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TENEMENT: Not Related.

TENEMENT HOLDER: Geophysical Associate Pty. Ltd.

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HARBOUR INVESTIGATIONS

GULF OF ST. VINCENT AREAS "A" & "B"

DEPARTMENT OF MARINE AND HARBORS

SOUTH AUSTRALIA

GEOPHYSICAL ASSOCIATES PTY. LTD.

November, 1969

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I INTRODUCTION

Geophysical Associates Pty. Ltd., 399 Honour Avenue, Graceville, Queensland were selected by the Department of Marine and Harbors, South Australia to conduct a bottom and shallow sub-bottom marine seismic survey in two areas of St. Vincent Gulf.

Area "A" comprised 36.04 miles of recording along the main channel route. (Outer Harbor Entrance)

Area "B" consisted of 8.33 miles of detailing in the pierhead and harbour area. (Ardrossan)

II OBJECTIVES OF THE SURVEY

The survey was initiated to investigate bottom and shallow sub-buttom conditions in these two areas, their suitability for installation of harbour facilities and for dredging.

III INSTRUMENTATION

(1) Sound Sources:

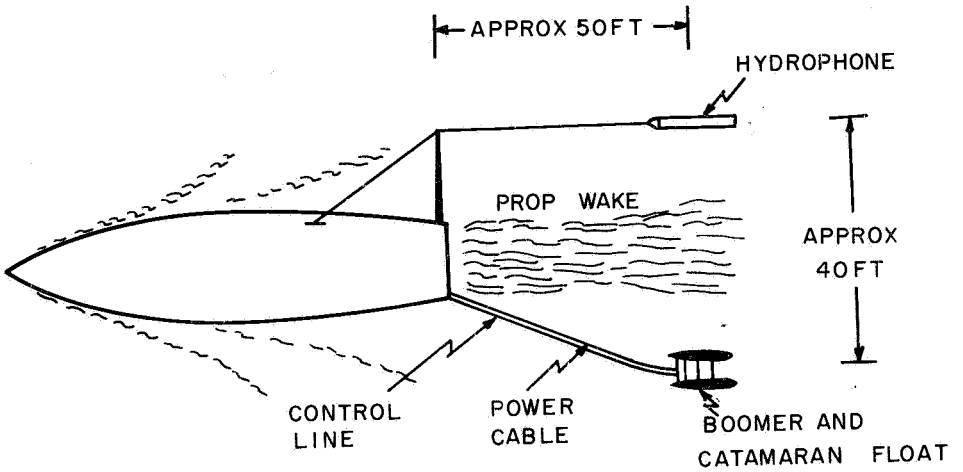
(a) High Resolution Boomer - generated signal of 0.002 secs duration with little or no transients, 600-800 cps range, maximum input of 500 joules.

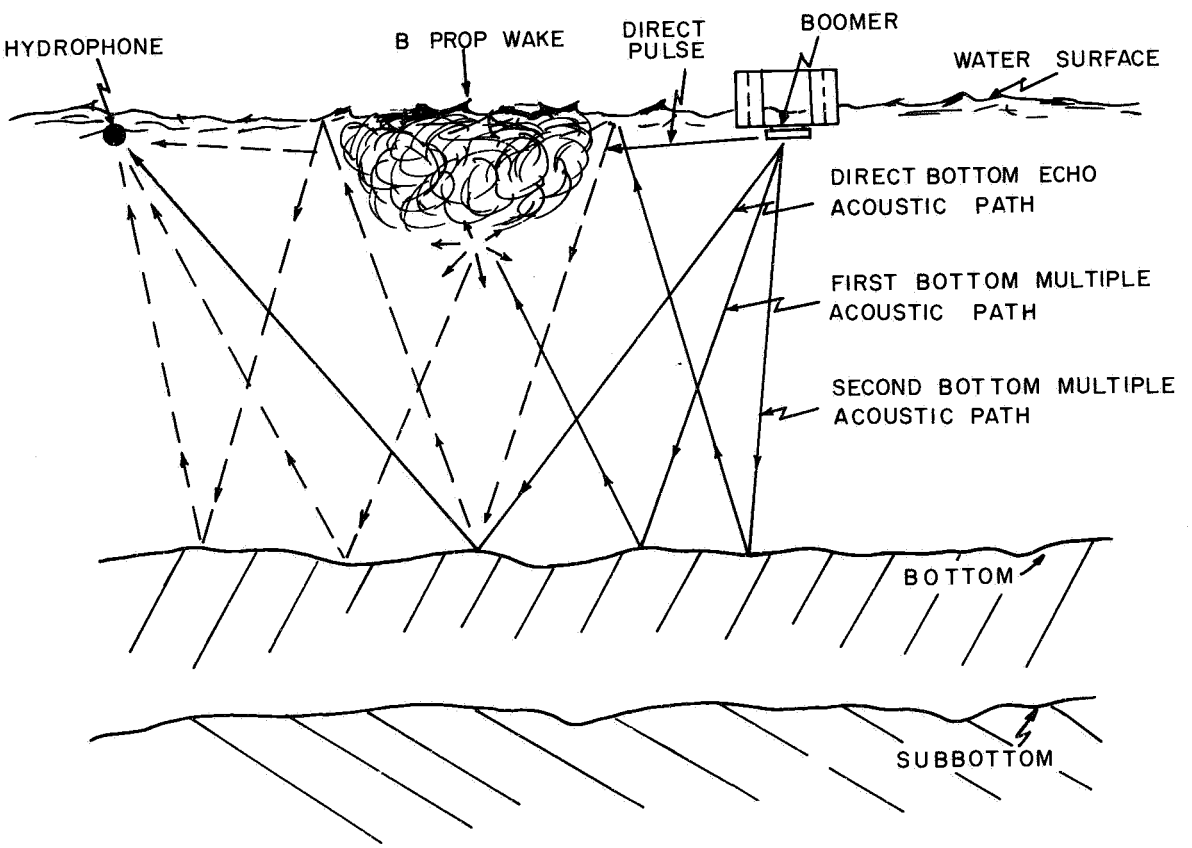
(b) Standard Boomer (Model 236) - generated signal 0.012 secs duration, energy range 400-800 cps, maximum input 1000 joules.

The Boomers are catamaram mounted and towed 40 to 50 ft behind the boat outside the wake (Figure 2)

(2) Hydrophone Array:

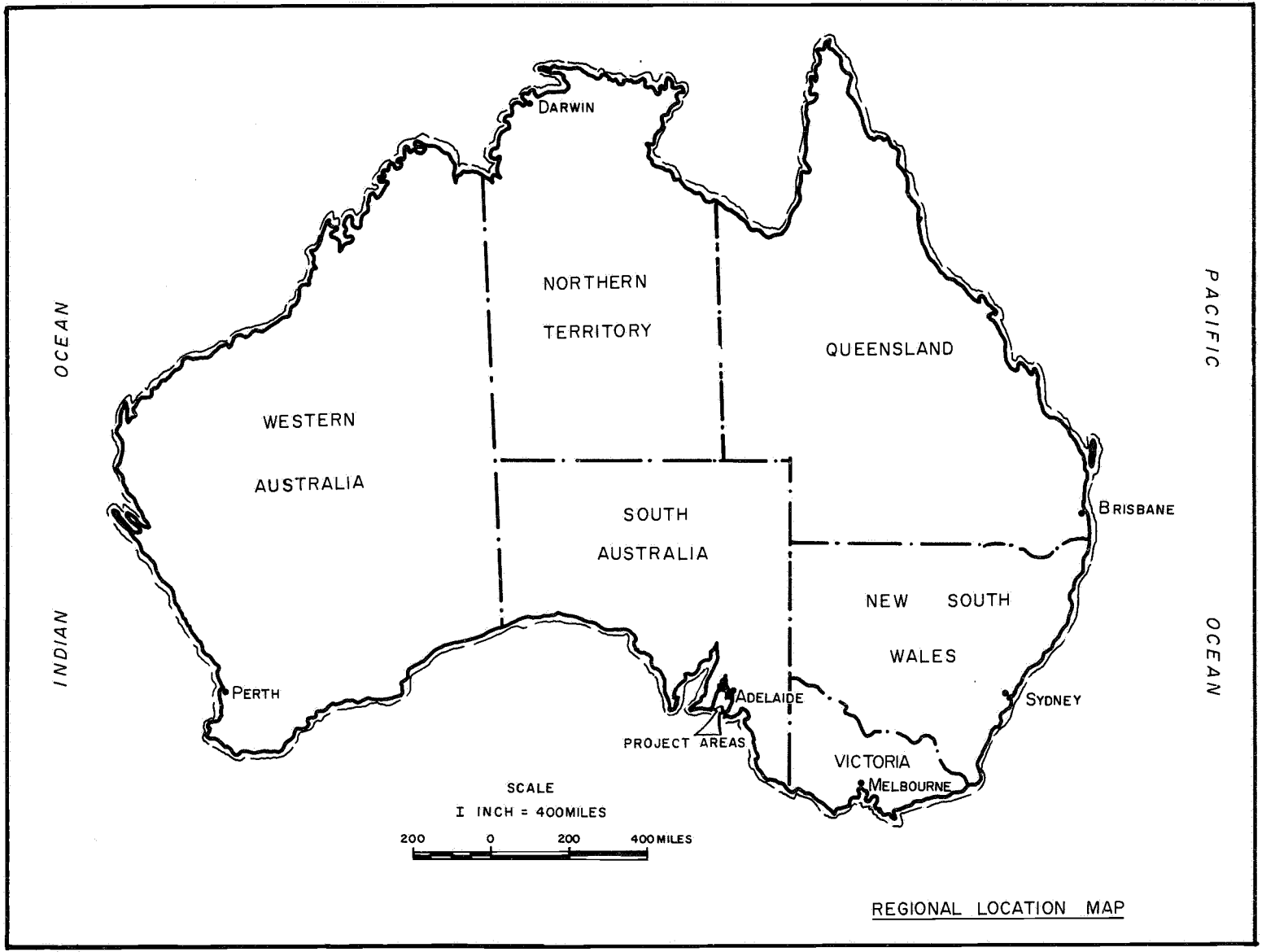
Ten acceleration-cancelling geophones are mounted in a rugged 2 inch diameter oil filled tube 15 ft long. Each geophone has a preamplifier/signal processer





TOWING DIAGRAM

Figure 2



REGIONAL LOCATION MAP

Figure 1

whose responses are coupled together into a single output. The hydrophone frequency range is 20-300 cps and it is towed behind the boat, 6 inches below the surface, on the opposite side of the wake from the catamaran. (Figure 2).

(3) Energy Source Components:

2 Model 232 Power Supplies
1 Model 231 Triggered Capacitor Bank

The Model 232 power supply provides a source of high voltage direct current for charging the capacitor bank. The triggered capacitor bank provides up to 1000 joules of capacitive energy storage and associated high energy switching control in 100 joule steps.

A 7½ KVA 240V 50 cps ship mounted diesel plant provided power for signal generation, a 1 KVA Bosch 240V 60 cps was utilized for recorder operation.

(4) Model 254 Seismic Recorder:

This recorder is completely transistorized with variable depth-time scales from 0-120 ft to 0-24,000 ft. Recordings are made on 11 inch Alfax electro-chemical paper with a variable helix speed adjustment of 1 to 100 rpm.

Filtering for the Model 254 recorder is provided by a Krohn-Hite 20 cps to 200 kc continuously - variable signal filter.

IV POSITIONING

All positioning was provided by surveyors from the Department of Marine and Harbors. Lines were radio controlled from shore by theodolite with additional sextant bearing checks from the boat.

The positioning is quite accurate with intersecting points in both areas being readily reconciled.

V VEHICLE

The "Saori" a 45 ft sailing vessel with auxiliary motor was utilized. This boat, owned by Geo Surveys of Australia, capable of 4-5 knots on the auxiliary motor is ideally suited for this type of survey.

VI PROCEDURE

(i) Area "A"

Runs were made down the main dredged channel, these profiles are Centre Line "A" (1-20) and Centre Line "B" (21-28). The Shed Line (29-40) intersects C.L. "B" at fiducial 27 and proceeds shoreward on a bearing of 040°T. Line 222 (41-46) was run from the north end of the Shed Line seaward on a bearing of 222°T. Line 65 (47-57) starts 4000 ft south of the western end of C.L."B" and terminates at fiducial 20 C.L. "A".

(ii) Area "B"

A grid of eight east-west lines approximately one mile long and 300 ft apart was profiled southeast of existing dock and pier facilities in Area "B". Line 9 runs north-south and intersects the near western end of lines 1 through 6.

VII RESULTS

AREA "A"

A line location map, scale 1" = 2000 ft and plotted profiles at 1" = 400 ft horizontally and 1" = 200 ft vertically have been prepared.

Centre Line "A" exhibits good record quality for its entirety. The dredged portion of the channel appears to be bottomed on a hard clay layer that is well defined at approximately 30 ft between fix 4 and 6. A suggested limestone layer at 18 to 20 ft between fixes 5 and 6 is not defined on the profile. Limestone crustal layers have

been interpreted at 50 to 60 ft and these are underlain by a thick limestone layer that reaches 90 ft at fiducial 20.

Centre Line "B" shows good record quality between fixes 20 and 25 but is poorer between 25 and 28 in the 3 to 4 ft. swells. The upper sediments are irregularly bedded between fixes 20 to 25 but appear more conformable to the west. Crustal limestone layers are well defined 30 to 40 ft sub-bottom and of note is an erosional channel at fix 24.

The Shed Line is of poorer quality between fixes 29 and 36 in the deeper rougher water but fair between 36 and 40. The hard clay layer encountered on C.L. "A" is well defined between fixes 34 to 40. The water is too shallow for accurate depth determination beyond fix 39.

Line 222 is of poor quality with very little penetration after fix 44.

Line 65 if of only fair quality in the rough, choppy water. Definition is much better between fixes 50-57 where the clay layer, crustal limestone layers and deeper limestone layer are readily identifiable.

Nowhere in the area surveyed is there any indication of bedrock or any hard material that would pose a problem in dredging.

AREA "B"

A line location map, scale 1" = 500 ft and plotted profiles at 1" = 200 ft horizontally and 1" = 20 ft vertically have been prepared. Record quality for the entire survey was good with penetration to at least 150 ft. Several conformable layers that are readily correlatable on all records have been plotted. Reflections A through D have been tentatively interpreted as thin limestone layers or crusts and E as a thick sandstone layer. These layers are suggestive of old shorelines and ocean floors.

The zone between the sea bottom and the first layer appears to be filled in with clay, silt and other sedimentary materials.

Here, as for Area "A", no materials were encountered that should impede dredging operations.

GEOPHYSICAL ASSOCIATES PTY. LTD.,

F.L. Hickey

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AREA A

HARBOR INVESTIGATION

for

DEPARTMENT of MARINE and HARBORS SOUTH AUST.

by

EG&G INTERNATIONAL

NOVEMBER 1969
BRISBANE QLD

GEOPHYSICAL ASSOCIATES PTY LTD

SCALE : 2,000ft to an inch

Plate I

LINE 222

SHED LINE

C.L. B (28-20)

LINE 65

C.L. A (20-1)

40,000ft N

30,000ft N

20,000ft N

10,000ft N

00

10,000ft S

50,000ft W

40,000ft W

30,000ft W

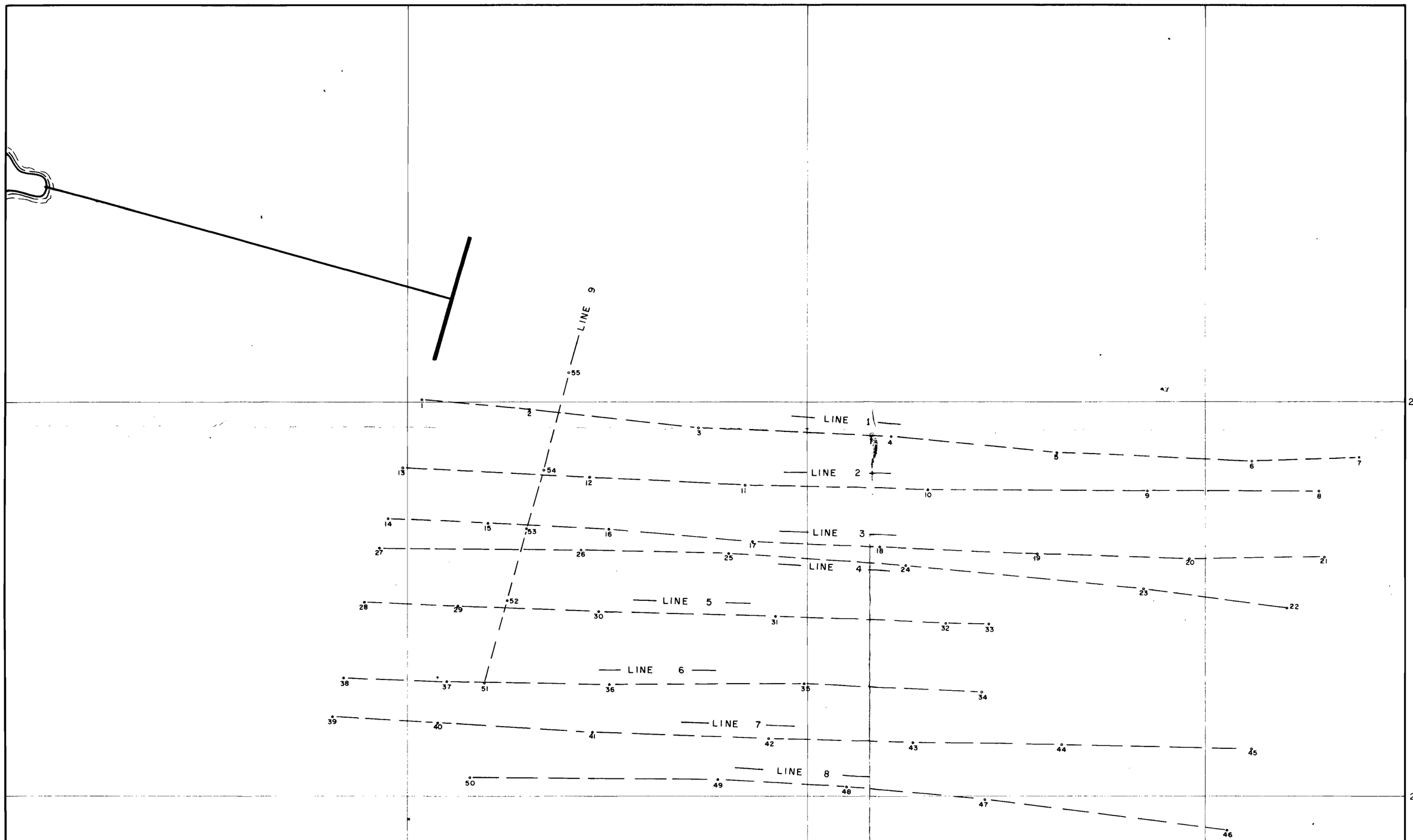
20,000ft W

10,000ft W

00

10,000ft E

20,000ft E



AREA B

HARBOR INVESTIGATION

for

DEPARTMENT of MARINE and HARBORS SOUTH AUST..

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NOVEMBER 1969
BRISBANE QLD

SCALE: 500ft to an inch

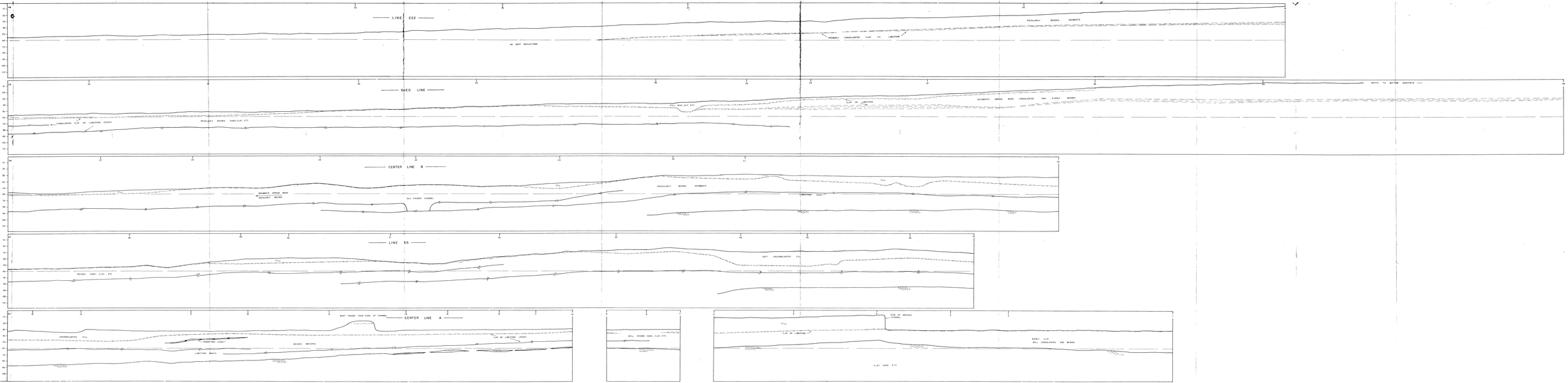
Plate II

6101-2

6101-3.

AREA "A"
ALL PROFILES
Horizontal scale: 1"=400'
Vertical scale: 1"= 20'

Plate III



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AREA "B"
PROFILES 1 — 9

Horizontal scale: 1"=200'
Vertical scale: 1" = 20'

Plate IV