

Mr. T.A.J. Leach, Asst. Chief Engineer

J.C. Foweraker, Geological Engineer

Water Investigations Branch

Ground Water Division

B.C. Water Resources Service

January 4th

65

Preliminary Geological Investigation
of Stocking Lake Dam Site

INTRODUCTION

At the request of Mr. Leach, a geological investigation was made of the Stocking Lake Dam site at the time that a new outlet trench for the lake was being excavated through the existing dam. A one-day field trip was made to the site with Mr. Roy Sorokoski on the 12th of November. Additional trips were subsequently made into Stocking Lake in conjunction with field investigations for a ground water supply for the proposed Institution near Saltair. During the initial trip to the site, a limited compass, Abney level and tape survey was made of the downstream half of the damsite. (See Fig. 3).

Stocking Lake lies approximately two miles south of Ladysmith (see Fig. 1). The lake level at the time of the investigation was at an elevation of 1168 feet approximately. The lake is separated from the coast by a prominent ridge. Stocking Lake is drained by Stocking Creek which follows a southeasterly course across the south end of this ridge and then emerges out onto the more open coastal area and flows into the sea at Davis Lagoon. (See Fig. 1).

At the Stocking Lake dam site two trenches have been excavated (see Figs. 3-5, Plates 1-3). Firstly, there is the spillway channel along which the now discarded siphon pipe was located. Secondly, there is the new outlet trench which has been cut through the old existing dam. The new outlet pipe from Stocking Lake is to be laid along the bottom of this trench.

SUMMARY OF PERTINENT NOTES AND RECOMMENDATIONS

Test Drilling

At Stocking Lake damsite, silts, sands and gravels which appear to be old channel deposits, are found to the right or west of the outlet trench. These deposits appear to be lying below till, however, it is not known whether this till seals off these deposits effectively from the waters of Stocking Lake. The possible extent of these deposits is shown in Fig. 2.

If a higher dam structure is to be contemplated in the future, it would be advisable to undertake a program of exploratory drilling within this area outlined in Fig. 2. A rotary drilling machine could do this work relatively quickly and easily. Initially, test holes could be put down in a line close to the proposed crestline of the dam, and depending on the results of the first few holes, further test holes could then be put down, if necessary, along a projection of this line to the southwest of the dam site. Additional holes could be put down along the northern boundary of the area outlined in Fig. 2, near to the edge of Stocking Lake. Adequate sampling procedures should be used.

Mr. J. Leach

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This drilling program would provide foundation information on the extent and nature of materials overlying bedrock, and would also provide information on the likelihood of seepage into and through the more permeable beds.

Water has been observed seeping out of sands below till, which is exposed in the right bank of the outlet trench, at a location opposite Station 2 in Fig. 3. Similar sand-beds below till are exposed elsewhere in the right bank of the outlet trench, as in Sections A-A' and B-B' (Figs. 4 and 5).

Impervious Silt Core

During the first visit to the damsite, it appeared that the impervious "mottled" silt core or wall of the old existing dam, was resting on grey sands, gravel and boulders which underlie the till. The section through this silt core is now poorly exposed in the outlet trench due to caving in of the bank (See Plate 2). If a larger higher dam is to be built in the future, then, subject to exploratory drilling information, it would appear advisable to extend any such core or wall, down to an impervious stratum, preferably down to bedrock. Depth to bedrock to the right or southwest of the outlet trench, however, is not known. (See Figs. 4 and 5).

Bedrock at the Dam Site

Bedrock described in hand specimen as a medium grained andesite is exposed in the left bank of the outlet trench and is over a length of 100 feet. The crest line of the existing old dam is about 35 feet from the upstream end of this exposed bedrock. The rock is open jointed and "blocky" in near surface exposures. The impervious silt core or wall of the dam rests on this rock in the left bank of the outlet trench. For a higher, larger dam structure, this loose surface rock should be removed, if a more effective seal is to be made between the dam and bedrock.

Water supply outlet pipes from Stocking Lake should be laid on the left side of the outlet trench where bedrock is known to be present. This would be preferable to locating them on the right side, where sand is exposed at the bottom of the trench.

J.C. Foweraker
Geological Engineer

JCF/lis
Attachs.

APPENDIX I - DETAILED NOTES ON THE GEOLOGY OF
STOCKING LAKE DAM SITE

Introduction

Two cross-sections of the geology at Stocking Lake Dam Site are given below: section A-A' and section B-B', both sections face downstream. (See Figs. 4 and 5). Numbers in brackets, (1), (2), etc., refer to corresponding numbers shown against beds in the sections in Figs. 4 and 5.

Section A-A' (Fig.4)

Bedrock (1) is exposed in the left bank of the outlet trench to a height of 6½ feet. The rock is described here from hand specimens as a medium-grained andesite belonging to the Sicker group of probable Permian age. A more detailed petrographic description will be available when thin sections of this rock are cut for study. The rock is open-jointed and "blocky" in near surface exposures.

Overlying bedrock on the left bank is a thin veneer of sands and fine gravels (2), which in turn, is overlain by soil, rock fragments, till, boulders, etc.(11). Till which in general blankets the area, has either been removed by erosion or is covered over with overlying surface debris at this location.

At the time of the first field inspection, the floor of the outlet trench was covered with a thickness of wet mud, which was removed when the lake began to empty through the outlet trench. However, considerable coarse material remains on the bed of the outlet stream and no exposures are evident. Bedrock has been blasted out on the left portion of the floor of the outlet trench during excavation so in part then, at section A-A', the trench floor is composed of bedrock. (See Fig. 4).

At the base of the right bank of the outlet trench occurs a 2½-foot exposure of fine grey silty sands (3), containing cobbles and boulders. Possibly the boulders are associated with the overlying till deposit (10), or alternately, the sands may represent only a bed within a thicker till sequence. (See Plate 1, Photo 1). This till is almost 7 feet thick on the right bank at section A-A'. The till is grey in colour, firm, fairly compact, and contains some large-sized boulders (see Photo 1), within an assorted grain-size matrix. It is just possible that the lower part of this grey till section may be older than the brown till that is exposed in the spillway trench. The colour differences however, could be due to weathering and location with respect to the water table.

At the base of both banks on the spillway trench at section A-A', are brown fine-grained sands (4), (5), which on the left bank are overlain by a fairly compact and firm brown till. On the right bank above the sands (5), is a thin 6-inch band of silt (6), which is overlain by a 6½-foot thickness of coarse sand and fine gravel (7). Many of the grains are angular and coated with silt and clay. Overlying bed (7), occurs a bed, 1½ feet thick, of coarse gravels and cobbles with a sand matrix (8); above (8) occurs a 3-foot bed of a very badly sorted coarse sand and gravel (9), many of the grains in this bed are coated with silt and clay. Unconformably overlying this section is a variable thickness of till, firm and compact, brown and somewhat weathered and containing a boulder about 8 feet in length.

Section B-B' (Fig. 5)

This section, which is parallel to, and immediately downstream from the crest line of the old existing dam, is in many respects similar to section A-A'. Immediately upstream from section B-B' is the impervious "mottled" silt core or wall of the old existing dam. This core is about two feet thick where it is exposed in the outlet trench. In the left bank, this impervious core apparently rests on bedrock. In the right bank of the outlet trench, the impervious core appeared during the first visit to the site to be resting on grey sands, gravel and boulders (2), which underlie the till (5). (See Plate 2, Photo 1). The section through this silt core is now poorly exposed in the outlet trench due to caving of the bank (see Plate 2). A closer inspection of the impervious dam core shows the silt is fairly hard and compact, with a mottled appearance, and it contains pieces of wood and other organic matter.

The dam fill (6), consists of a heterogeneous mixture of sands, silts, soil, assorted sized pebbles and cobbles and organic matter. The dam fill overlies bedrock on the left bank of the outlet trench, and overlies till on the right bank. The impervious silt core extends up to the present surface of the dam fill in both sides of the trench.

Exposure on right bank of spillway excavation at downstream end (Plate 3, Photo 1)

A prominent 15-foot high section is exposed at the downstream end of the spillway, on the right bank. Commencing at the top, the following section is exposed.

<u>Feet</u>	<u>Description of beds</u>
1	Top soil, boulders
3-5	Till: firm, compact, brown in colour, contains pebbles and boulders and an assorted clay-silt-sand matrix.
1	Sand and gravel
1	Coarse gravel, cobbles, with a sand matrix.
1	Soft brown sandy silt.
3	Lense of brown, compact, horizontally bedded silt.
5-6	Brown sands, gravels, beds dipping approximately to the southwest (see Plate 3, Photo 1), top of this bed contains coarse gravel and some cobbles.

This exposure and others occurring in the right bank of the spillway (see Fig. 4) are interpreted as being the remnant of an old channel deposit, overlain by till. The possible areal extent of the deposit is shown in Fig. 2.

It is apparent from the sections that the till is conformable with the surface topography and therefore truncates and unconformably overlies the older deposits.

Additional Notes and Sections

On the right bank of the outlet trench near the lake and opposite station 7 in Fig. 3, (see also Plate 3, Photo 2), the following section is exposed:

<u>Feet</u>	<u>Description of Beds</u>
3-4	Top soil, humus, boulders, etc.
1	Silt, sand and lenses of gravel - firm but not very compact.
5-6	Coarse sands and gravels dipping gently upstream towards the lake.

Near the base of this section are some 1-2 feet diameter boulders and lenses of a firm, but not compact gravel, containing a silty sand matrix. Although the contact is obscured, it appears that these deposits are younger than the till and possibly could have been formed by "reworking" of the till along the margin of the lake near its outlet.

Thirty-five feet downstream from this section, there is exposed again in the right bank of the outlet trench, the following section:

<u>Feet</u>	<u>Description of Beds</u>
2-5	Damfill: Heterogeneous mixture of sands, silts, soil, assorted sizes pebbles and organic matter
1-2	Fairly compact grey till containing boulders*
4-5	Fine grey silty sand containing boulders, with coarser sands near the base of the section.

* Further downstream, the till becomes thicker (see Figs. 4 and 5)

Exposed in the right bank of the outlet trench opposite Stations 2 and 3 in Fig. 3, occurs the following section:

<u>Feet</u>	<u>Description of Beds</u>
4-6	Grey till (similar to above)
2½	Lense only of fine grey silty sand.
2-3	Soft saturated sand containing boulders. Water was observed to be seeping out of these sands.

Along the left bank of the outlet trench, downstream from the rock outcrop which terminates at station 4 (Fig. 3), there occurs an exposure of brown fine silty clay containing numerous angular pieces of bedrock. It has been suggested by Mr. Livingston that this silty clay may be slope wash debris, which has collected at the base of this slope.

J.C. Foweraker
Geological Engineer

JCF/lb

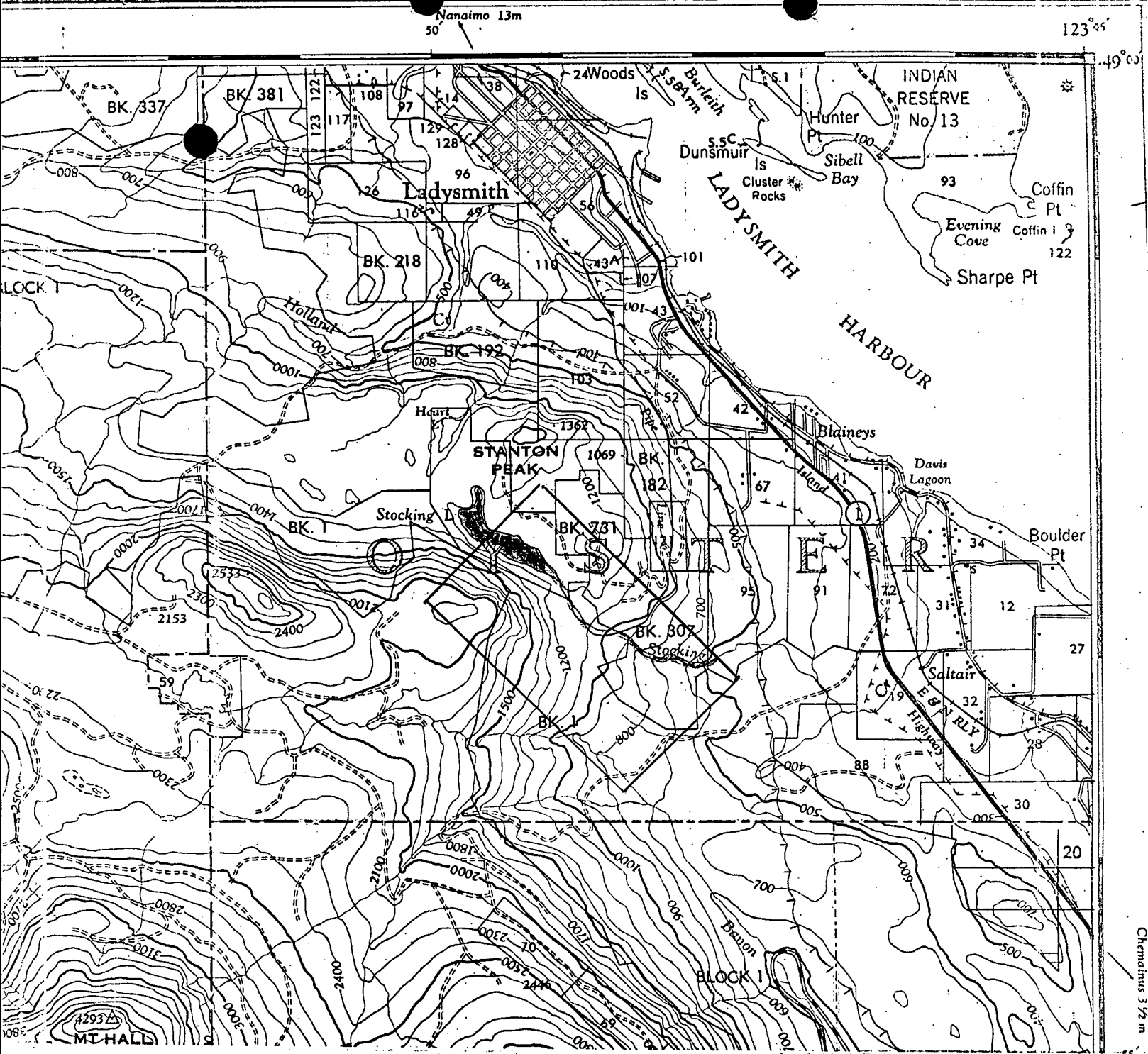


Figure 1

Scale 1:50,000

Chematus 3 1/2 m

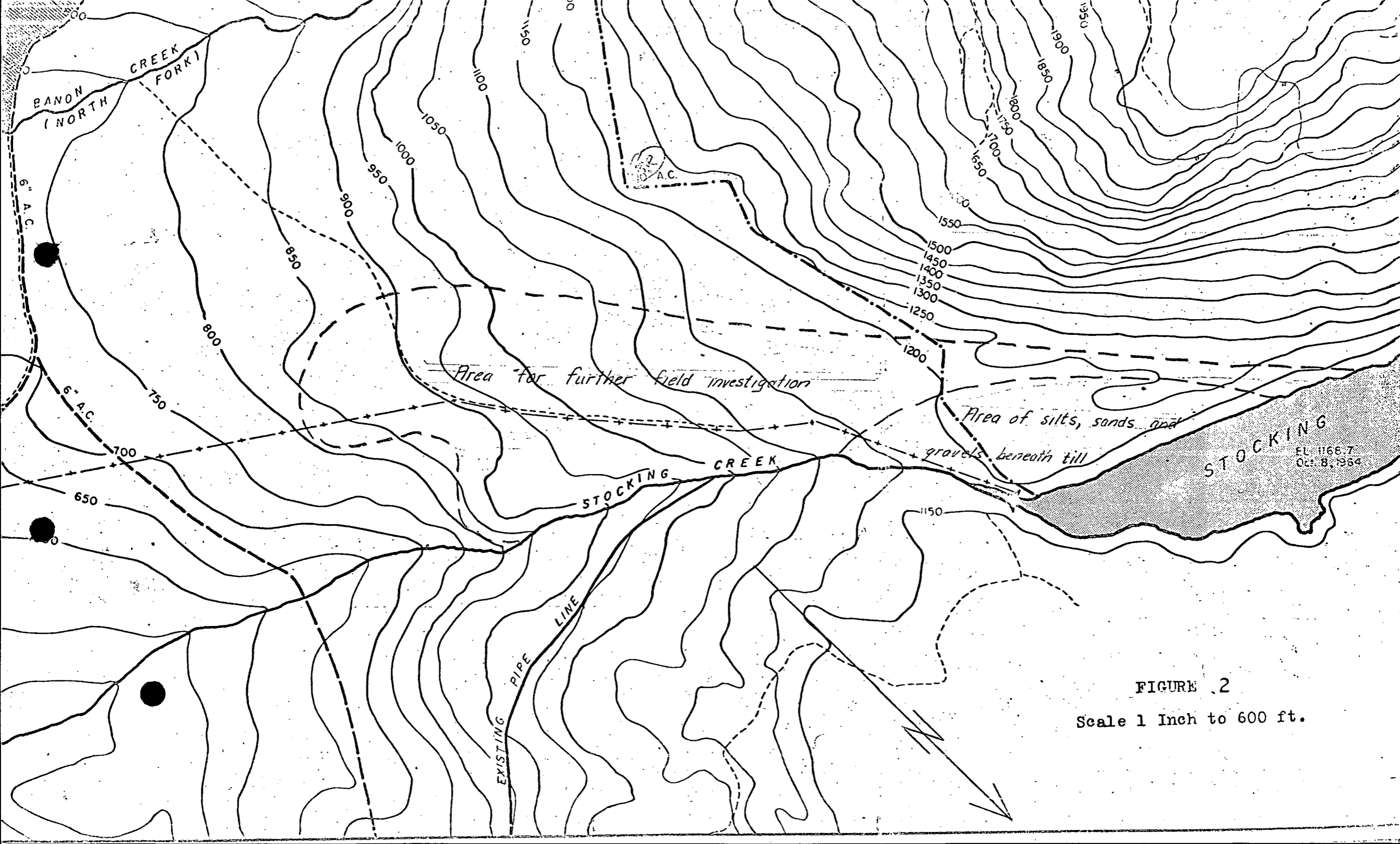


FIGURE 2
Scale 1 Inch to 600 ft.

LADYSMITH - SALTAIR WATERWORKS SYSTEM
STOCKING LAKE OUTLET TRENCH
SECTION A - A' 11th. Dec. 1964.



1. RIGHT BANK
LOOKING UPSTREAM



2. LEFT BANK



3. LOOKING UPSTREAM

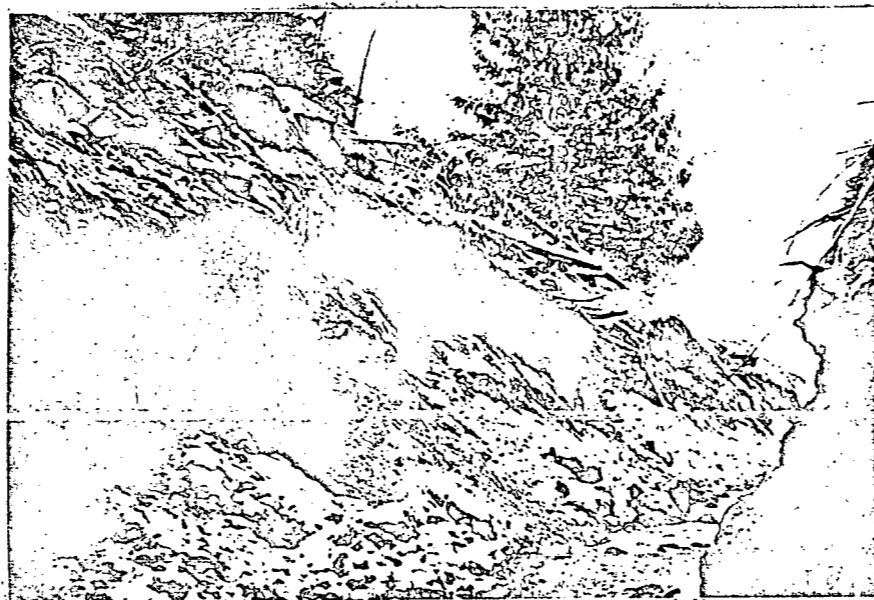
LADYSMITH - SALTAIR WATERWORKS SYSTEM
STOCKING LAKE OUTLET TRENCH
SECTION B - B' 11th. Dec. 1964.



1. RIGHT BANK



2. LEFT BANK



3. RIGHT BANK
LOOKING UPSTREAM.

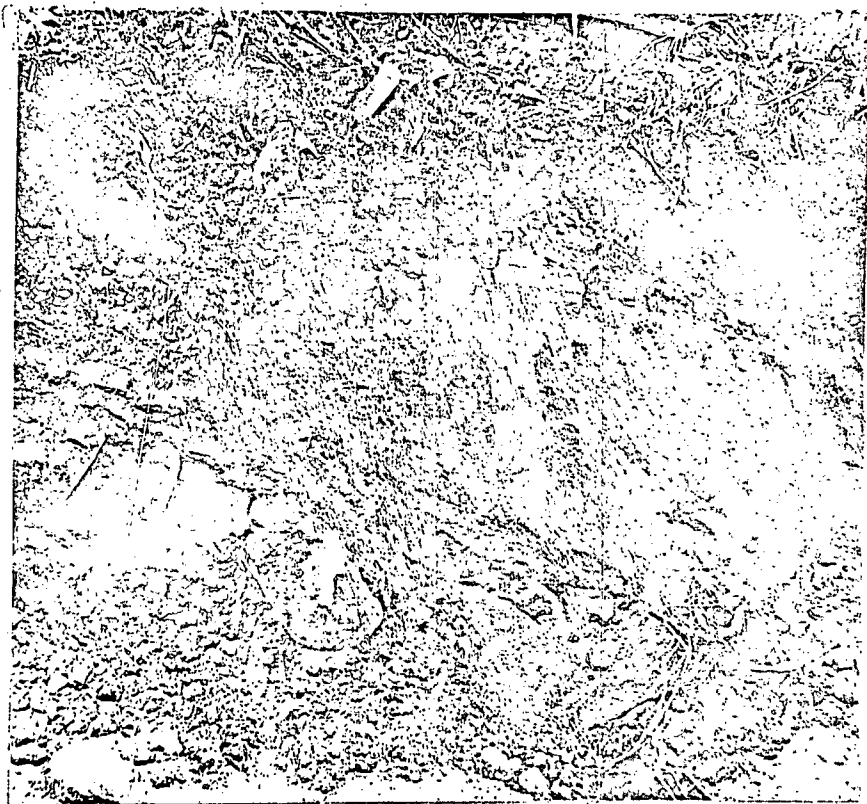


4. LEFT BANK
LOOKING UPSTREAM.

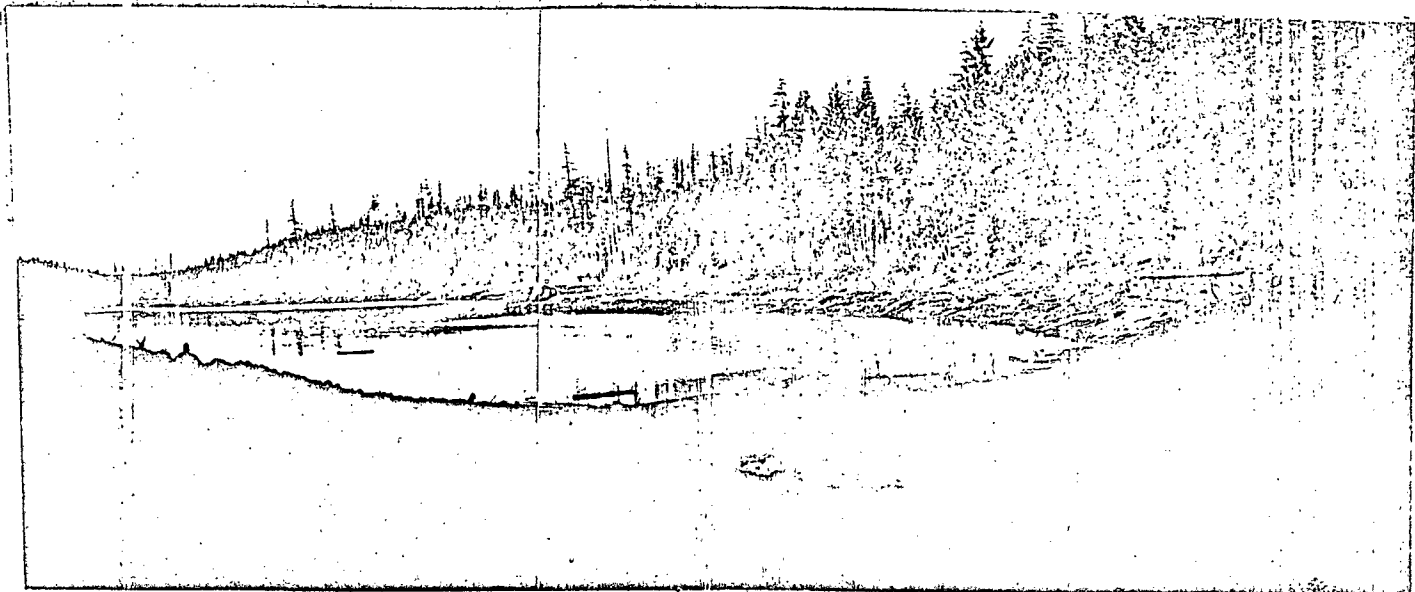
LADYSMITH SALTAIR WATERWORKS SYSTEM
STOCKING LAKE



1. EXPOSURE ON RIGHT BANK OF SPILLWAY EXCAVATION



2. OUTLET TRENCH RIGHT BANK
UPSTREAM FROM OLD DAM



3. STOCKING LAKE
FROM OUTLET TRENCH

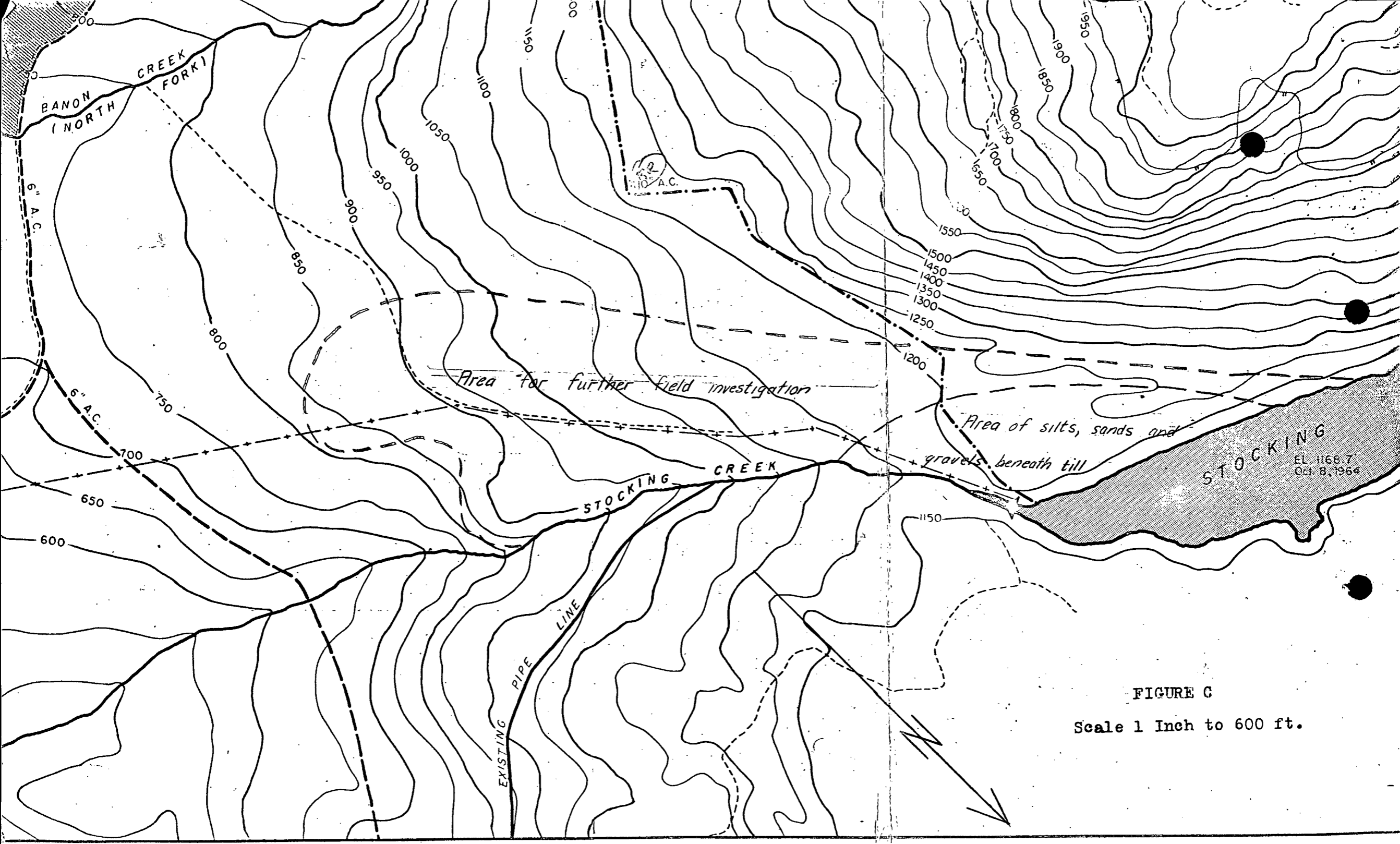


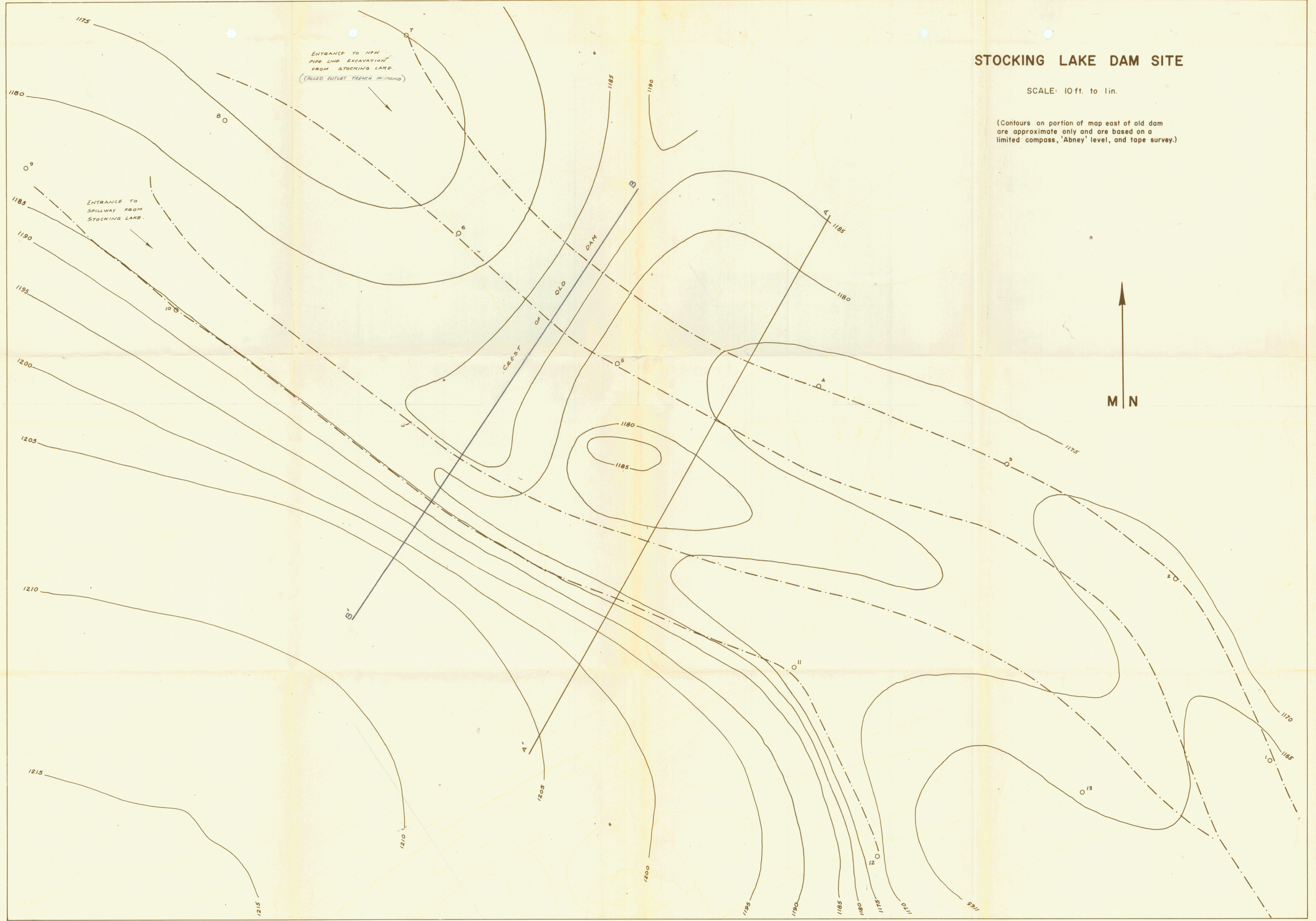
FIGURE C

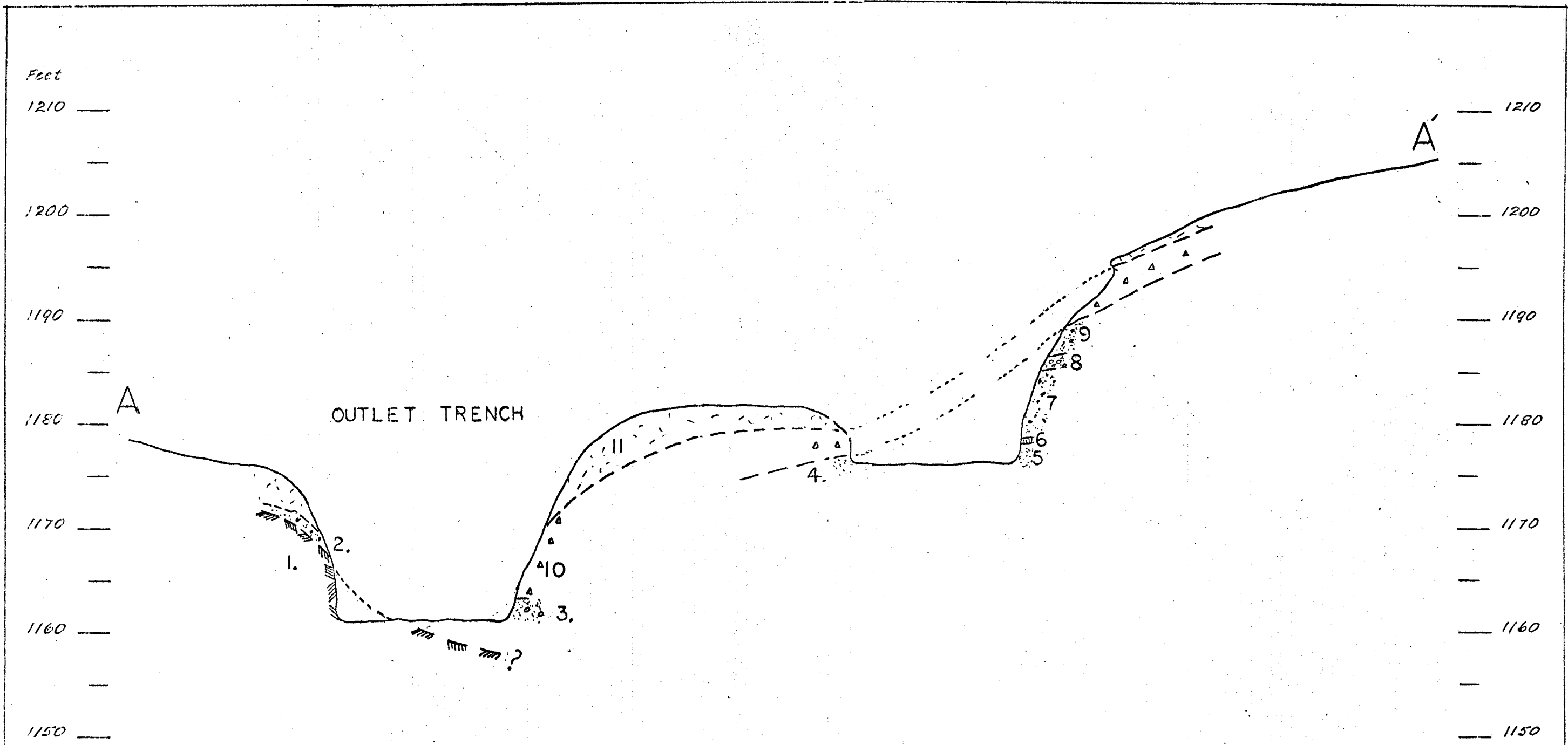
Scale 1 Inch to 600 ft.

STOCKING LAKE DAM SITE

SCALE: 10 ft. to 1 in.

(Contours on portion of map east of old dam are approximate only and are based on a limited compass, 'Abney' level, and tape survey.)





STOCKING LAKE DAM SITE
 SECTION A - A'
 SCALE 10 FEET TO 1 INCH

FIGURE 4

