(Imperial Oil Enterprises Ltd.)
Reflection Seismic Program
Wrigley Area
Permits 4378, 4379, 6365

Department Code No. 7-6-5-71-4
7-6-5-99 July 9, 1971

IMPERIAL OIL ENTERPRISES LTD.
Producing Department - Western Region



# Reflection Seismic Program

## Wrigley Area

Permits: 4378, 4379, 6445

Western Geophysical Co. Party 30
from February 24th to March 14th, 1971

I.O.E. P.W.O. No.: L132253

Department Code No.: 7-6-5-71-4

by

O. Friesen

Southern Exploration District
Edmonton, Alta.

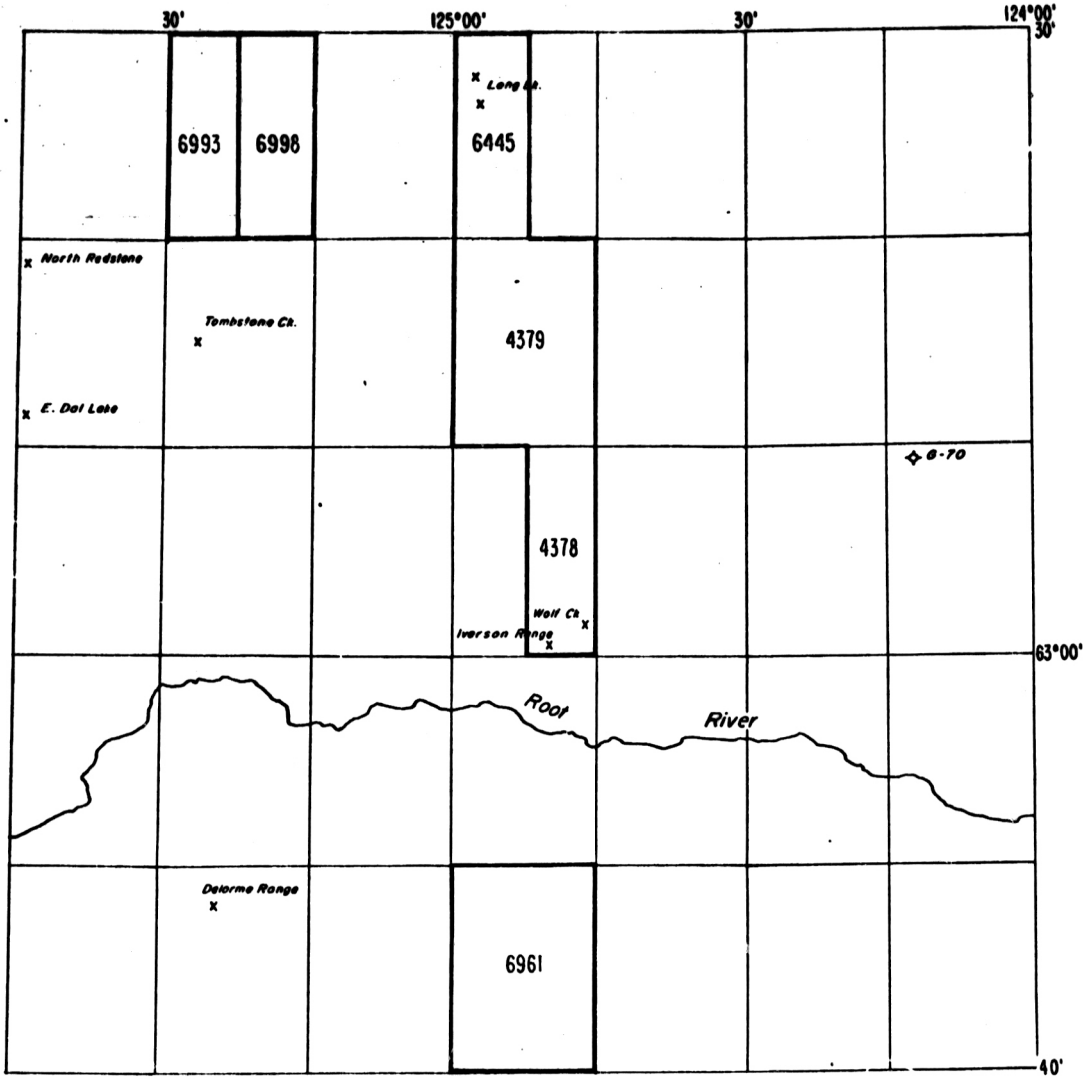
Date: July 9, 1971

## Contents

## Introduction

This is a report on seismograph operations conducted by Western Geophsycial Co., Party 30 on behalf of Imperial Oil Enterprises Ltd. in the Wrigley area from February 24th to March 14th, 1971.

The shooting was mainly on Gobles Oil and Gas permit nos. 4378, 4379, and 6445. There was some "off-permit" shooting necessary for tie lines. This is included in the report.




# WRIGLEY AREA

IMPERIAL OIL ENTERPRISES LIMITED

SCALE 1:500,000

## Statistical Data

**Dates** The move into the Wrigley area from another assignment in the north of the area was completed on February 22, 1971 and recording commenced on February 24th. Recording was completed and the vehicles released on March 14, 1971.

**Production** 52 miles, 215 shot points, average daily production 2.7 miles, 19 working days. No down-days.

**Equipment** Recorder, shooting unit, cable unit, 2 survey units, party manager's 4 wheel drive, 4 shot hole drills, 2 water trucks, 3 bulldozers, 1 dozer shift truck. Chartered light aircraft from Ft. Simpson used for supervisory trips and supplies. Fuel supplies were trucked from Ft. Simpson.

**Personnel** Party Manager, Operator and Assistant, Shooter and Assistant, two surveyors, two rodmen, five geophysical helpers, two mechanics, three camp staff, four drillers, four drill helpers, one drill supervisor, six dozer operators, one dozer foreman, one dozer camp cook.

**Surveying** Horizontal angles turned with Wilde T-16 theodolite. Horizontal control based on topography and aerial photos. Vertical datum used was another company's seismic elevations.

Conditions - Weather was typically cold, with temperatures ranging from 0° to -50°F. Terrain was generally rough, with elevation changes ranging up to 1000' along some lines. The line along the Dahadinni River was relatively smooth and flat.

## Field Procedures

A 100% single fold method was used. Single holes were used spaced 440 feet apart, stations were 110' apart with 9 geophones over 220 feet. The charge size varied from 1 1/4 to 105 pounds of "Geogel". Most holes were shot with 50 pounds. The average hole depth was 75 feet. The drilling was fair to good.

## Data Processing

All of the seismograms were corrected to a datum of +1000' A.S.L. using a datum velocity of 12,000'/sec. The data was played back digitally with sections produced on variable density film. All the data was filtered with selective filters used to remove low frequency interference energy. The data was not deconvolved because multiple interference was not a problem. The processing was done in Imperial Oil's Process Centre.

## Results and Interpretation

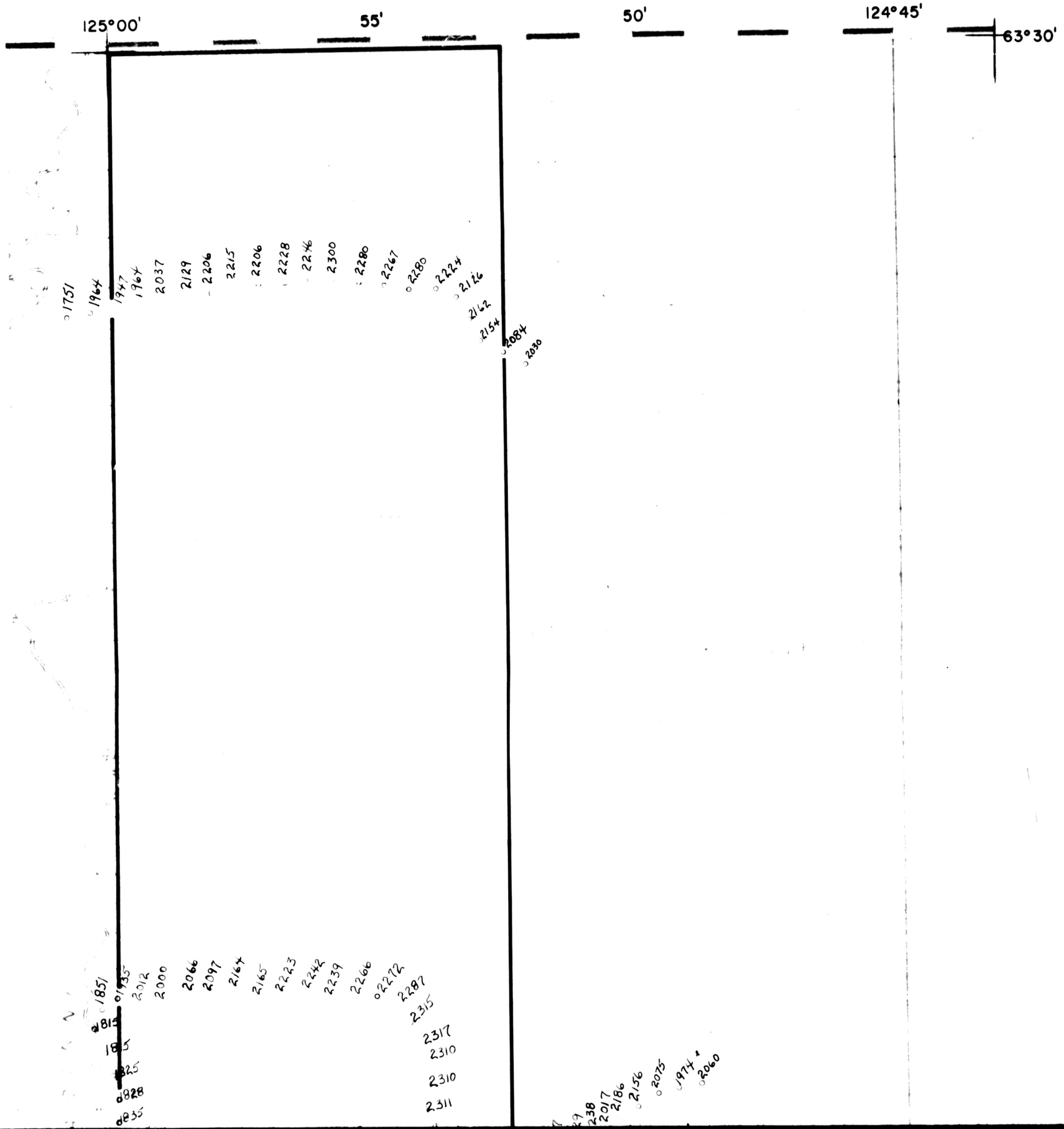
The quality of the seismograms varied from good to almost unuseable. The only consistent reflections which could be carried were from the top of the Middle Devonian Carbonate (Hume) and from the Proterozoic unconformity. Time structure maps of each of these reflections were constructed together with the isochron between the two reflections. Several reflections occurred between the Middle

Devonian Carbonate and Proterozoic but were sporadic and impossible to carry over much of the area of the program. The seismic coverage in the area was tied to a velocity survey at the well Shell Wrigley G-70 (63°10'N, 124°00'W).

Two major features were observed from the seismic coverage. A major anticlinal structure exists, persisting to the Proterozoic unconformity below the surface Dahadinni anticline. The surface structure is enhanced, relative to the Proterozoic structure, by thrust faulting which apparently soles out somewhere in the carbonate section between the Hume and Proterozoic.

The two southernmost lines of the program indicate that a similiar situation exists under the Trench Lake anticline. The relief of the Dahadinni structure at the Proterozoic unconformity seems to be at least 4000' in an east-west direction and about 1000' in a north-south direction, within the area of the survey. Note: The contour interval used is 100 ms equivalent to about 600' on the Hume time structure and about 1000' on the Proterozoic time structure and the isochron. This interval was used in favour of one equivalent to 100' in the interests of clarity.

O. Friesen, P.Eng.
Exploration Manager, Southern District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2246
2300
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2224
2126
2162
2154
2084
2030
1851
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2000
2066
2097
2164
2165
2223
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2266
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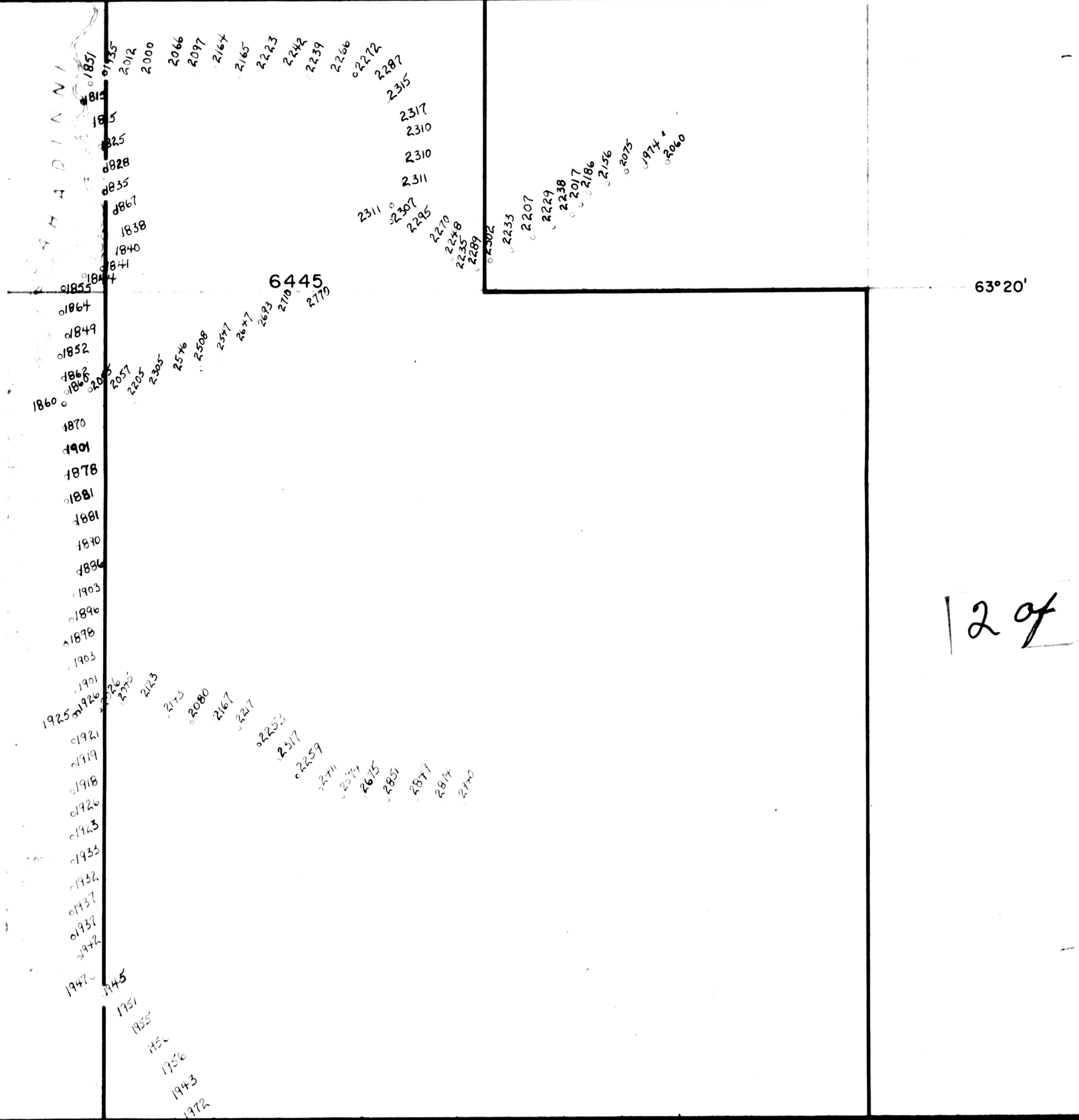
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1851
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2317
2310
2310
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2311
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2248
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2289
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2207
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2017
2186
2156
2075
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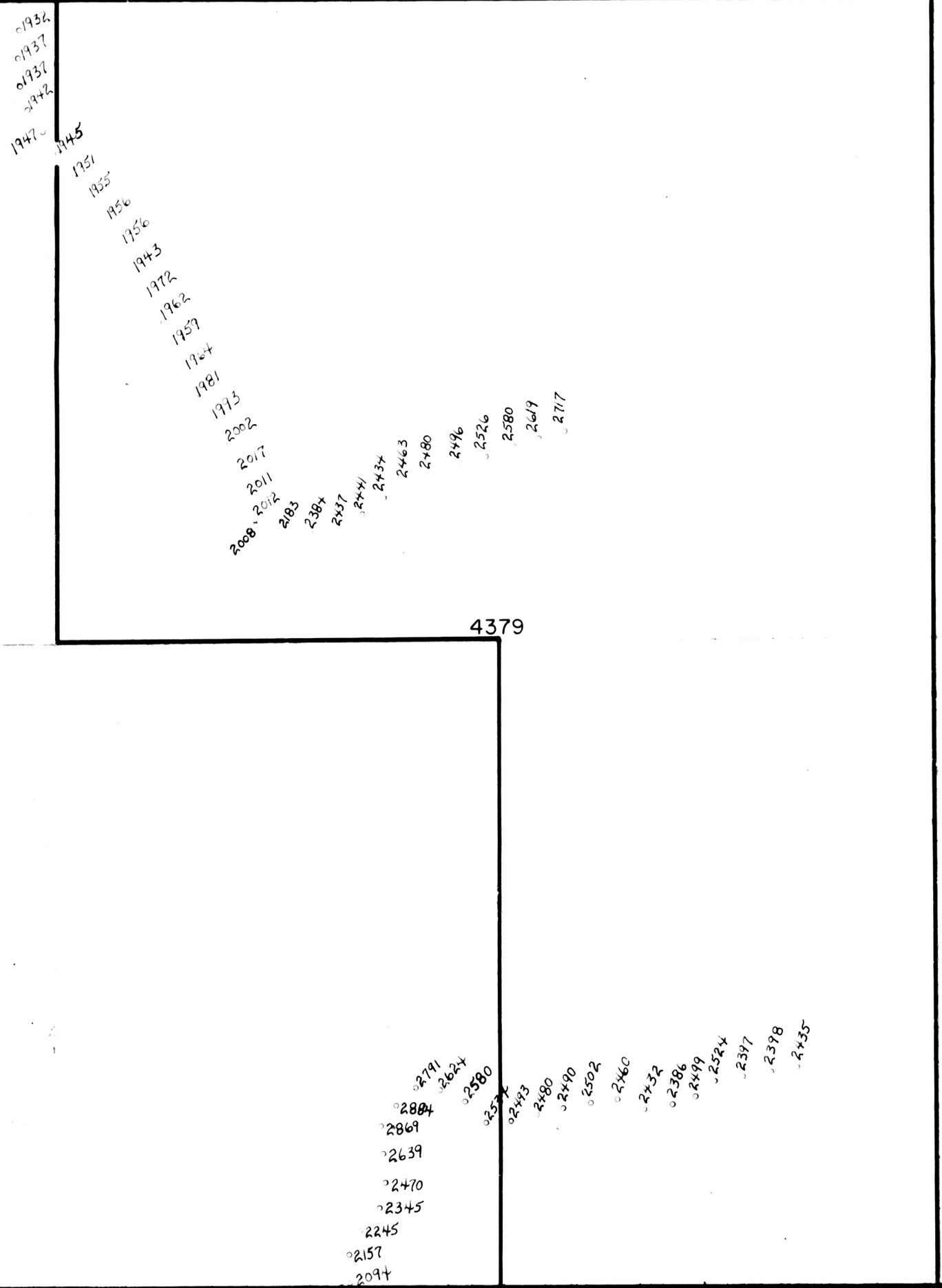
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2012
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2384
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2441
2434
2463
2480
2496
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2580
2619
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2245
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63°10'

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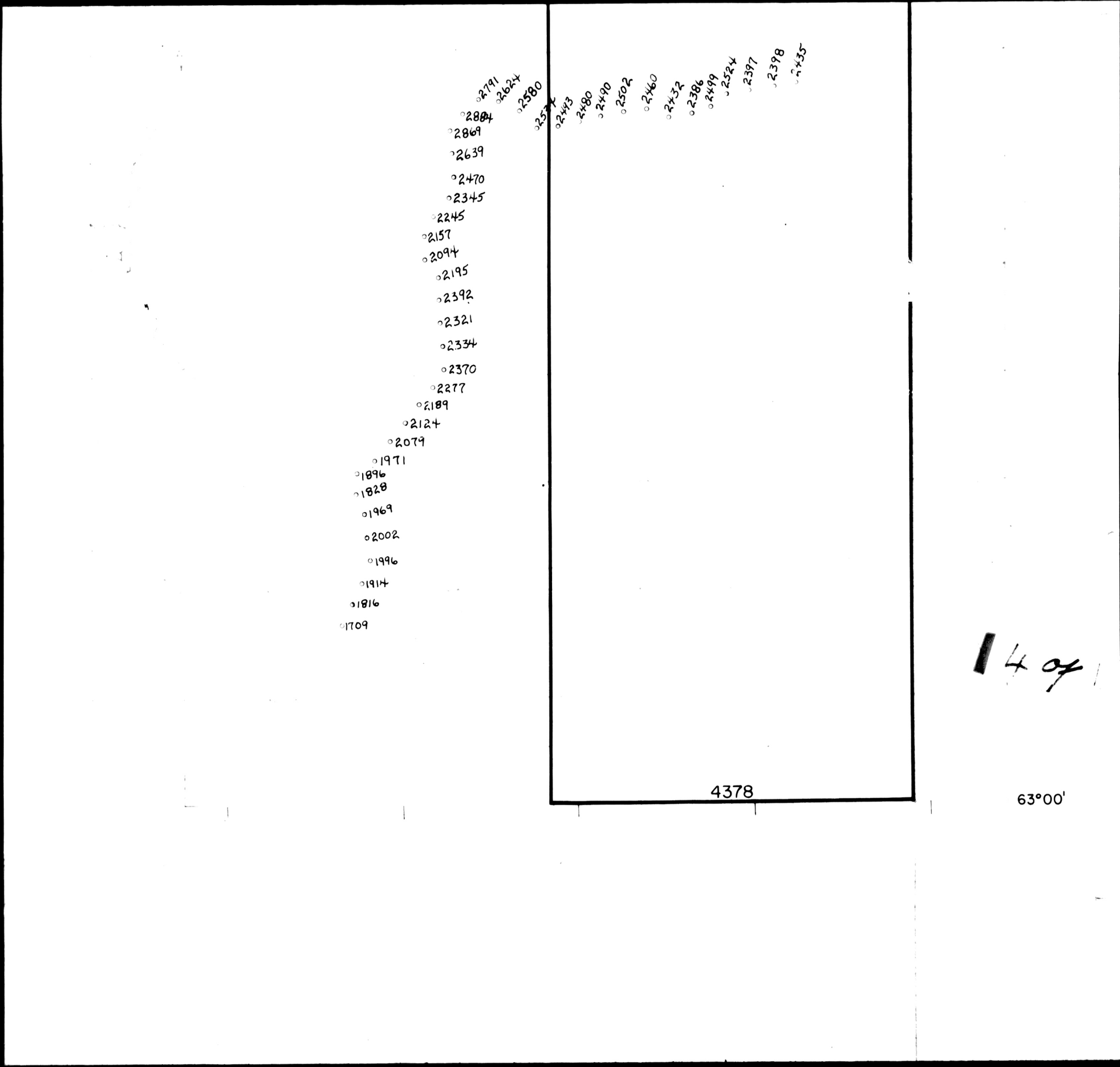
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1971
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1996
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1709
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2443
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2490
2502
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2432
2386
2499
2524
2397
2398
2435
4378
63°00'

o1969
o2002
o1996
o1914
o1816
o1709

4378

63°00'

o1431 o1428 o1421 o1415 o1428 o1414 o1407 o1402 o1378 o1370 o1365

62°56'

# SHOT POINT ELEVATIONS

# SEISMIC PROJECT - WRIGLEY AREA

SCALE 1 = 50,000

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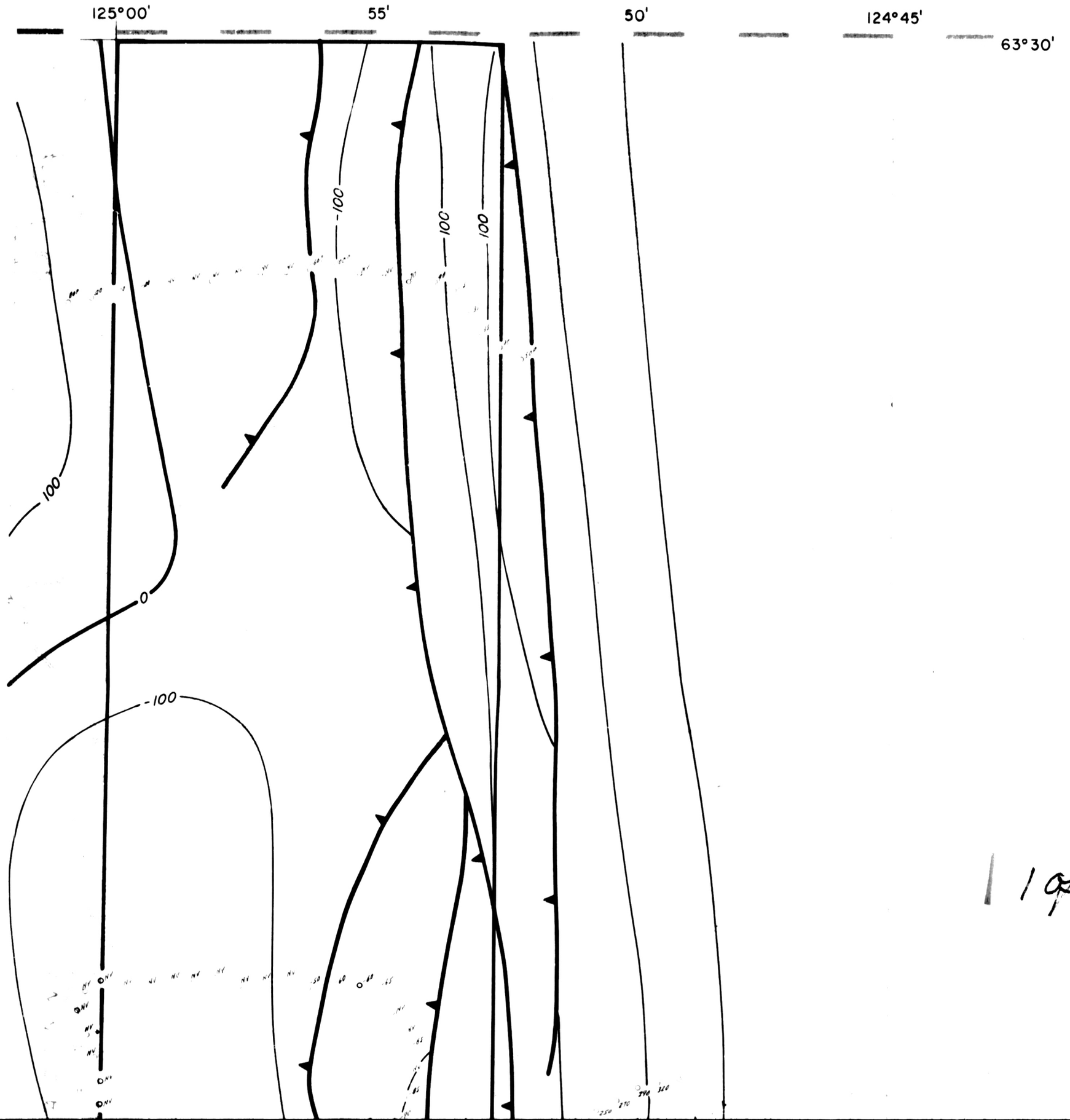
F 51.297-1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124°45'
63°30'
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100
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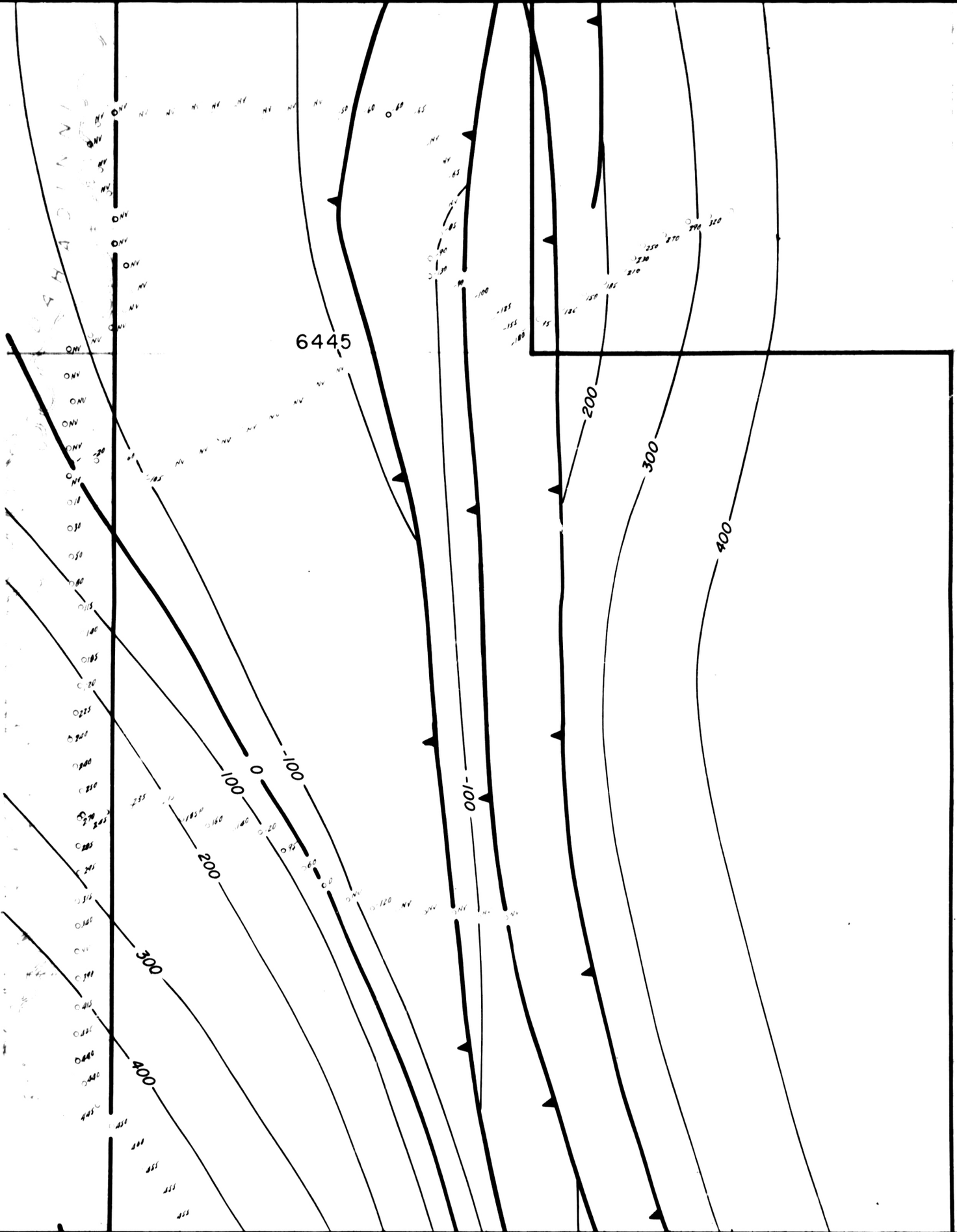
0
-100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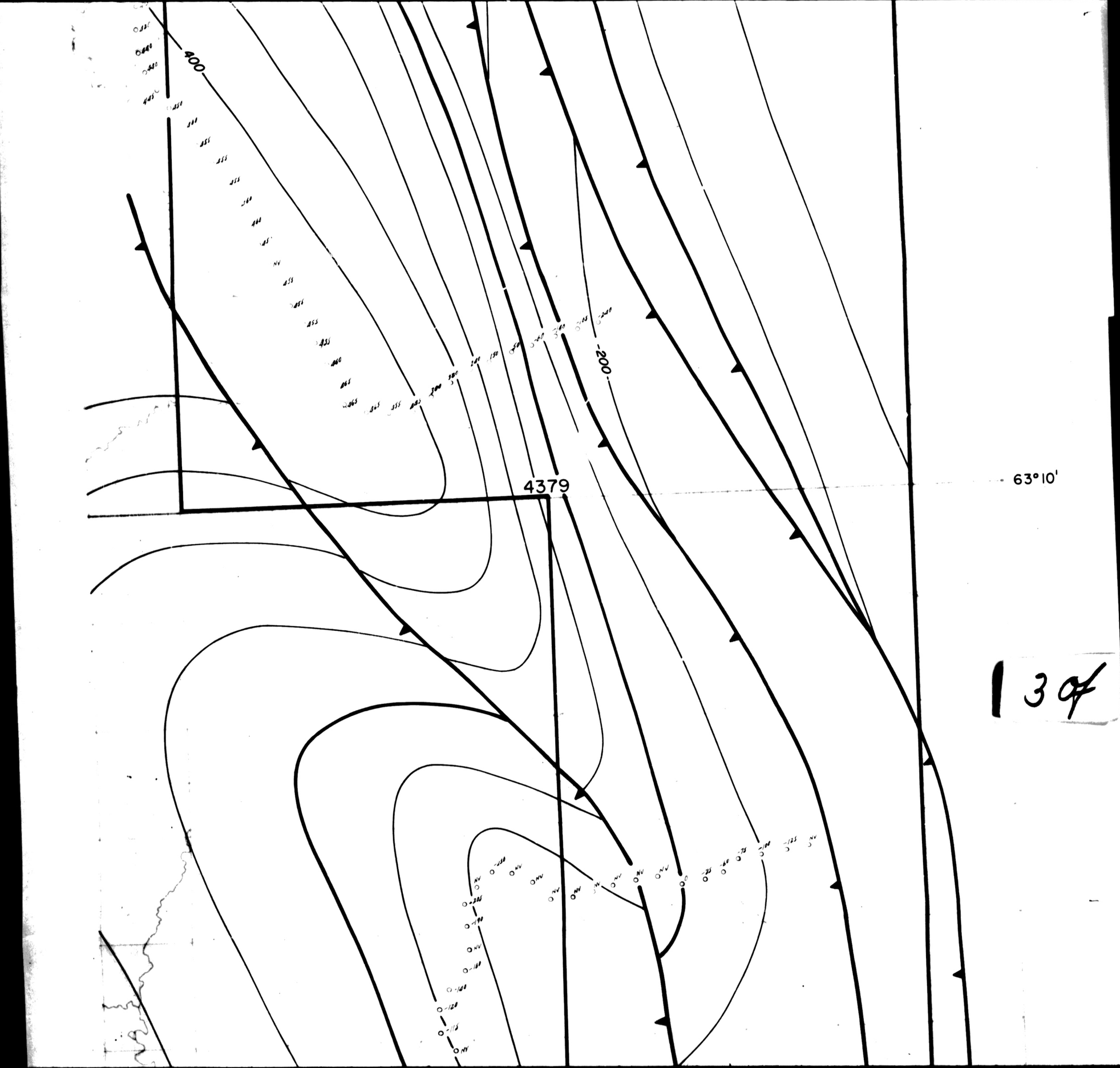
400
-200
4379
63°10'
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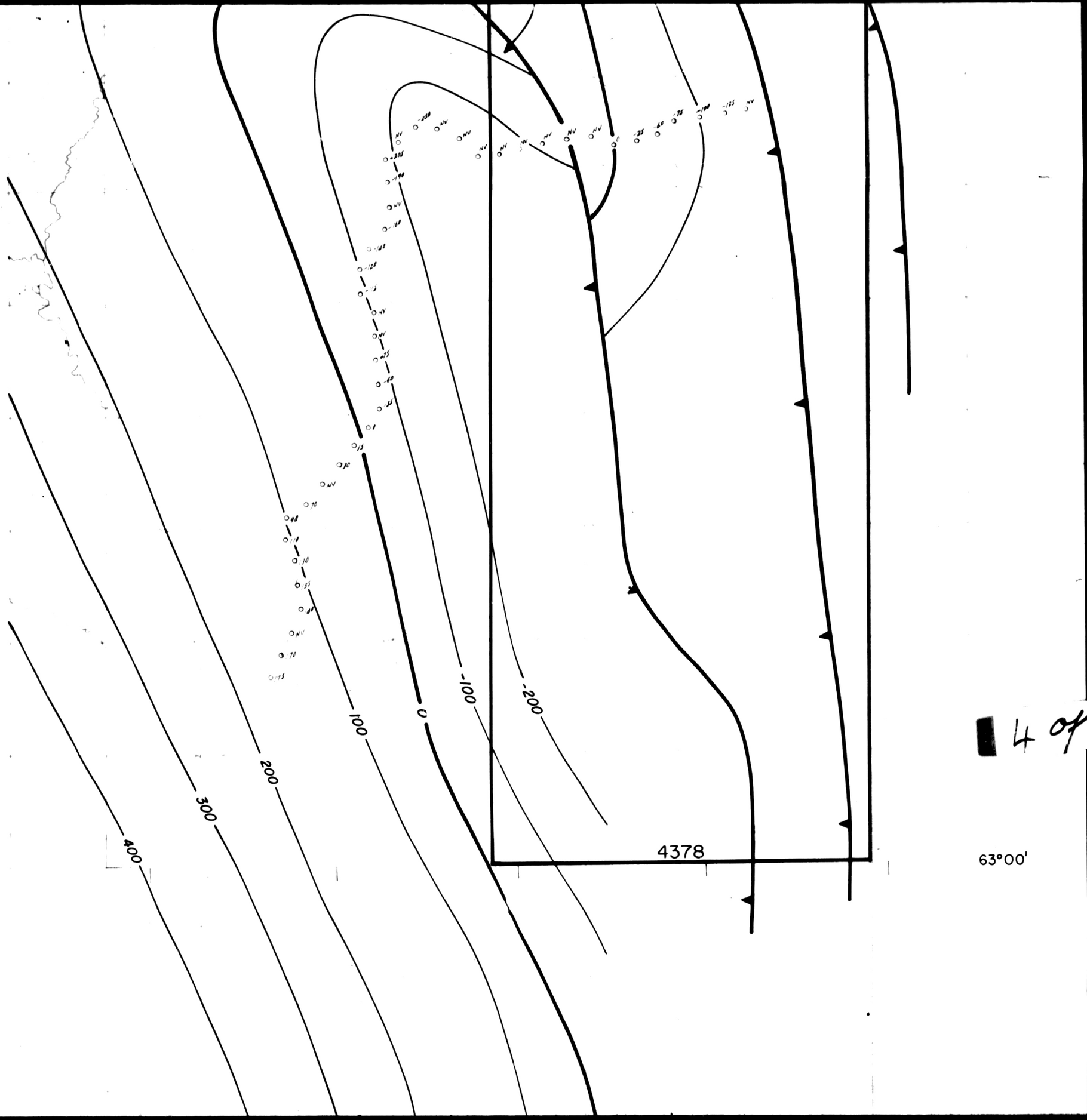


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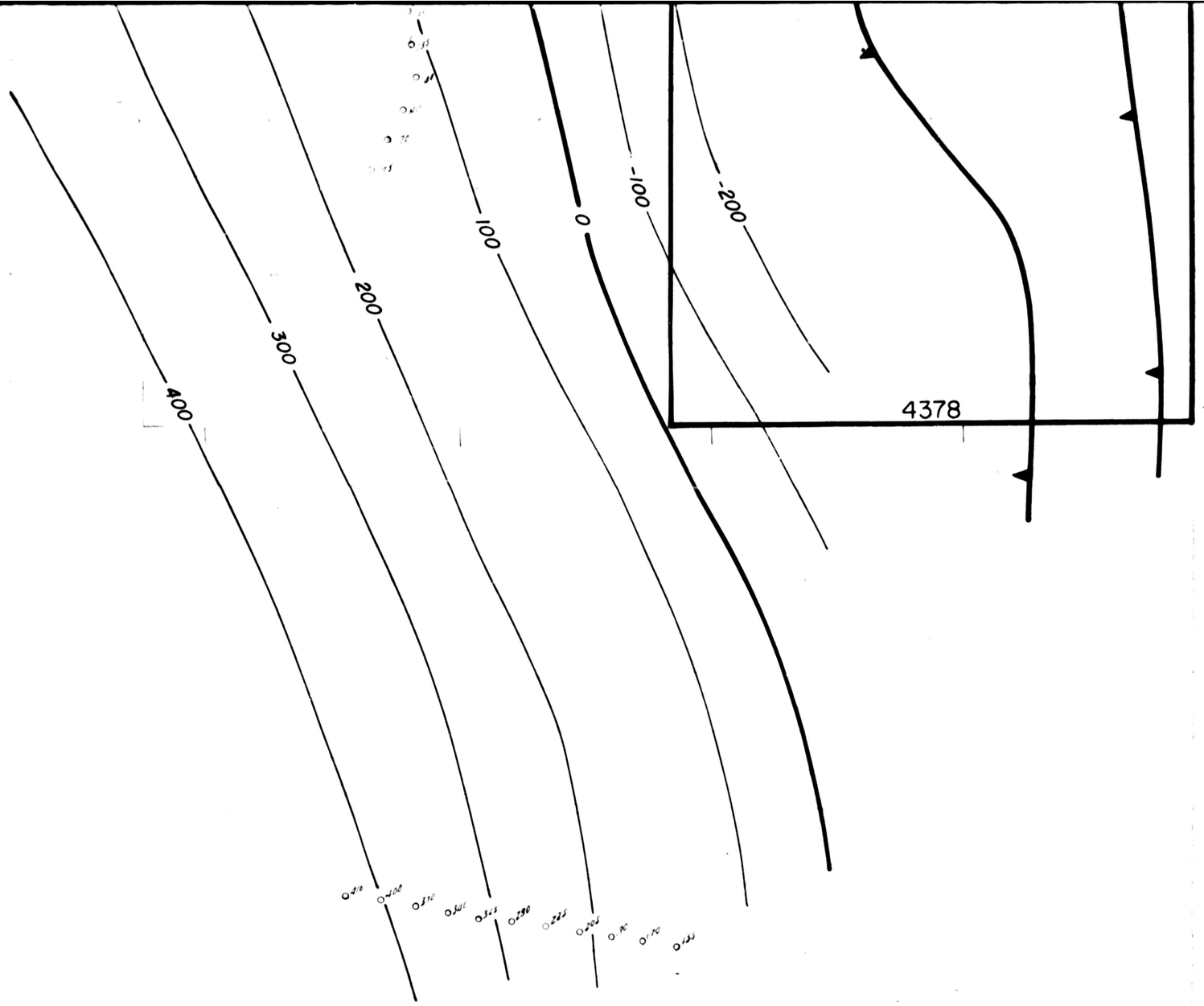



# HUME TIME STRUTURE

CONTOUR INTERVAL 100 MS

# SEISMIC PROJECT - WRIGLEY AREA

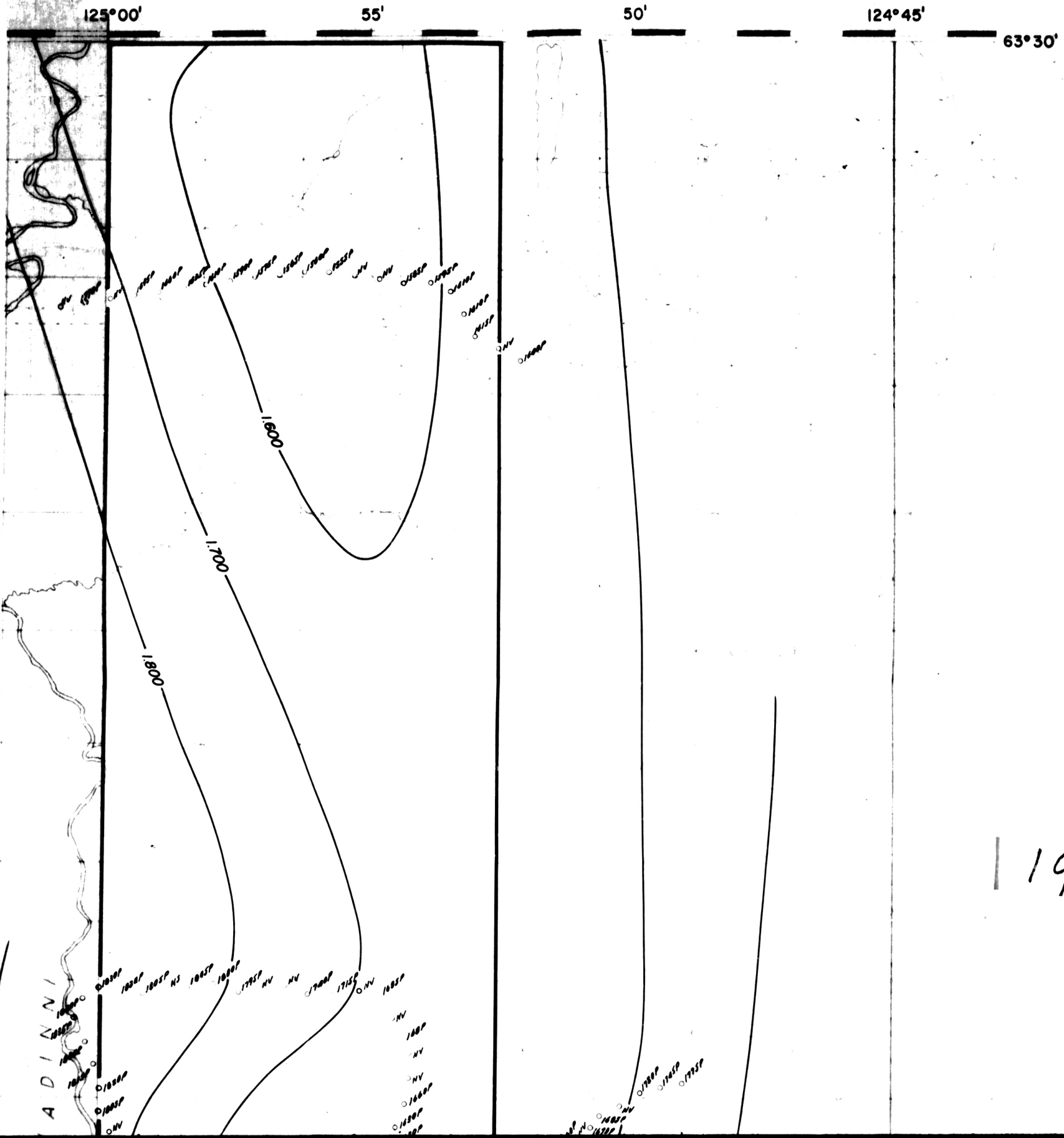
DATUM 1000' DATUM VELOCITY 12000'/sec.

- VALUES ARE ABOVE DATUM

SCALE 1=50,000

5 of 5

F 51.297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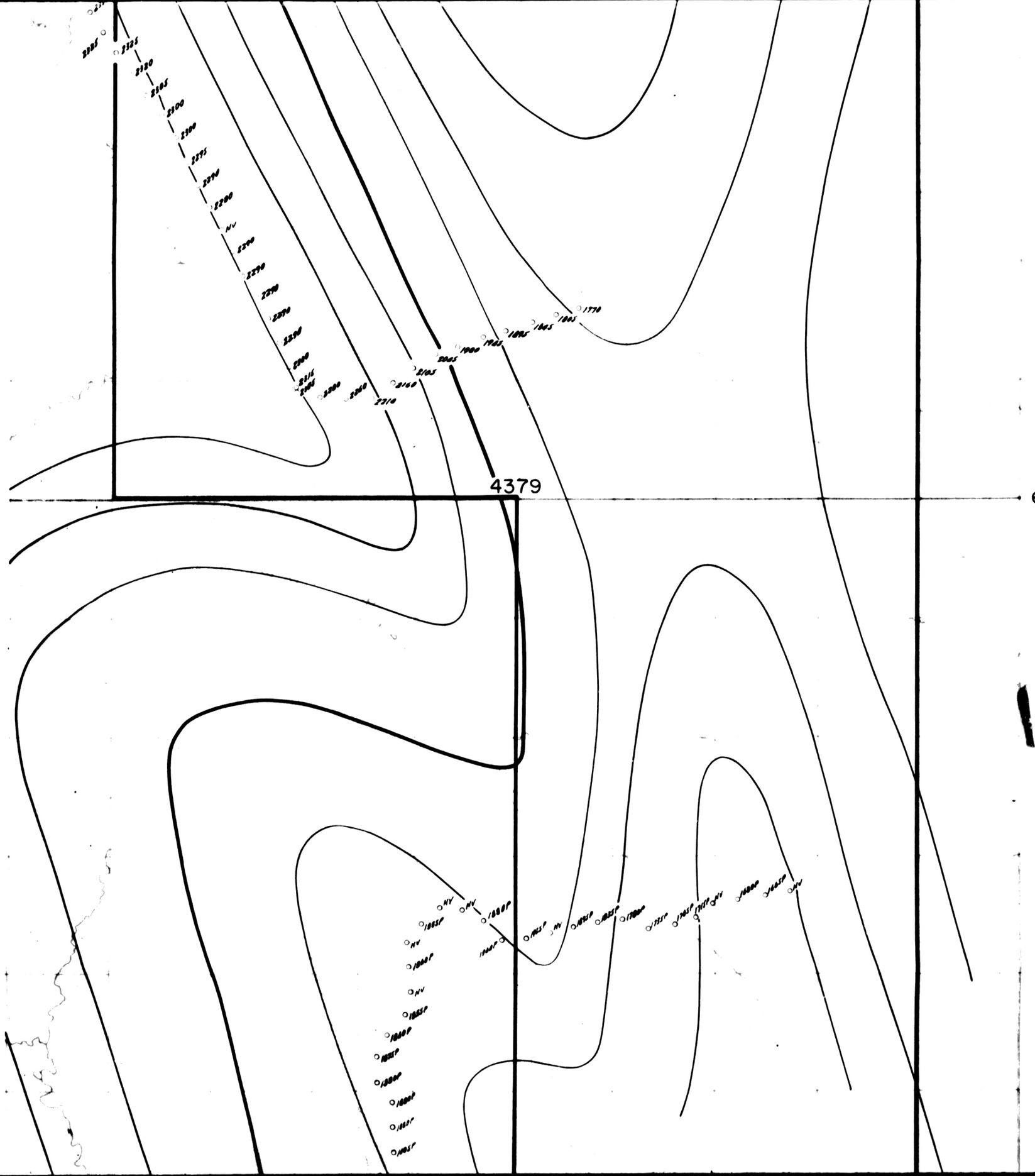
50'
124°45'
63°30'
1600
1700
1800
ADIINNI

2 of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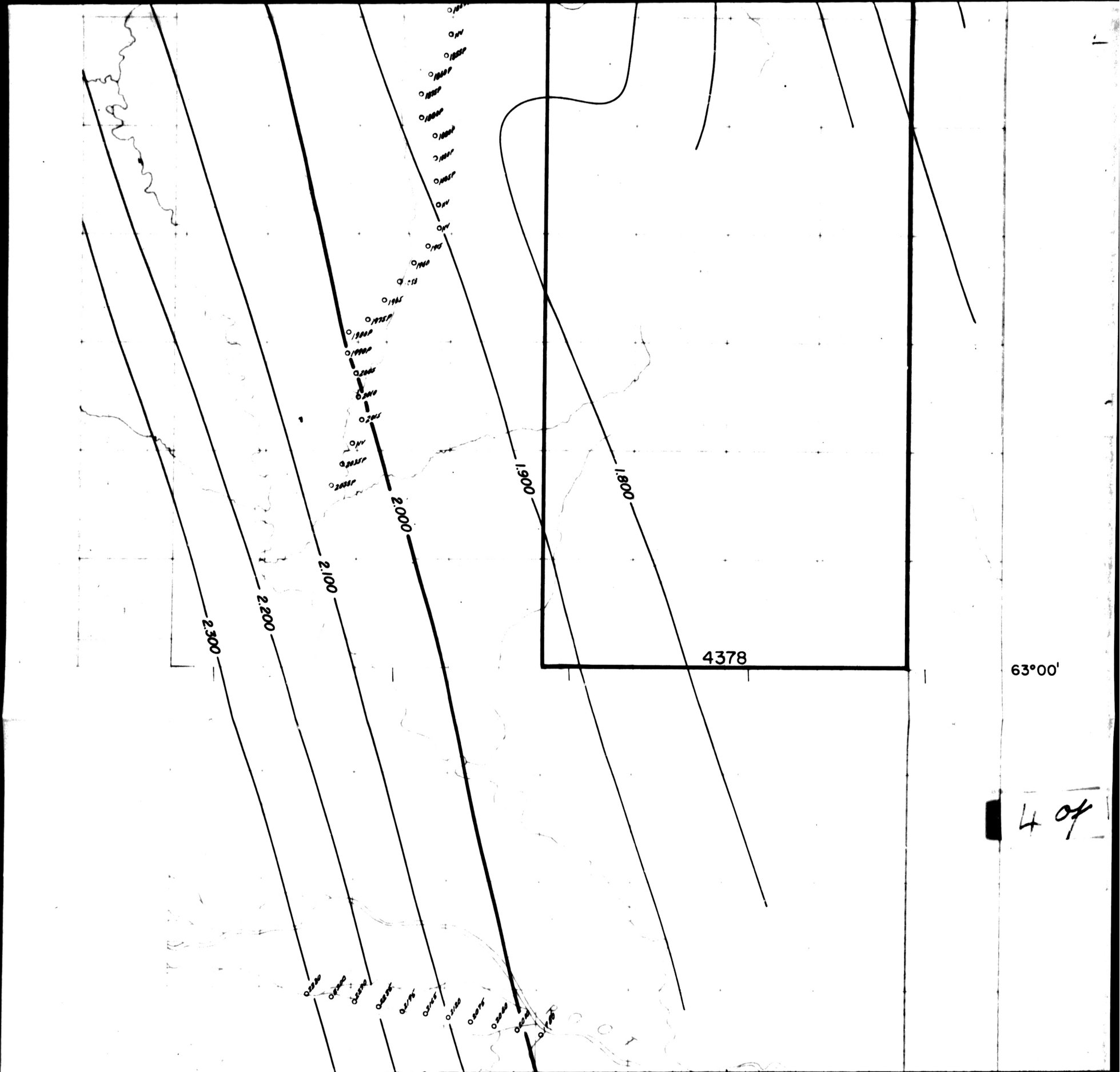
63°10'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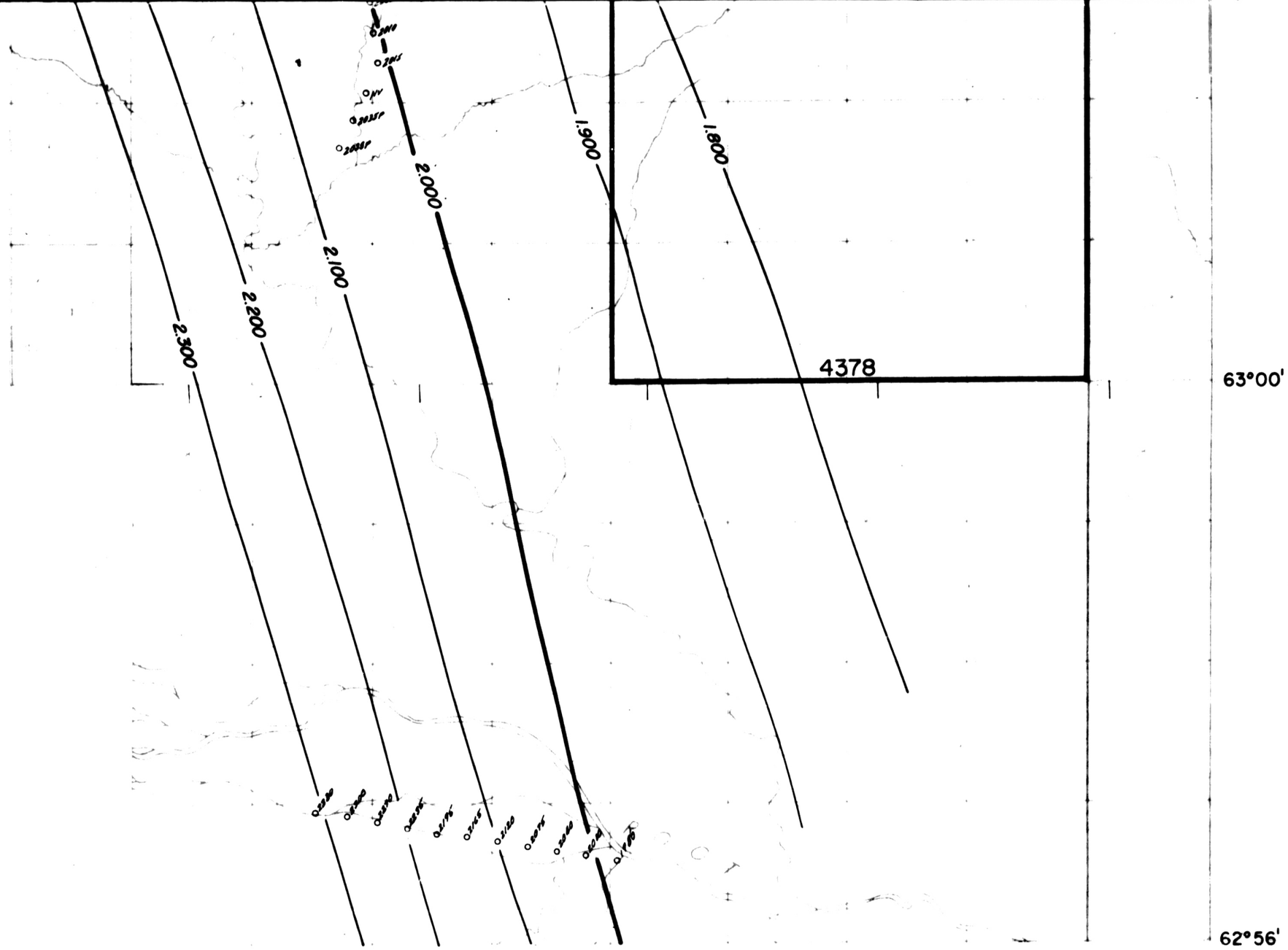
2.000
2.100
2.200
2.300
4378
63°00'




PROTEROZOIC TIME STRUCTURE

CONTOUR INTERVAL 100 MS

# SEISMIC PROJECT - WRIGLEY AREA

DATUM 1000' DATUM VELOCITY 12000'/sec.

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SCALE 1 = 50,000

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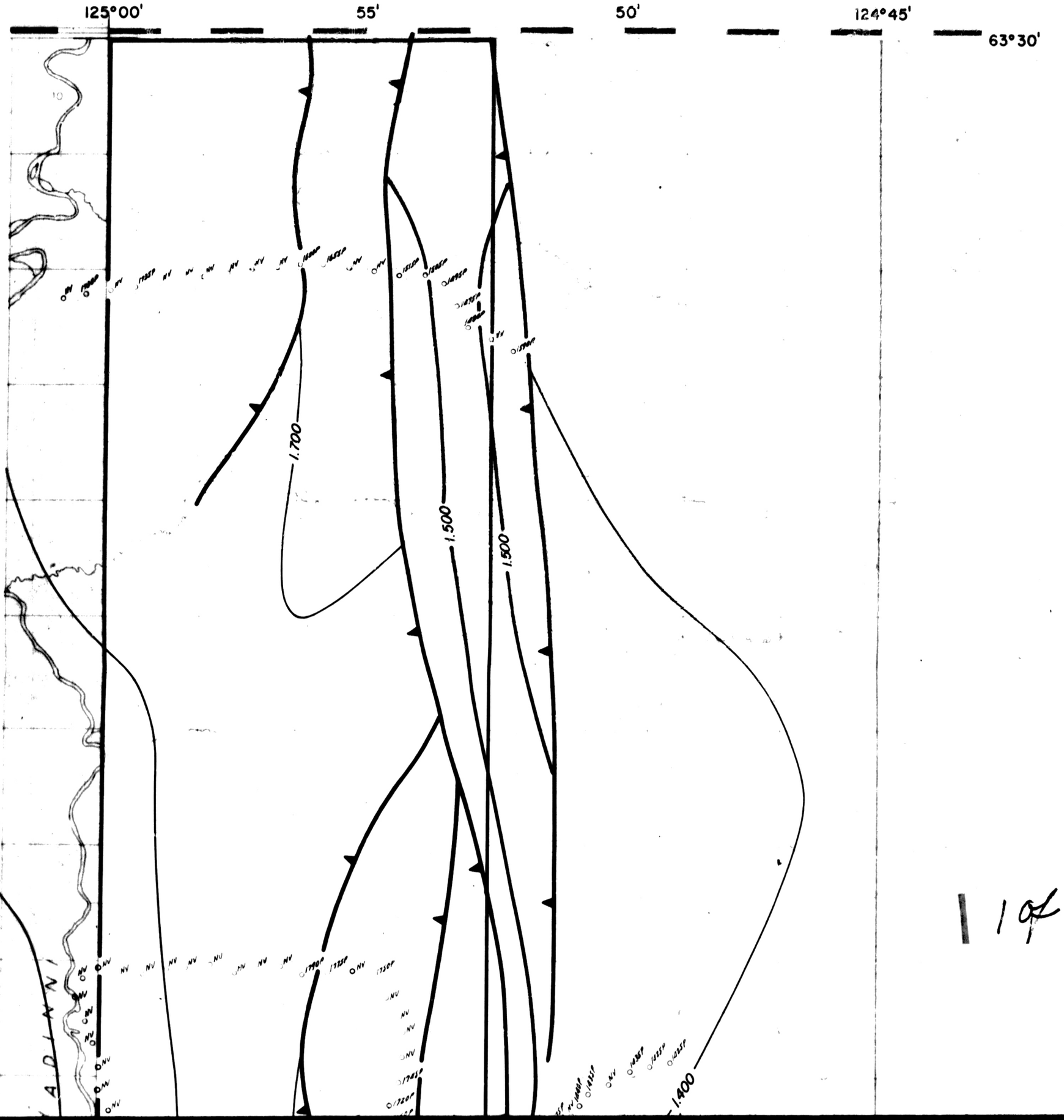
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50'
124°45'
63°30'
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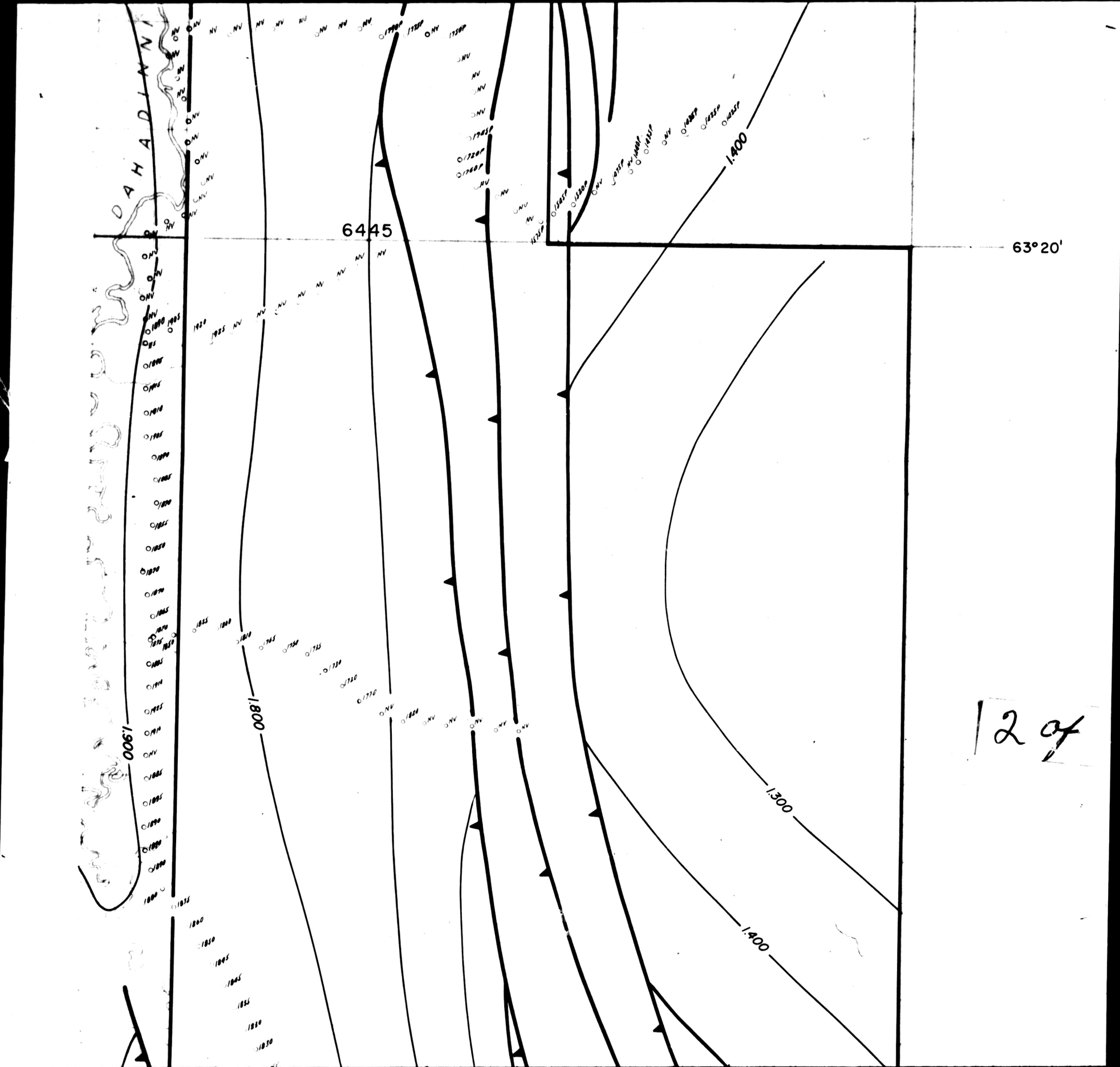
1.500
1.500
1.400

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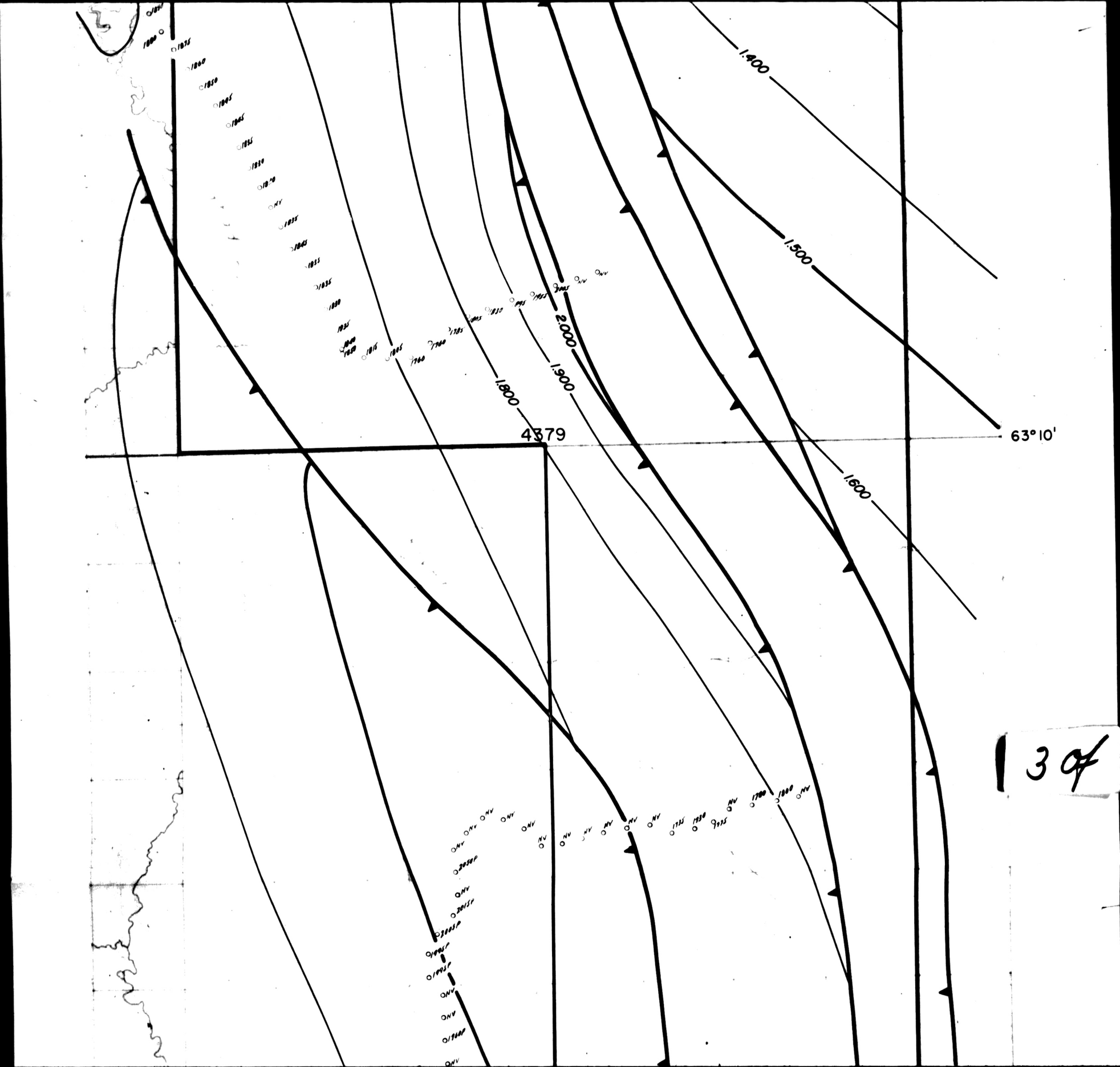


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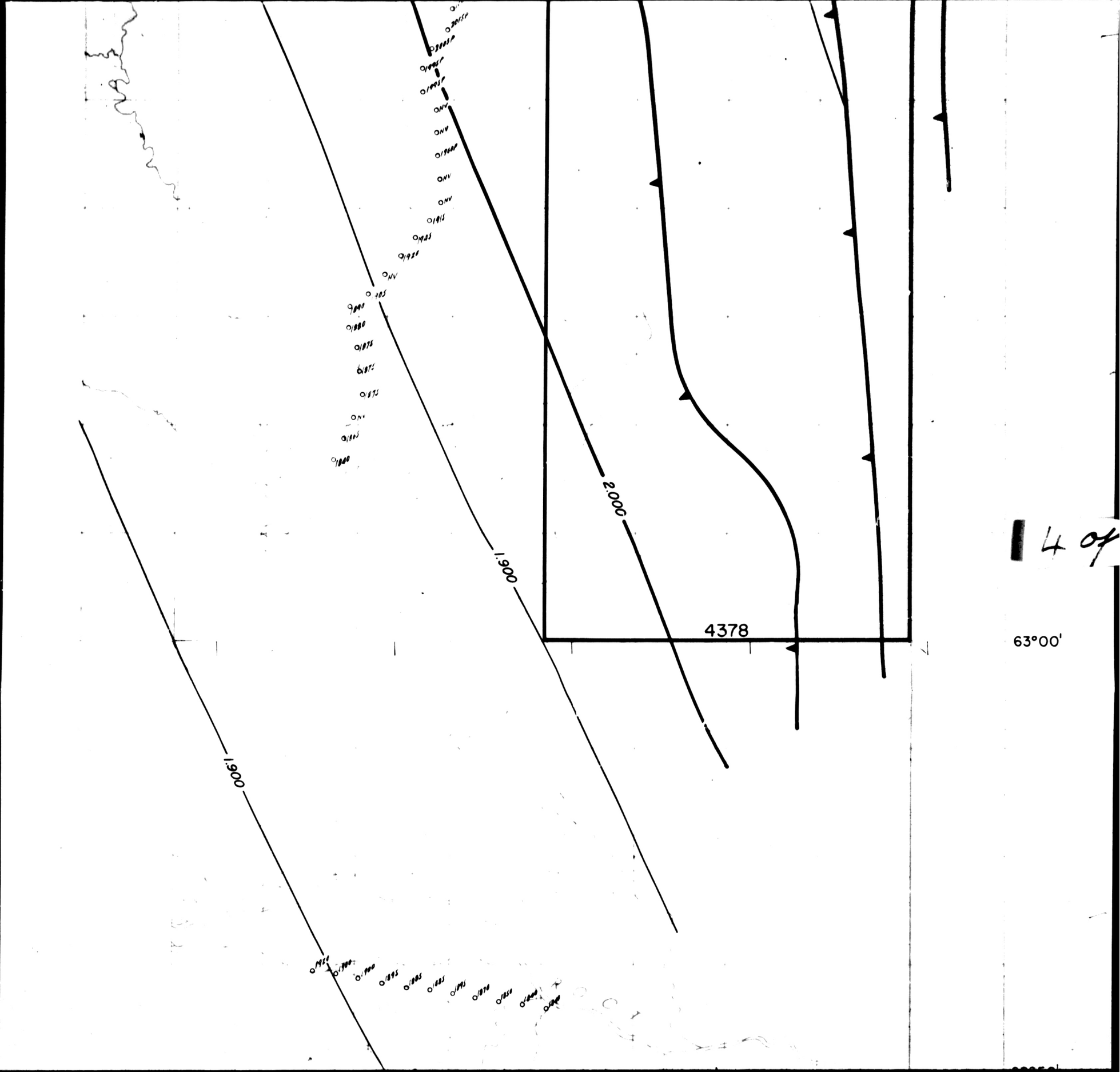
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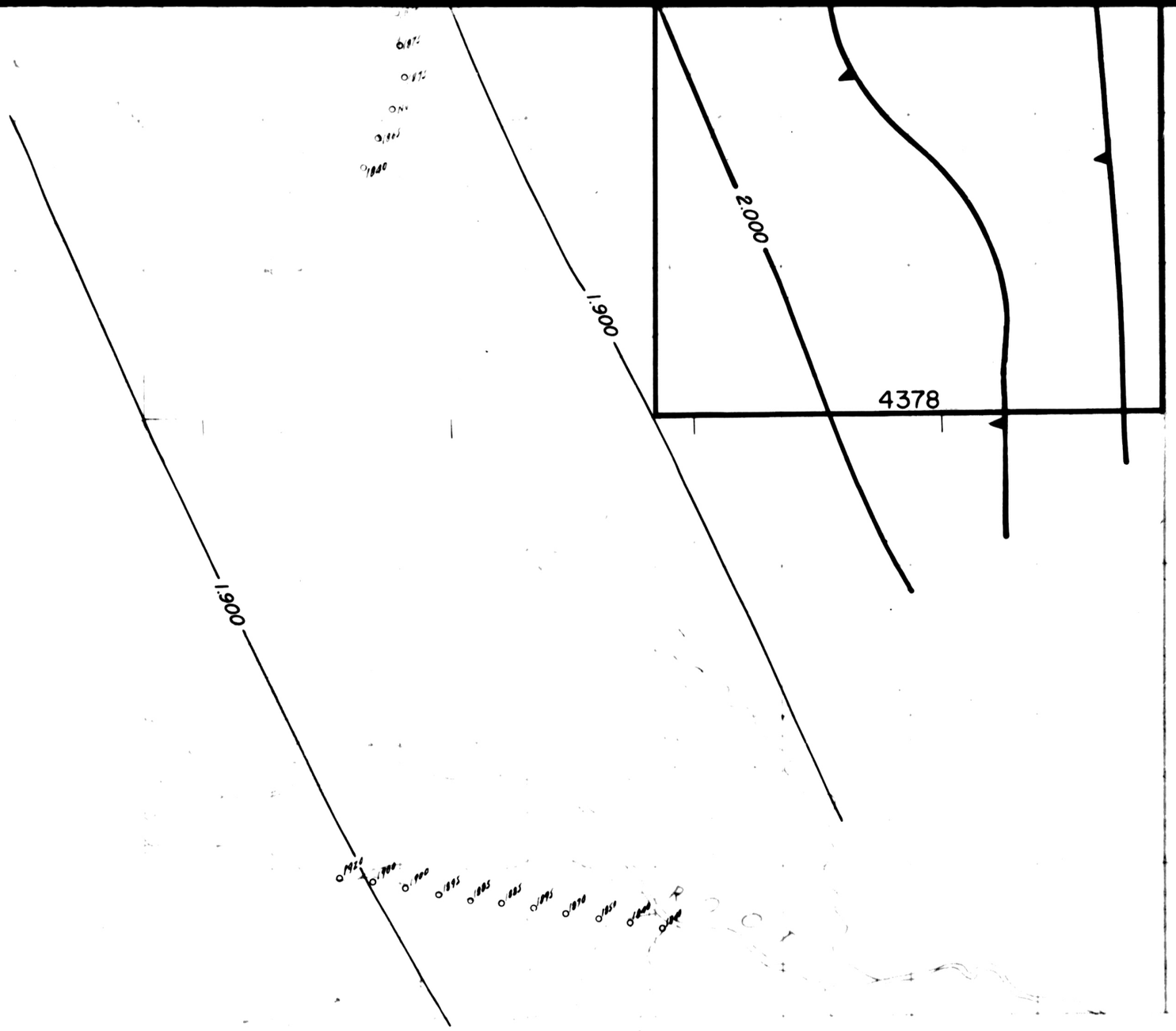
1.900
1.900
4378
63°00'




ISOCHRON HUME TO PROTEROZOIC

CONTOUR INTERVAL 100 MS.

# SEISMIC PROJECT - WRIGLEY AREA

5 of 5

SCALE 1 = 50,000

F 51.297

IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT - WESTERN DISTRICT



MACKENZIE PLAIN AREA

# TRANSCRIPTION AND INTERPRETATION OF REFLECTION SEISMIC



Data Received: April to July, 1971

Lease Group Nos. L-46 and L-47

Permittee: Imperial Oil Limited

Project No. 7-6-5-71-4

Shot By: Sigma Exploration Ltd.

Under Permit No. 815-1-6-70-1

by

D. Jardine
Manager, Western Exploration District

Calgary, Alberta
July, 1975

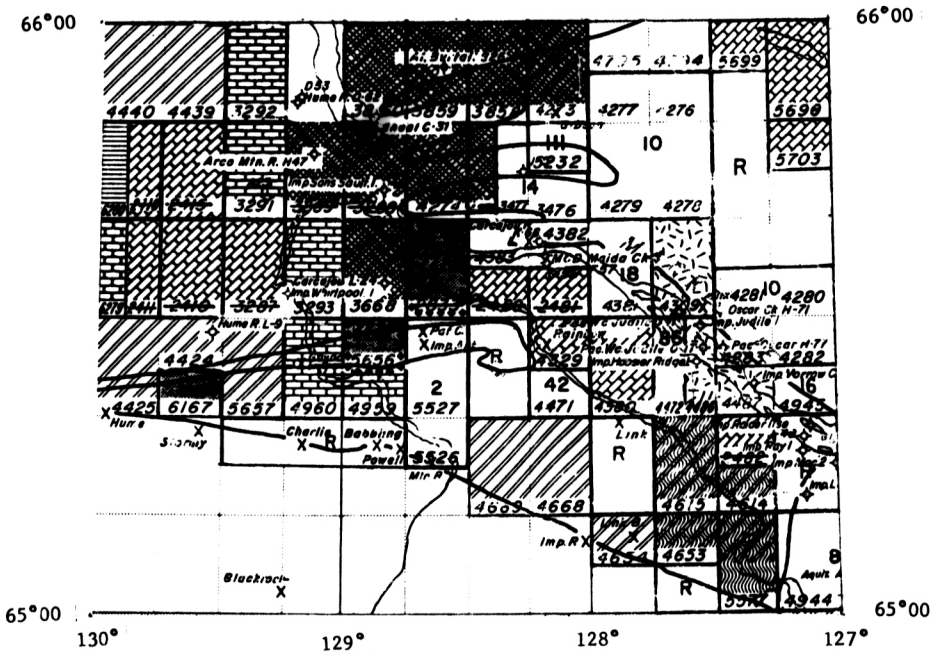
IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT - WESTERN DISTRICT

# MACKENZIE PLAIN AREA

# TRANSCRIPTION AND INTERPRETATION OF REFLECTION SEISMIC

## CONTENTS




Location Map

## INTRODUCTION

This is a report on the transcription and interpretation of reflection seismic data from the Mackenzie Plains area, shot by Sigma Exploration Ltd. as part of a participation survey. The work was done during the summer of 1971 and then re-worked the following summer.

These data were received in several shipments between April 1971 and July 1971, from Sigma Exploration Ltd. All statistical data concerning dates of program, production, equipment, personnel, survey methods, general conditions and field procedures will be found in Sigma's report on this program.

## Data Processing

After receiving these data, the field tapes were transcribed onto Imperial reels and all lines were reprocessed in an attempt to improve the final data quality. This was achieved in general by using slightly different filters, static corrections and deconvolution operators from Sigma's processing. All reprocessing was done at Imperial's data processing centre.

## Results and Interpretation

Structure maps were made on the pre-Cretaceous unconformity, Hume top and Proterozoic top. Isochrons of the Mount Cap and Saline River intervals within the Cambrian, and from the Hume to Cambrian, were made. Also a pre-Cretaceous

subcrop map was made. All of the isochrons should be used with care because the quality of the reflectors used to make them is poor; the reflectors are often intermittent. The quality of the reflectors used for the structure maps is fair to good, deteriorating to poor to the west in the case of the Hume.

The Proterozoic time structure is marked by northwest-southeast trending block faults which are thought to have been present since late Proterozoic - early Cambrian time. Thus they would have been the foci for the accumulation of the Lower Cambrian Mount Clark sandstone. The Mount Cap isochron shows a general thinning of the section to the southeast. This is probably due to deposition. The Saline River salt isochron also shows this. In this case, there has been flowage of the salt during the Laramide orogeny which tends to mask any depositional effects. Reactivation of old basement faults seems to have been the trigger for the salt flowage.

The Hume to Cambrian interval is influenced by the basement block faulting. This seems to have affected the growth of the Silurian carbonates. Also, there is regional evidence for an epeirogenic uplift during this interval. The

pre-Cretaceous subcrop map shows that the Upper Devonian Imperial shales had been eroded completely prior to Cretaceous time over part of the area where structural highs existed. It should be noted that these highs are coincident with the basement structure, as are the thins on the pre-Cretaceous structure map.

D. Jardine, Manager
Western Exploration District
Imperial Oil Limited

JET/b