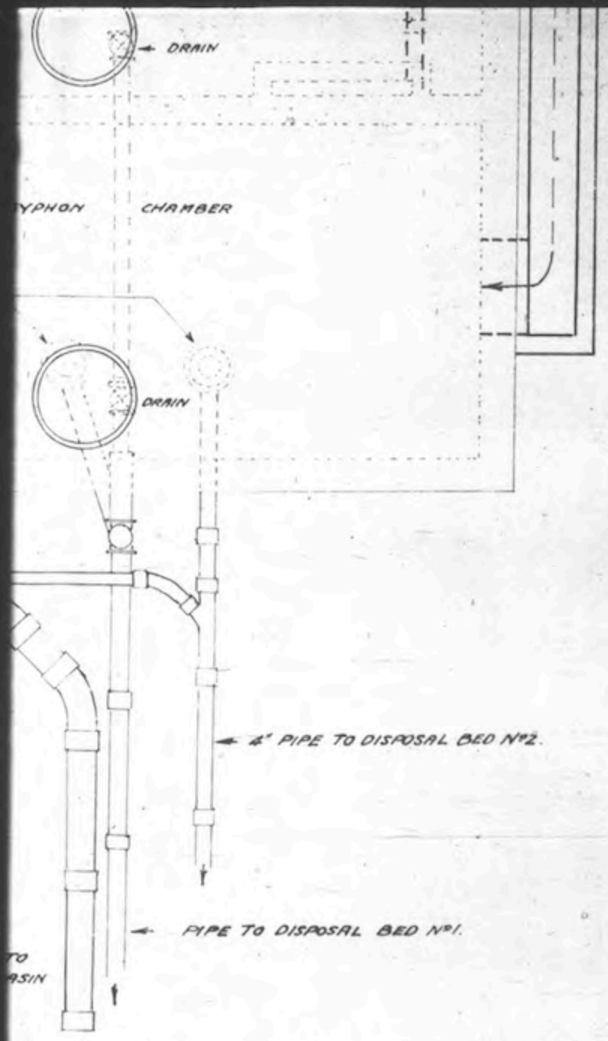
DEPARTMENT OF MINES AND RESOURCES
SURVEYS AND ENGINEERING BRANCH
DOMINION WATER AND POWER BUREAU
VANCOUVER B.C.

SEWAGE DISPOSAL SYSTEM FOR KAMLOOPS INDUSTRIAL SCHOOL KAMLOOPS AGENCY	PLAN No 51 REPORT No 443 FILE No 174-24 SURVEY PLAN H.C.W. TRACED CHECKED
SCALES AS SHOWN	APPROVED

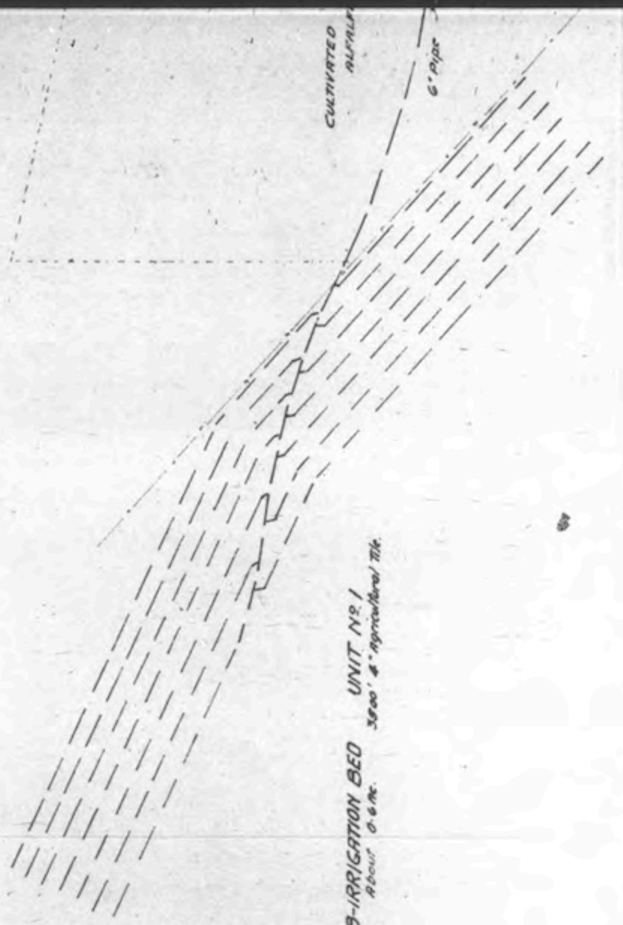
CULTIVATED ALFALFA

PLAY GROUND

SUB-IRRIGATION BED UNIT No 1



PROPOSED NEW SEPTIC TANK UNIT
AND ALTERATIONS TO EXISTING TANK
SCALE ONE INCH = TWO FEET.



PROPOSED SEWAGE DISPOSAL SYSTEM
KAMLOOPS INDUSTRIAL SCHOOL
SCALE 1 INCH = 50 FEET.

DEPARTMENT OF MINES AND RESOURCES
SURVEYS AND ENGINEERING BRANCH
DOMINION WATER AND POWER BUREAU
VANCOUVER B.C.

SEWAGE DISPOSAL SYSTEM FOR KAMLOOPS INDUSTRIAL SCHOOL KAMLOOPS AGENCY	PLAN No 51 REPORT No 443 FILE No 174-24 SURVEY PLAN 17 C.N. TRACED CHECKED
SCALES AS SHOWN	APPROVED C.S. 10266