# SOIL AND FOUNDATION CONDITIONS

THE PROPOSED POINTED MOUNTAIN GAS PLANT

AMOCO



ELMER W. BROOKER & ASSOCIATES LTD.

SOIL & FOUNDATION CONSULTANTS

THE ASSOCIATION OF
PROFESSIONAL ENGINEERS
OF ALBERTA
PERMIT NUMBER
P245
ELMER W. BROOKER
& ASSOCIATES LTD.

# PRELIMINARY SOILS INVESTIGATION

At The Site Of

THE PROPOSED POINTED MOUNTAIN GAS PLANT

AMOCO

Submitted To:

L.G. GRIMBLE & ASSOCIATES LTD.

FEBRUARY, 1971

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# I. INTRODUCTION

On February 5th and 6th, 1971, a field investigation was conducted to determine the soil and foundation conditions at the site of the proposed Pointed Mountain Gas Plant for Amoco Canada Petroleum Company Ltd. The gas plant is being built to process natural gas from a nearby well on Pointed Mountain and is located as shown on the key plan, Drawing No. A-1, Appendix A. Drawing No. A-2 is a site plan showing the testhole locations relative to the reference grid system established on site.

Authorization to carry out this investigation was received from Mr. L. G. Grimble, P. Eng. of L. G. Grimble and Associates Ltd., prime consultants to Amoco. The following items were considered within the terms of reference of the assignment.

a. Suitability of site chosen.

b. Subsurface soil conditions.

c. Foundation proposals.

Subsurface soils consist of a silt stratum overlying a clay layer which extends to an approximate depth of 9 feet below existing grade. The silt stratum was observed to an approximate average depth of 4.0 feet below existing grade. Noted below the clay layer was a hard glacial till composed primarily of silty clay. The soils encountered provide good foundation conditions with respect to bearing capacity and tolerable settlement. Soils at a shallow depth show medium to high swelling potential, hence consideration has been given to this aspect in the following recommendations.

## II. RECOMMENDATIONS

Based on information obtained from the investigation, the following design recommendations are stated.

### 2.1 Foundation Type

A number of foundation types may be considered at this site. For buildings and other structures both isolated spread footings and strip footings placed at relatively shallow depths will suffice. Mat foundations under machines will be suitable. A pile and grade beam foundation system may also be used if economically justified. End bearing belled cast-in-place concrete piles founded in the clay till, or cast-in-place concrete friction piles may be employed at the site.

### 2.2 Depth and Size of Foundation

All shallow foundation elements that will be located under a heated building or structure should be cast in the very stiff clay stratum. A minimum depth of 5.0 feet is recommended for shallow foundation elements located in the clay stratum.

With reference to subsection 2.6.1, it is recommended that footings under non-heated structures should be located at a minimum depth of 9.0 feet below final grade.

Cast-in-place concrete belled piles should be founded in or on the hard glacial till, which exists at an approximate average depth of 9.0 feet below existing grade. It is recommended that the bells be embedded to a minimum depth of 2.5 times the pile bell diameter. Cast-in-place concrete friction piles should also be founded in the till stratum. The top 9 feet of pile embeddment should be considered to contribute negligible frictional resistance with respect to bearing capacity beneath unheated areas, due to frost and seasonal moisture variation effects. Beneath heated areas, the top 5 feet of pile embeddment should be considered to contribute negligible frictional resistance due to moisture variation effects.

Strip and square footings should have a minimum width of 1.5 and 3.0 feet, respectively. Piles should be constructed with a minimum shaft diameter of 16 inches.

## 2.3 Design Net Bearing Values

### 2.3.1 Static Foundation Loads

a. Spread or Mat Foundations

Spread or mat foundations, resisting static loads, may be designed using net allowable bearing pressures of 3300 and 4000 pounds per square foot, for foundation elements founded in the light brown silty clay and till, respectively.

b. Cast-In-Place Concrete Piles

End bearing cast-in-place belled piles may be designed to resist static loads using a net allowable bearing pressure of 9000 pounds per square foot. These piles should be founded in till and be embedded to a minimum depth of 2.5 times the pile bell diameter.

Cast-in-place concrete friction piles may be designed to resist static loads using an allowable skin friction of 500 pounds per square foot.

### 2.3.2 Dynamic Foundation Loads

a. Spread or Mat Foundations

Spread or mat type foundation subjected to dynamic loads, should be desgined using reduced net allowable bearing pressures as follows:

| Machine Type | Foundation Soil | Net Allowable Bearing Capacity (P.S.F.) |
|---|---|---|
| Reciprocating Engines | Light brown silty clay | 825 |
| Centrifugal Engines | Light brown silty clay | 1650 |
| Reciprocating Engines | Till | 1000 |
| Centrifugal Engines | Till | 2000 |

In addition to using the reduced net allowable bearing capacities given above, machine foundation, either for centrifugal or reciprocating equipment, should be proportioned on the basis of elastic half space theory. Allowable amplitudes of movement, frequency ratio and damping should be taken into account. For design considerations of foundations supporting dynamic loads the following dynamic soils properties are recommended.

Gd - Dynamic Shear Modulus - 10,000 psi

$\mu$ - Poissons Ratio - 0.47

These dynamic properties have been inferred from laboratory test results on representative samples of the silty clay and till underlying the site.

b. Cast-In-Place Concrete Piles

End bearing cast-in-place concrete belled piles may be designed to resist dynamic loading conditions using a net allowable bearing pressure of 3000 pounds per square foot. These piles should be founded in the till and should be embedded to a minimum depth of 2.5 times the pile bell diameter. Cast-in-place concrete friction piles, supporting dynamic loads, may be designed using an allowable skin friction value of 250 pounds per square foot.

## 2.4 Lateral Pile Capacity

An allowable lateral bearing pressure of 400 pounds per square foot per foot of pile embeddment length may be used in designing short piles to resist lateral loads. The effective pile embeddment length should be measured from a point 2 pile diameters below final grade.

## 2.5 Excavations and Swelling Considerations

2.5.1 No loose, disturbed, remoulded or slough material should be allowed to remain in open footing or pile excavations. Hand cleaning must be undertaken if an acceptable surface cannot be prepared by mechanical equipment. Since the silty clay and clay till are of stiff consistency, slopes in the order of 20 feet high are expected to stand vertically for short periods of time. However, the design of cut back side slopes is controlled by the Workmens Compensation Act and a slope of 2 vertical to 1 horizontal is normally recommended in this type of material. Deterioration of side slopes with time and possible wet weather conditions can be expected.

2.5.2 The relatively dry condition of the silty clay and underlying clay till with respect to their plasticity characteristics, suggests that swelling movements are probable if free water is allowed access to these materials. Constant volume swelling tests reveal that the swelling potential of the clay is very high. Excavations should, therefore, be sheltered from snow, rain, freezing temperatures and the ingress of free water. A skin coat of concrete, placed immediately after an excavation is completed, would be helpful in protecting the foundation soil from the elements of weather and consequent alteration of the existing moisture content.

## 2.6 Frost and Frost Heave

### 2.6.1 Frost Penetration

The geographic location of the site, with respect to existing freezing index maps, indicates that the area of the plant site is subject to a long term average of approximately 5200 degree days of freezing annually. Considering the soil types existing on site and allowing for conditions of exposed ground, the anticipated depth of frost penetration under unheated areas is 8 to 9 feet. Therefore, it is recommended that footings under unheated structures should have a minimum depth of cover of 9 feet.

2.6.2 Frost Heave

The soil materials in their natural state at this site are moisture deficient and medium to highly plastic. Thus, they are considered to be only moderately frost unstable and should not heave excessively when frozen. However, if drainage is poor and water is allowed to accumulate in the subsoil, both rebound heave and/or frost heave may occur. Therefore, well developed site drainage is recommended.

## 2.7 Grade - Supported Floor Slabs

Floor slabs may be supported on grade on the local inorganic silt, clay or clay till. A leveling course of clean granular material should be placed beneath the grade supported floor slabs. It is recommended that the leveling course be kept to a minimum thickness of about 6 inches and that site preparation prevent the collection of free water in the leveling course, which can act as a reservoir. Floor slabs should be structurally separated from machine bases and other components of the foundation systems.

## 2.8 Backfill

2.8.1 The local inorganic clay or clay till excavated at the site will be suitable as random backfill material adjacent to footings and foundation walls. Some moisture conditioning may be necessary as the materials, particularly the clay till, are presently dry of optimum. Random backfill should be placed in layers not exceeding 6 inches in thickness. Compaction of the backfill should be to a mean compaction of 95% of Standard Proctor maximum dry density, with not more than 5% of the tests falling below 93% of Standard Proctor maximum dry density.

2.8.2 The local inorganic clay and clay till may also be used as backfill to provide structural support beneath foundations and adjacent to machine bases. Compaction of this backfill material must be to a mean dry density of 100% of Standard Proctor maximum dry density with not more than 10% of the test results falling below 98% of Standard Proctor maximum dry density.

2.8.3 Frozen backfill or backfill placed on frozen surfaces is not considered to be suitable for random backfill adjacent footings, foundation walls, or for backfill providing structural support. Frozen fill material is considered suitable only for providing temporary working surfaces from which work can be carried out.

## 2.9 Drainage

The site should be sloped to provide positive drainage away from all structures. In order that erosion by running water is minimized, steep drainage gradients should be avoided. Since the materials on site are moderately frost susceptible, accumulation of moisture in the subsoil should be avoided in order that frost heaving is minimized or prevented.

## 2.10 Concrete

Type V Sulphate Resistant Portland Cement is recommended for concrete in contact with the natural soil. A minimum 28 day concrete compressive strength of 3500 pounds per square inch is recommended for foundation units.

# III. FIELD AND LABORATORY INVESTIGATIONS

Field drilling was carried out using a Texoma hydraulic drill rig, which was capable of drilling to a maximum depth of 30 feet. A total of 10 testholes were drilled and logged on site, with the depth of penetration ranging from 12 feet to 30 feet. The lesser depth was essentially the depth at which penetration refusal was encountered due to the presence of a very rocky zone in the till stratum. In addition, two holes which were not logged, were attempted and abandoned after penetration refusal was met at shallow depths. The testhole locations are shown on Drawing No. A-2, Appendix A, and detailed logs are enclosed as Drawings No. B-1 to B-10, inclusive, Appendix B.

Disturbed bag samples were taken at approximately 2 foot depth intervals and undisturbed Shelby tube samples were taken at 5 or 10 foot intervals in the testholes. Standard Penetration tests were not carried out as the drill rig was not equipped to perform this test.

Standard laboratory tests were undertaken on representative samples to determine the natural moisture content profile, grain size distribution, plasticity indices, unconfined compressive strength, swelling and consolidation characteristics, compaction characteristics, and water soluble sulphate content of the subsoil. The results from the preceding tests are graphically displayed on the testhole logs, on grain size distribution curves presented as Drawings No. B-11 and B-12, and on a compaction curve, presented as Drawing No. B-13. A tabular summary of results is included as Drawing No. B-14.

## IV. SITE CONDITIONS

The site is located in the foothills area adjacent to Pointed Mountain, as shown on the key plan, Drawing No. A-1. The ground at the site presently slopes to the south and east. Gullies in the area are moderately steep and form a drainage network leading to Fishermans Lake. Good site drainage may be readily achieved through proper site grading. The area is thickly wooded with mature poplar and a few spruce trees. Approximately 6 inches of moss and organic cover exists over the entire site.

At the time of the investigation approximately 18 inches of snow covered the site and the depth of frost penetration was noted to be approximately 3 feet. Permafrost was not encountered in any of the testholes.

## V. SUBSURFACE CONDITIONS

Generally the stratigraphy at the site was found to be relatively uniform, with the following soil types identified:

| | Description | Approximate Average Depth (Ft.) |
|---|---|---|
| TOPSOIL | moss and organic cover | 0 - 0.5 |
| SILT | light brown, clayey | 0.5 - 4.0 |
| CLAY | light brown, silty, medium plastic, very stiff | 4.0 - 9.0 |

| | | |
|---|---|---|
| TILL | dark brown, silty, clayey, with stones and rust spots, becoming more silty and less stoney with depth, medium plastic, hard | 9.0 - End of Hole |

NOTE:

1. The maximum depth of testhole penetration was 30 feet.
2. Penetration refusal was met in several of the testholes at approximately the 12 foot depth where a very rocky zone was encountered in the till.
3. No groundwater was observed in any of the testholes which were checked at intervals of 2 and 8 hours after drilling.
4. The depth of frost penetration was found to be approximately 3 feet.

Two stratigraphic sections are included as Drawings No. A-3 and A-4, Appendix A.

## VI. LIMITATIONS

Information presented herein is based on the findings in ten testholes. Similar conditions were observed in each testhole, indicating that noted conditions are believed to be representative of the entire site. However, since the maximum depth of penetration was limited to 30 feet and there may be considerable excavation carried out in levelling the site, the effective depth of investigation will be correspondingly reduced. Consequently, if conditions other then those presented herein are noted during construction, we should be notified in order that our recommendations may be evaluated in light of new findings.

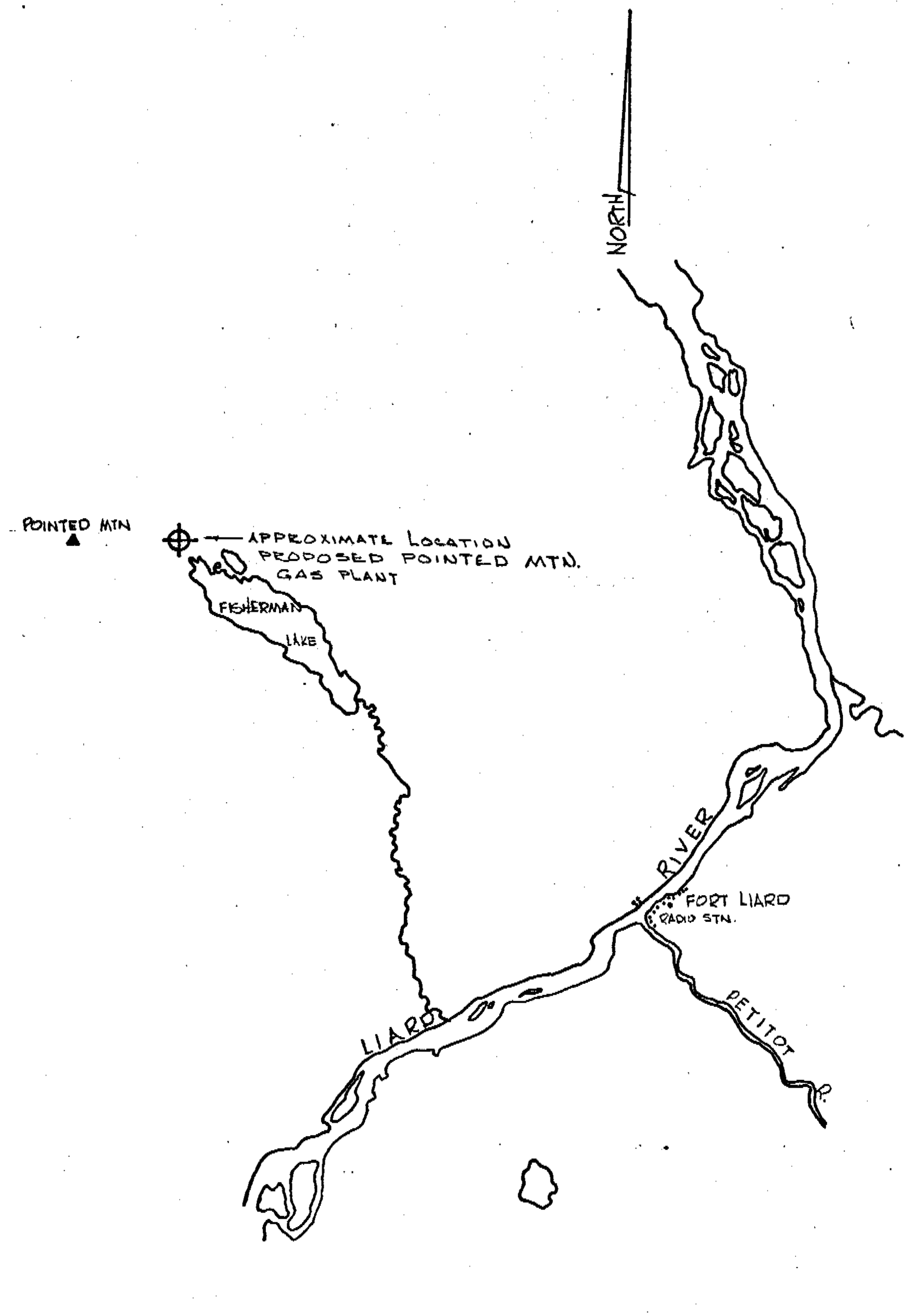
Respectfully Submitted,

ELMER W. BROOKER & ASSOCIATES LTD.

Lawrence A. Balanko, P. Eng.

Garry R. Gilchrist, P. Eng.

LAB:sjw




KEY PLAN

| DATE: 12\|2\|71 | SCALE: 1" ≈ 4 mi | JOB NO. E-310 | DWG. NO. A-1 |
|---|---|---|---|

JOB No. E - 310

# SUMMARY OF RESULTS

| TEST HOLE | DEPTH | NATURAL WATER CONTENT | ATTERBERG LIMITS | | | UNCONFINED COMPRESSION TEST | | | | OTHER TESTS | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LL | PL | PI | WET DENSITY | WATER CONTENT | COMPRESSIVE STRENGTH | FAILURE STRAIN | | |
| | feet | % | % | % | % | p.c.f. | % | t.s.f. | % | see figure | |
| 1 | 6 - 7½ | SOLUBLE SULPHATE CONTENT - 2.53% | | | | | | | | | |
| 1 | 12 - 13½ | | | | | 138.0 | 12.0 | 5.63 | 7.87 | | |
| 1 | 12 - 13½ | SOLUBLE SULPHATE CONTENT - 3.07% | | | | | | | | | |
| 1 | 28 - 29½ | | | | | 137.8 | 13.0 | 2.12 | 6.15 | | |
| 1 | 28 - 29½ | SOLUBLE SULPHATE CONTENT - 0.11% | | | | | | | | | |
| | | | | | | | | | | | |
| 2 | 4 - 6 | | | | | 119 | 16.8 | 1.89 | 2.63 | | |
| 2 | 4 - 6 | CONSTANT VOLUME SWELLING PRESSURE - 3.70 T.S.F. | | | | | | | | | |
| 2 | 28 - 30 | | | | | 136.8 | 14.9 | 2.03 | 6.11 | | |
| | | | | | | | | | | | |
| 4 | 22 | | | | | 136.4 | 15.7 | 2.09 | | | Direct Shear |
| | | | | | | | | | | | |
| 5 | 6 | 19.3 | 49.9 | 19.8 | 30.1 | | | | | | |
| 5 | 14 | 17.4 | 50.0 | 18.7 | 31.2 | | | | | | |
| 5 | 22 | | | | | 139.6 | 13.3 | 2.87 | 12.30 | | |
| 5 | 28 - 30 | 13.5 | 38.0 | 14.5 | 23.5 | | | | | | |
| 6 | 4 | SOLUBLE SULPHATE CONTENT - 0.14% | | | | | | | | | |

Drawing No. B-14

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# COMPACTION TEST RESULTS

- ☑ STANDARD PROCTOR (AASHO T99-57, ASTM D698-58T)
- ☐ MODIFIED PROCTOR (AASHO T180-57, ASTM D1557-58T)
- ☐ OTHER

PROJECT POINTED MT'N GAS PLANT
JOB No. E-310 DATE FEB 13, 1971
SAMPLE No. TH. 3.
DEPTH
MAX. DRY DENSITY LBS./CU. FT. 99.0
OPTIMUM W.C., % 23.0
NATURAL W.C., %

HAMMER WT., LBS. 5.5
DROP, IN. 12
NO. LAYERS 3
NO. BLOWS/LAYER 25
DIA. MOLD., IN. 4.0
HEIGHT MOLD., IN. 4.6
VOL. MOLD., CU. FT. 1/30
COMPACTIVE EFFORT - FT. LBS./CU. FT. 12,375
SAMPLE CLASSIFICATION

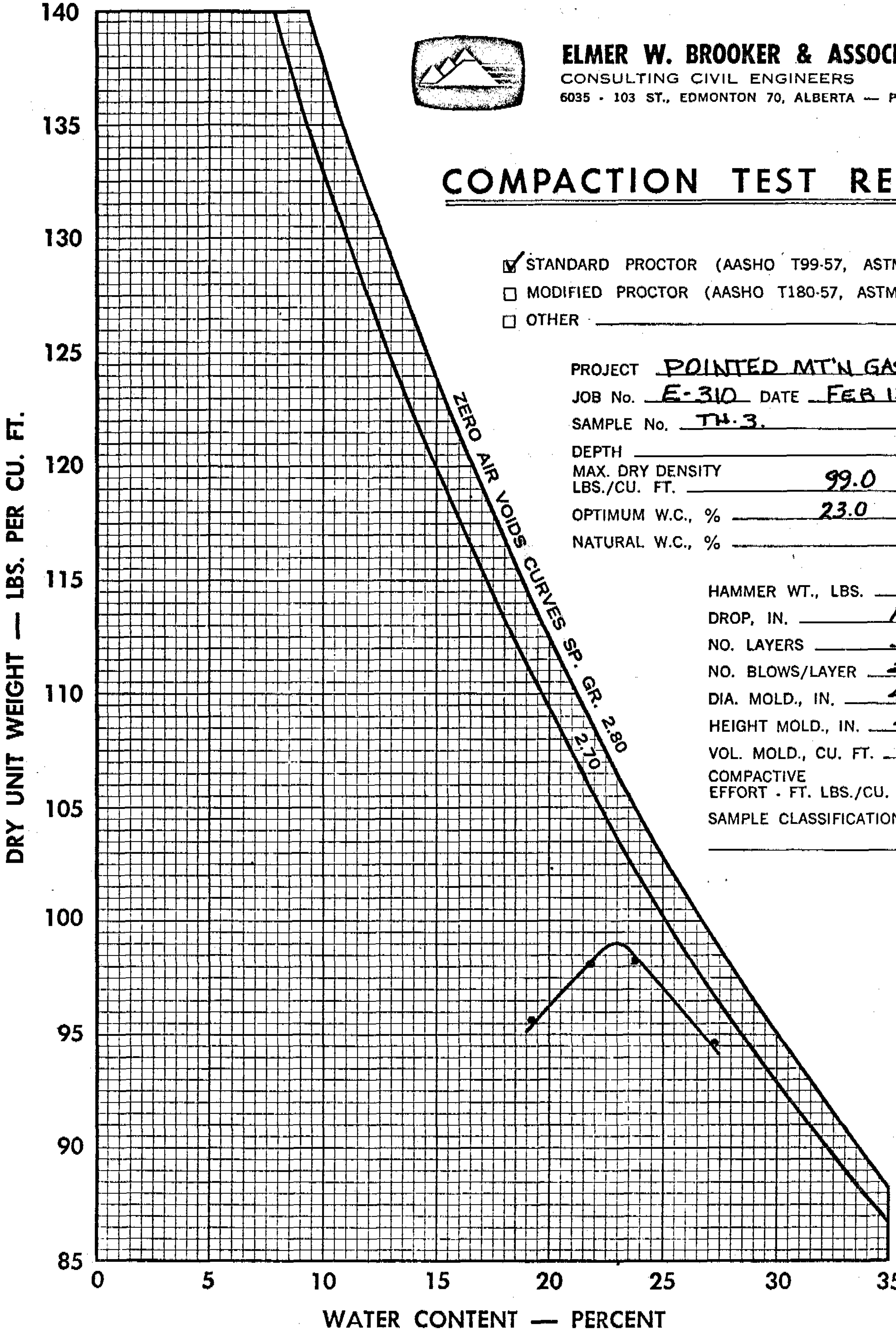
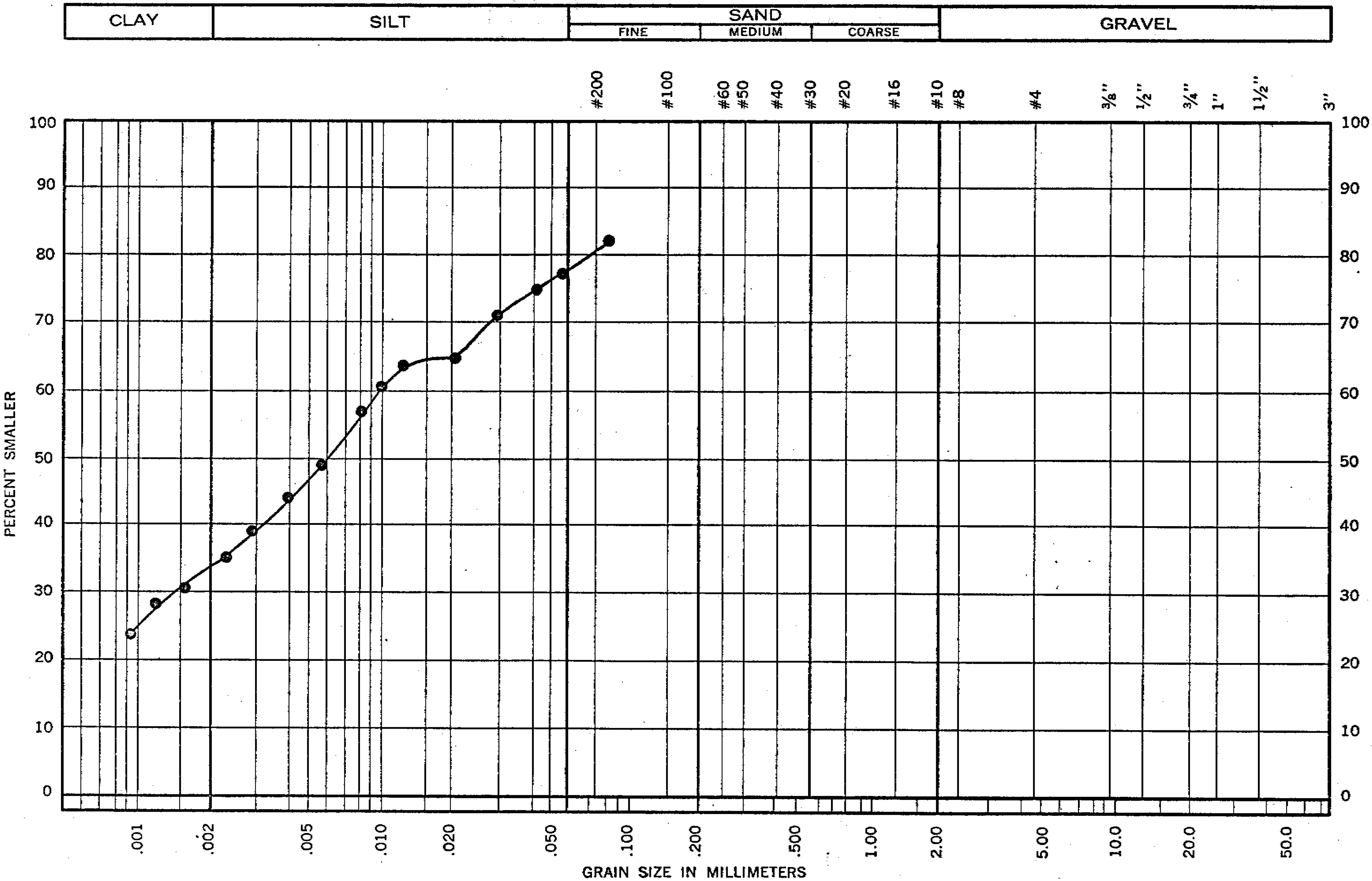



FIGURE B - 13

# GRAIN SIZE DISTRIBUTION




BROOKER & ASSOCIATES

SAMPLE DESCRIPTION *Dark Brown Clay — Till*

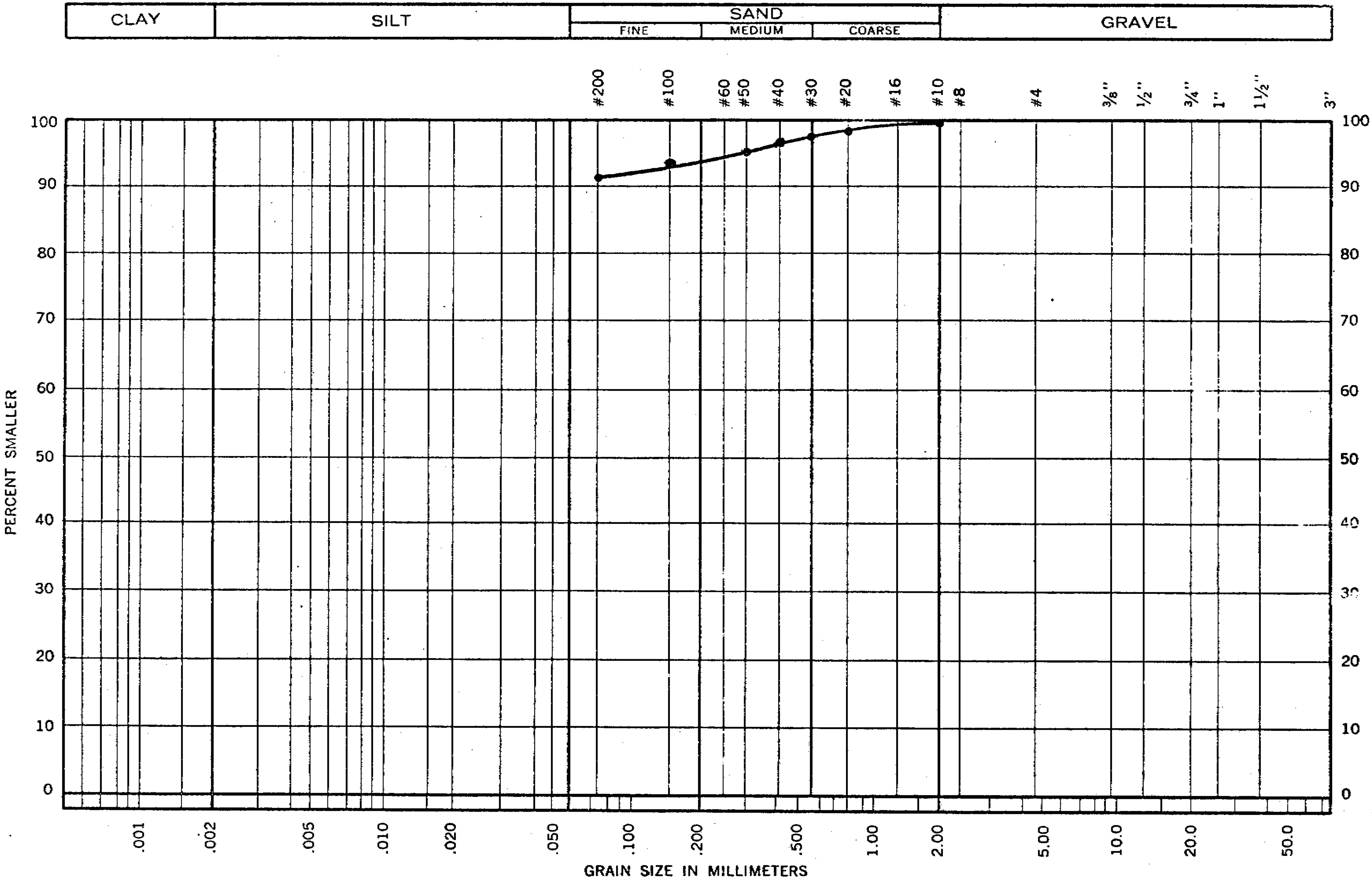
PROJECT *Pointed Mountain Gas Plant*

JOB No. *E-310* DATE *Feb. 15, 1970*

SAMPLE No. *TH. 5*

DEPTH *28'-30'*

# GRAIN SIZE DISTRIBUTION




BROOKER & ASSOCIATES

SAMPLE DESCRIPTION *VERY FINE SILTY SAND.*

PROJECT *POINTED MT'N GAS PLANT*
JOB No. *E-310* DATE *FEB. 13, 1971*
SAMPLE No. *TH 3*
DEPTH *4'*

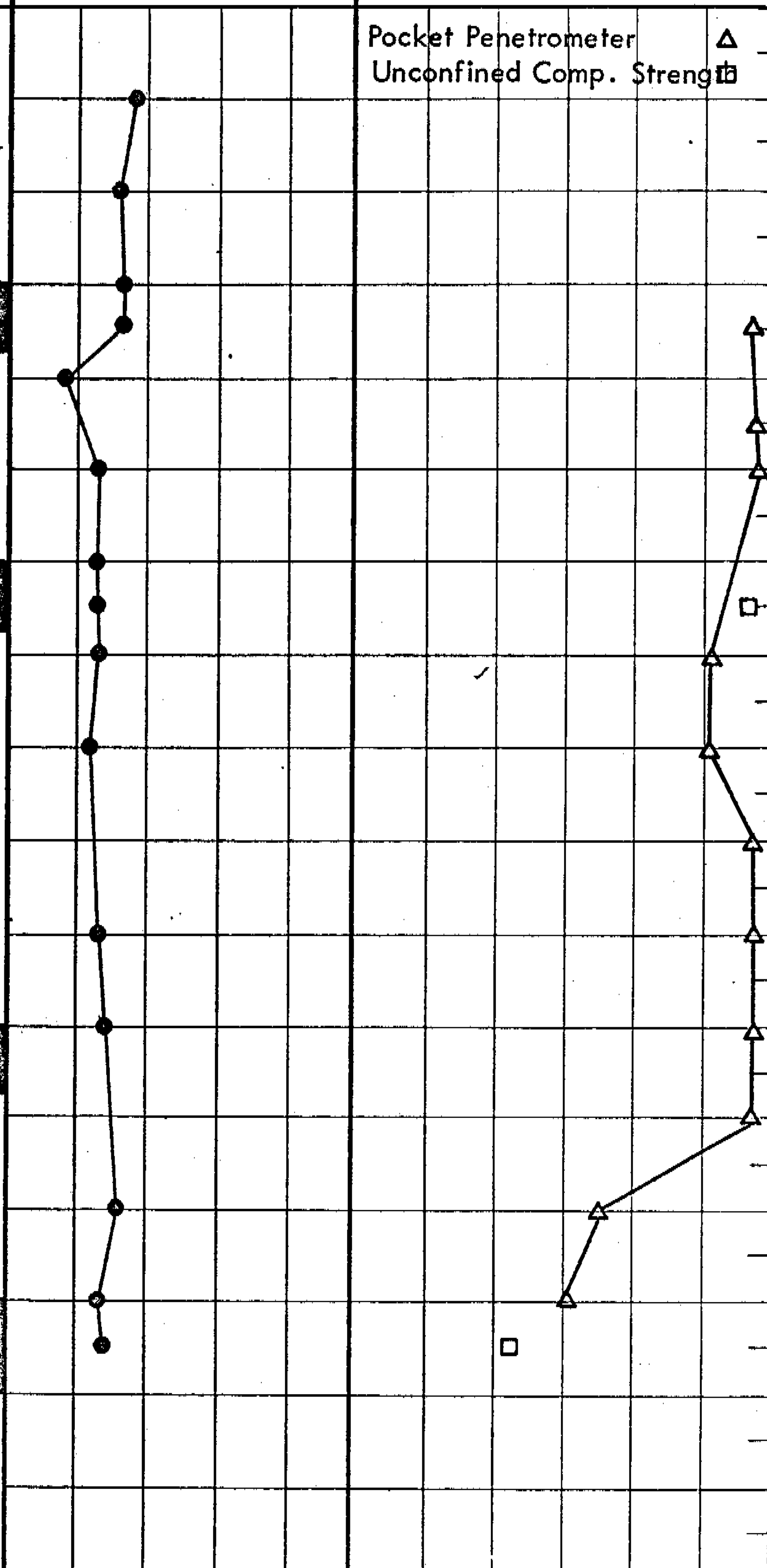
FIGURE B - 11

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 1 |
|---|---|---|
| SURFACE ELEVATION | 141.1' | JOB No. E - 310 |

| Depth ft. | SOIL DESCRIPTION |
|---|---|
| | TOPSOIL - moss & organic cover |
| 2 | SILT - light brown with some clay; lightly frozen to about 3 feet |
| 4 | CLAY - very stiff, silty, light brown |
| 6 | |
| 8 | TILL - hard, dark brown silty clay with stones, coal specks and rust spots |
| 10 | |
| 12 | |
| 14 | |
| 16 | |
| 18 | |
| 20 | |
| 22 | |
| 24 | |
| 26 | |
| 28 | |
| 30 | END OF HOLE |

Water Content % ●
10 20 30 40

Compressive Strength tsf.
1 2 3 4 5




10 20 30 40 50

Penetration Resistance N

BROOKER & ASSOCIATES

Completion Depth 30'

Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

Dwg. No. B-1

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. | 2 (a) |
|---|---|---|---|
| SURFACE ELEVATION | 140.8' | JOB No. | E - 310 |

| Depth ft. | SOIL DESCRIPTION | Water Content % 10 20 30 40 | Compressive Strength tsf. 1 2 3 4 5 |
|---|---|---|---|
| | TOPSOIL - moss & organic cover | | Pocket Penetrometer △ |
| 2 | SILT - light brown with some clay lightly frozen to about 3 feet | | Unconfined Comp. Strength □ |
| 4 | CLAY - very stiff, silty light brown | | |
| 6 | | | |
| 8 | | | |
| 10 | TILL - hard, dark brown sitly clay with stones and rust spots | | |
| 12 | END OF HOLE | | |

Note: Auger unable to penetrate very stoney till. Similar result from testhole 2 (b) distance of 11 feet to north.

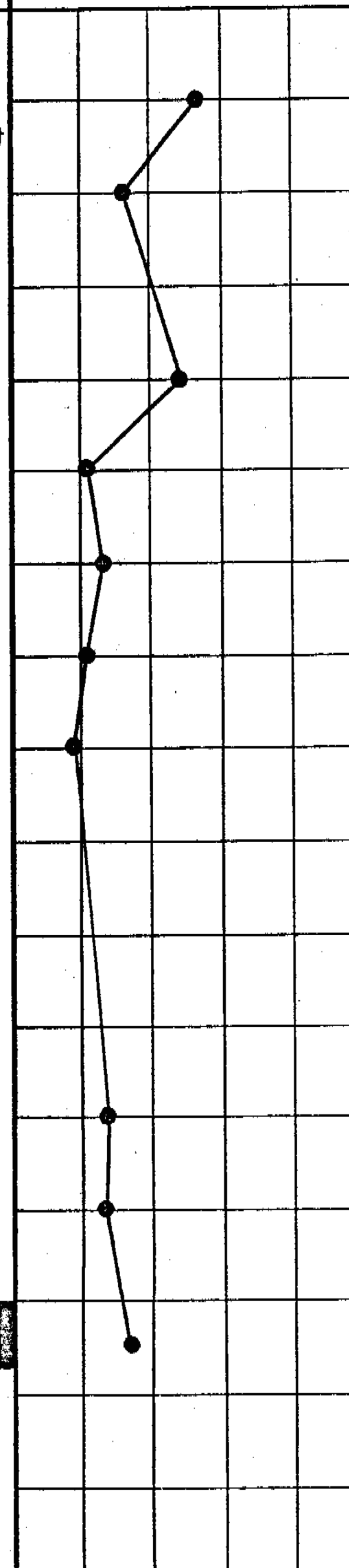
| | | | |
|---|---|---|---|
| BROOKER & ASSOCIATES | Completion Depth 12' | Date Feb 6/71 | 10 20 30 40 50 Penetration Resistance N |
| | Depth to Water in Boring Nil | Page 1 of 1 | Dwg. No. B-2 |

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 2 (c) |
|---|---|---|
| SURFACE ELEVATION | | JOB No. E - 310 |

| Depth ft. | SOIL DESCRIPTION | |
|---|---|---|
| | TOPSOIL | - moss & organic cover |
| 2 | SILT | - light brown with some clay<br>lightly frozen to about 3 feet |
| 4 | CLAY | - very stiff, silty light brown |
| 6 | | |
| 8 | | |
| 10 | TILL | - hard dark brown silty clay with stones rust spots a little sand |
| 12 | | |
| 14 | | |
| 16 | | |
| 18 | | |
| 20 | | |
| 22 | | |
| 24 | | |
| 26 | | |
| 28 | | |
| 30 | END OF HOLE | |

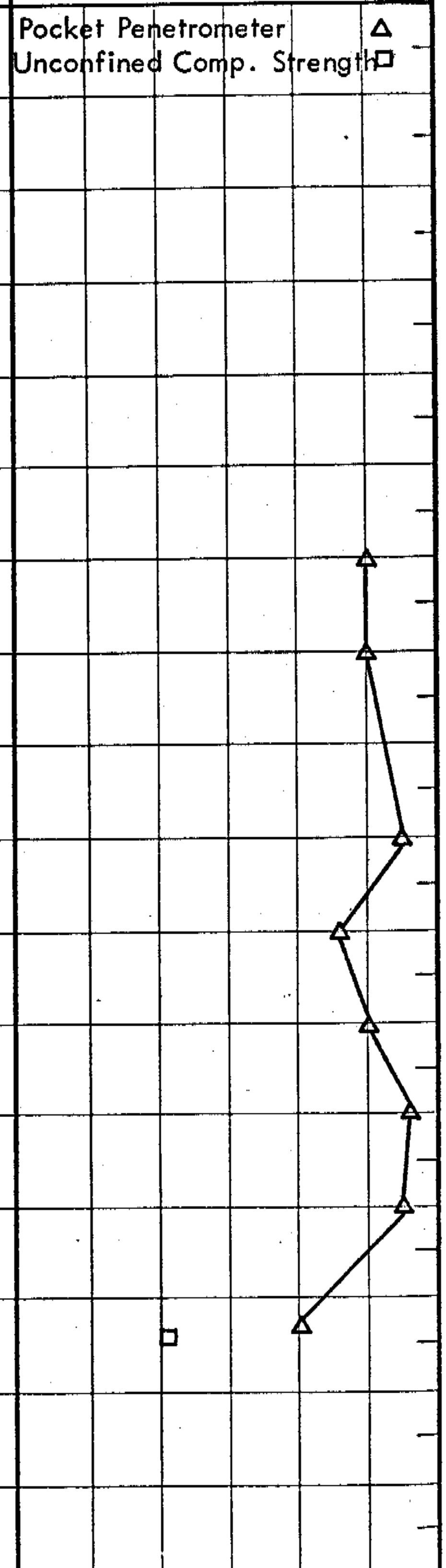
Water Content % ●

10 20 30 40



Compressive Strength tsf.

1 2 3 4 5




10 20 30 40 50

Penetration Resistance N

BROOKER & ASSOCIATES

Completion Depth 30'

Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

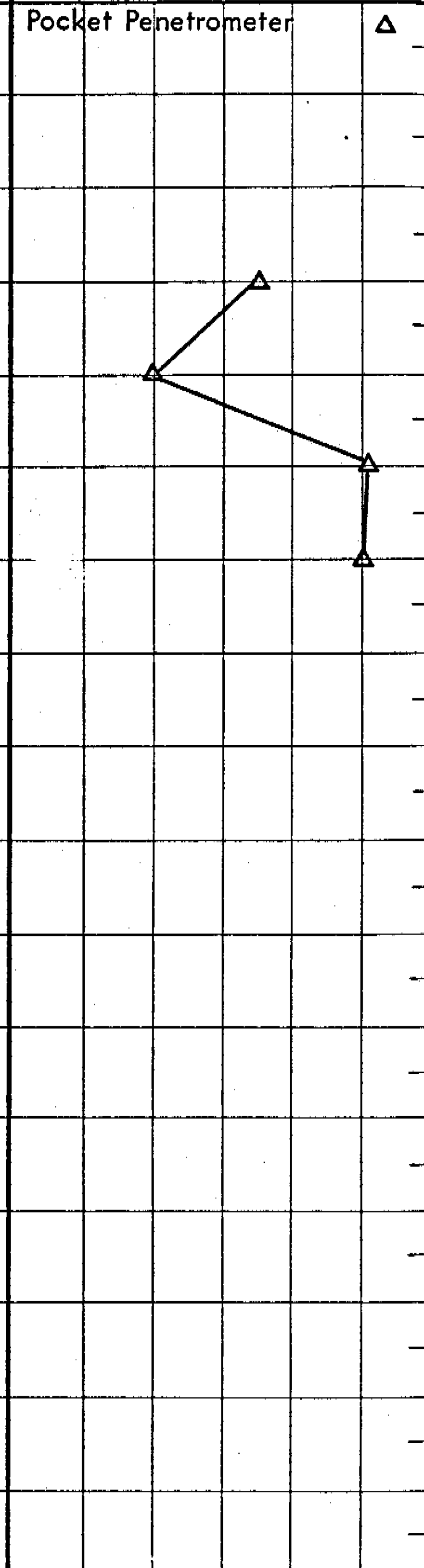
Dwg. No. B-3

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 3 (a) |
|---|---|---|
| SURFACE ELEVATION | 139.6' | JOB No. E - 310 |

| Depth ft. | SOIL DESCRIPTION | |
|---|---|---|
| | TOPSOIL | - moss & organic cover |
| -2 | SILT | - light brown with some clay light frozen to about 3 feet |
| -4 | CLAY | - very stiff, silty stoney light brown |
| -6 | | |
| -8 | | |
| -10 | TILL | - hard dark brown silty clay with large number of stones |
| -12 | | |
| -14 | END OF HOLE | |
| | Note: | Abondoned, too stoney for auger to penetrate |

Water Content %
10 20 30 40

Compressive Strength tsf.
1 2 3 4 5




10 20 30 40 50

Penetration Resistance N

BROOKER & ASSOCIATES

Completion Depth 13'

Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

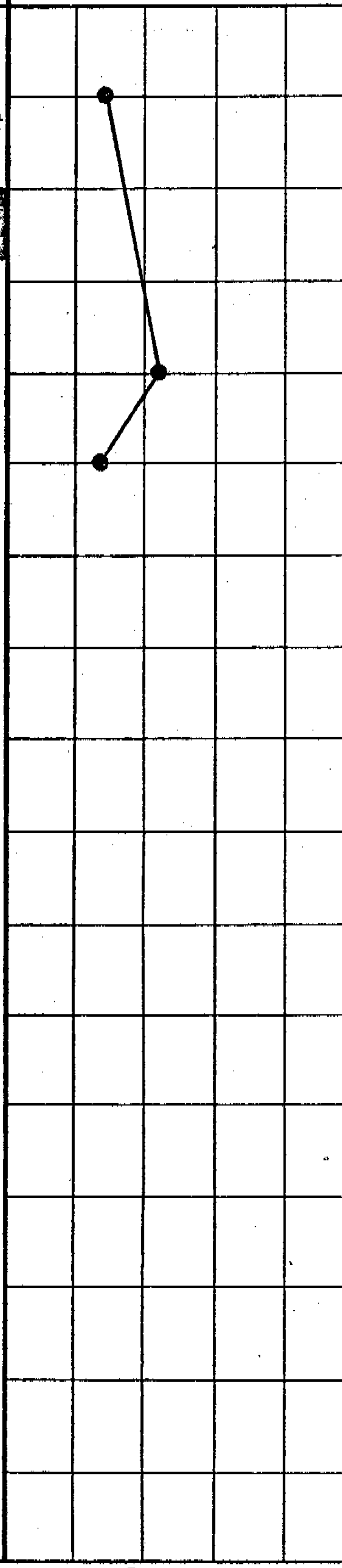
Dwg. No. B-4

| | | | |
|---|---|---|---|
| PROJECT | POINTED MOUNTAIN GAS PLANT | | TESTHOLE No. 3 (b) |
| SURFACE ELEVATION | 139.6' | | JOB No. E - 310 |

| Depth ft. | SOIL DESCRIPTION |
|---|---|
| | TOPSOIL - ~~moss & organic cover~~ |
| 2 | SILT - light brown with some clay lightly frozen to about 3 feet |
| 4 | CLAY - very stiff, silty, stoney light brown |
| 6 | |
| 8 | |
| 10 | TILL - hard dark brown silty clay with large number of stones |
| 12 | |
| 14 | END OF HOLE |
| | Note: Abandoned, too stoney for auger to penetrate (3c) Abandoned at $3\frac{1}{2}$' for same reason |

Water Content % ●

10 20 30 40



Compressive Strength tsf.

1 2 3 4 5

Completion Depth 13'

Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

10 20 30 40 50

Penetration Resistance N

Dwg. No. B-5

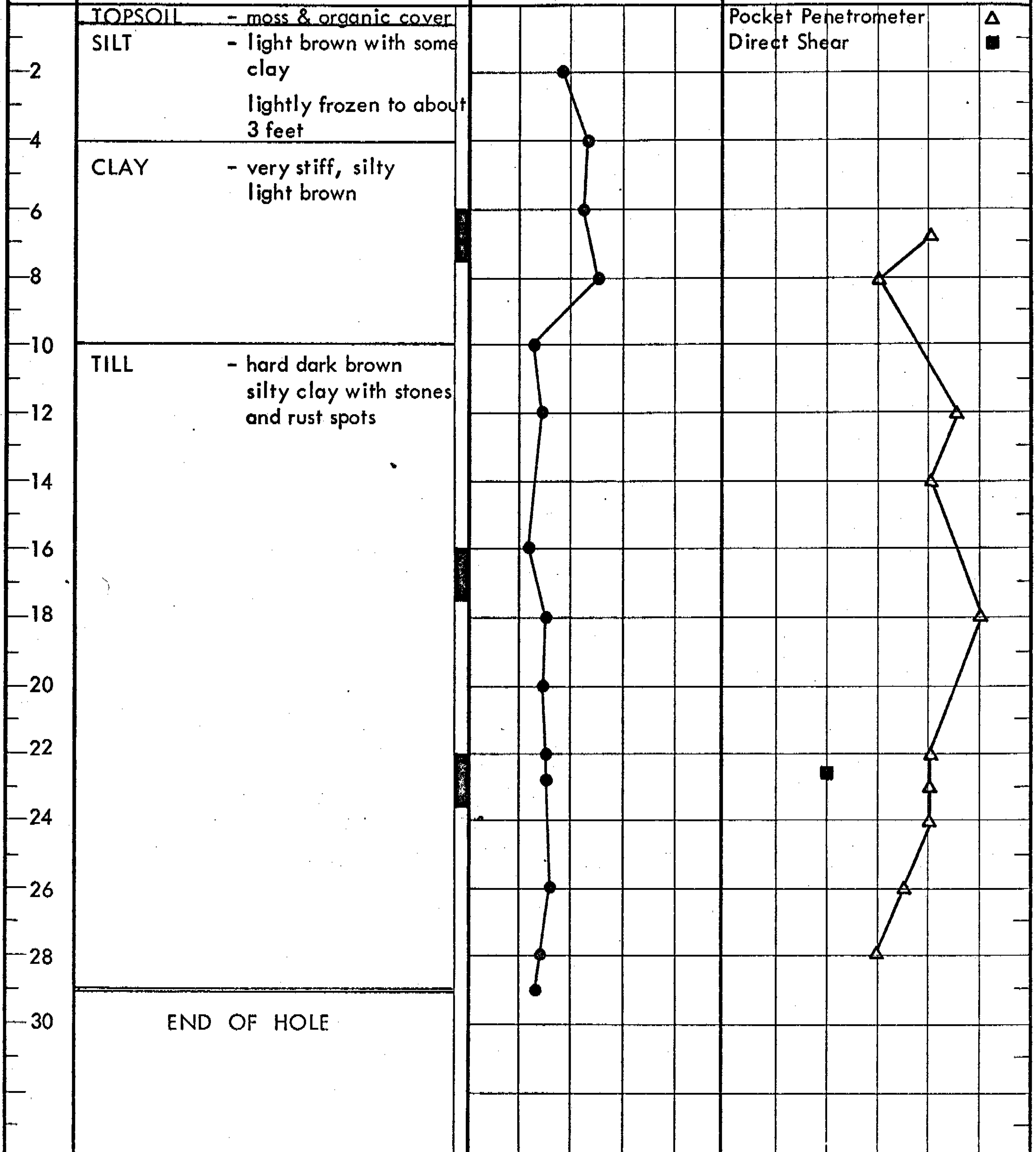
BROOKER & ASSOCIATES

| | | | |
|---|---|---|---|
| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. | 4 |
| SURFACE ELEVATION | 124.2' | JOB No. | E - 310 |

| Depth ft. | SOIL | | DESCRIPTION |
|---|---|---|---|
| | TOPSOIL | - | moss & organic cover |
| 2 | SILT | - | light brown with some clay<br>lightly frozen to about 3 feet |
| 4–10 | CLAY | - | very stiff, silty light brown |
| 10–29 | TILL | - | hard dark brown silty clay with stones and rust spots |
| 30 | END OF HOLE | | |

Water Content % ●
10 20 30 40

Compressive Strength tsf.
1 2 3 4 5




10 20 30 40 50
Penetration Resistance N

BROOKER & ASSOCIATES

Completion Depth 29'
Date Feb 6/71
Depth to Water in Boring Nil
Page 1 of 1
Dwg. No. B-6

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 5 (a) |
|---|---|---|
| SURFACE ELEVATION | 121.1' | JOB No. E - 310 |

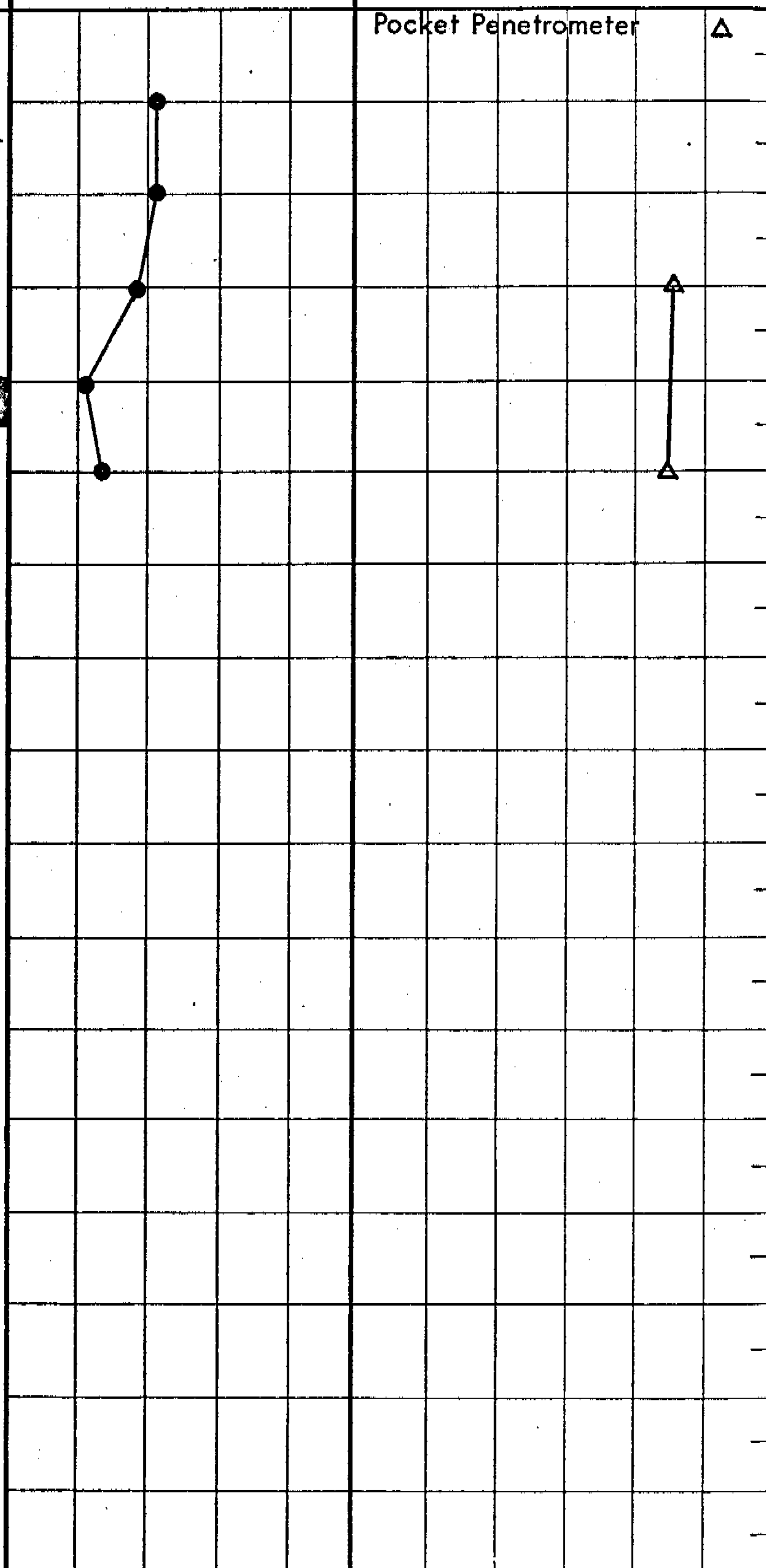
| Depth ft. | SOIL | DESCRIPTION |
|---|---|---|
| 0 | TOPSOIL | - moss & organic cover |
| | SILT | - light brown with some clay<br>lightly frozen to about 3 feet |
| 4 | CLAY | - very stiff silty light brown |
| 8 | TILL | - hard dark brown silty clay with stones and rust spots |
| 12 | | END OF HOLE |

Note: Drill rig broke down, new hole started at adjacent location

Water Content % ●: 10 20 30 40

Compressive Strength tsf.: 1 2 3 4 5

Pocket Penetrometer △



Penetration Resistance N: 10 20 30 40 50

BROOKER & ASSOCIATES

Completion Depth 12'

Date Feb 5/71

Depth to Water in Boring Nil

Page 1 of 1

Dwg. No. B-7

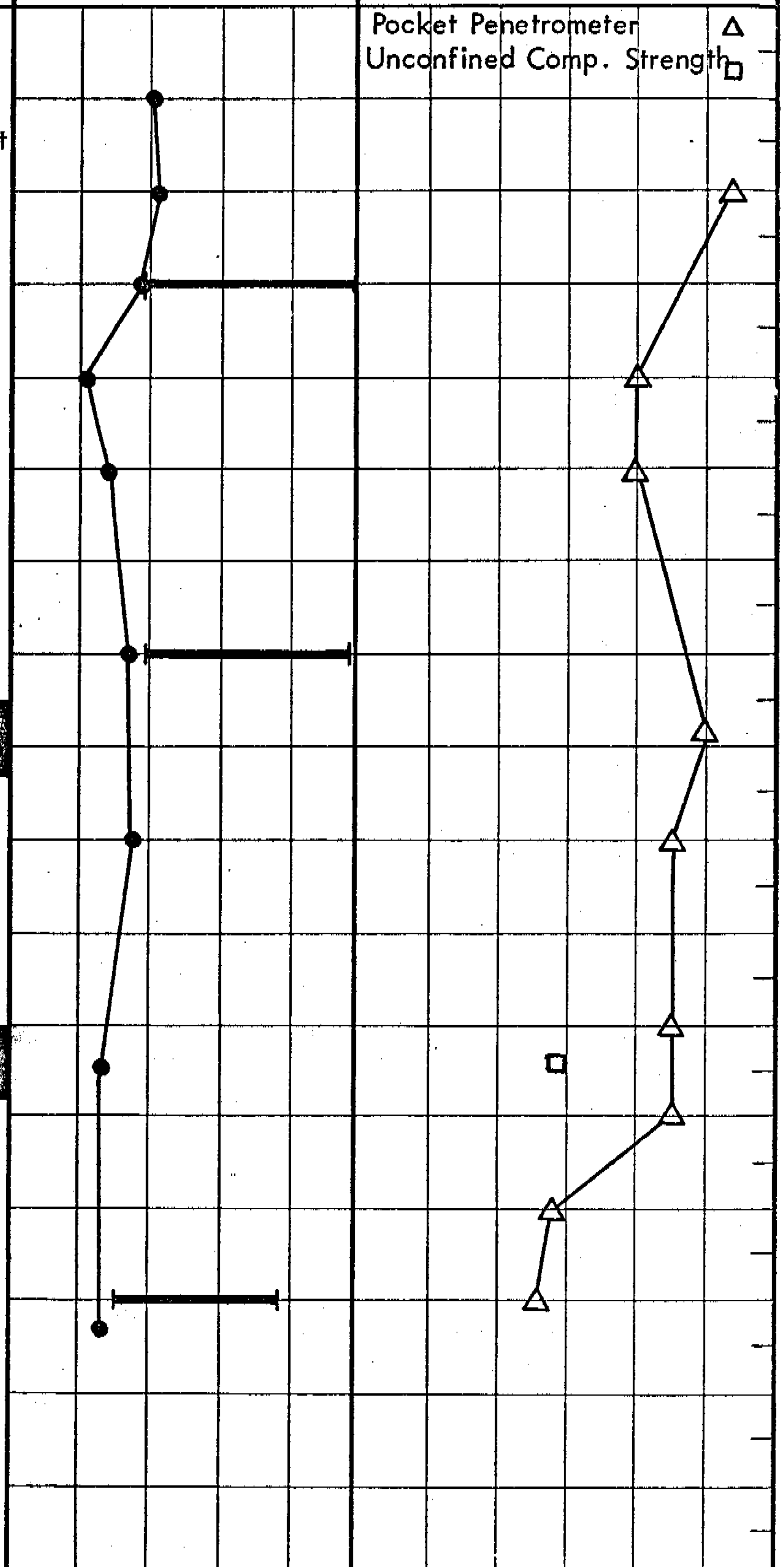
| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 5 (b) |
|---|---|---|
| SURFACE ELEVATION | | JOB No. E - 310 |

| Depth ft. | SOIL | DESCRIPTION |
|---|---|---|
| 0 | TOPSOIL | - moss & organic cover |
| 0–3.5 | SILT | - light brown with some clay<br>lightly frozen to about 3 feet |
| 3.5–8 | CLAY | - very stiff, silty light brown |
| 8–28 | TILL | - hard, dark brown, silty clay with stones and rust spots |
| 28 | END OF HOLE | |

Depth scale (ft.): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28

Water Content % ● — 10, 20, 30, 40

Compressive Strength tsf. — 1, 2, 3, 4, 5




Penetration Resistance N — 10, 20, 30, 40, 50

BROOKER & ASSOCIATES

Completion Depth 28'

Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

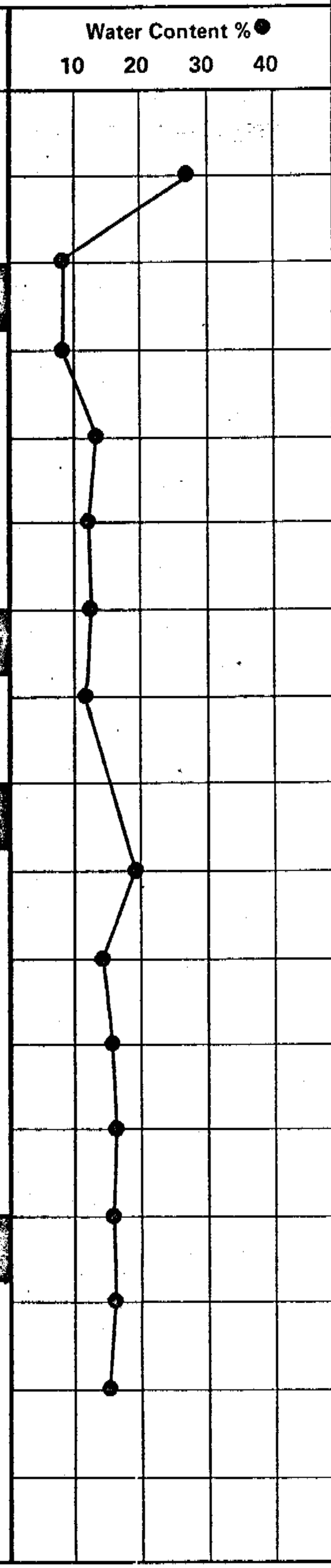
Dwg. No. B-8

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 6 |
|---|---|---|
| SURFACE ELEVATION | 114.0' | JOB No. E - 310 |

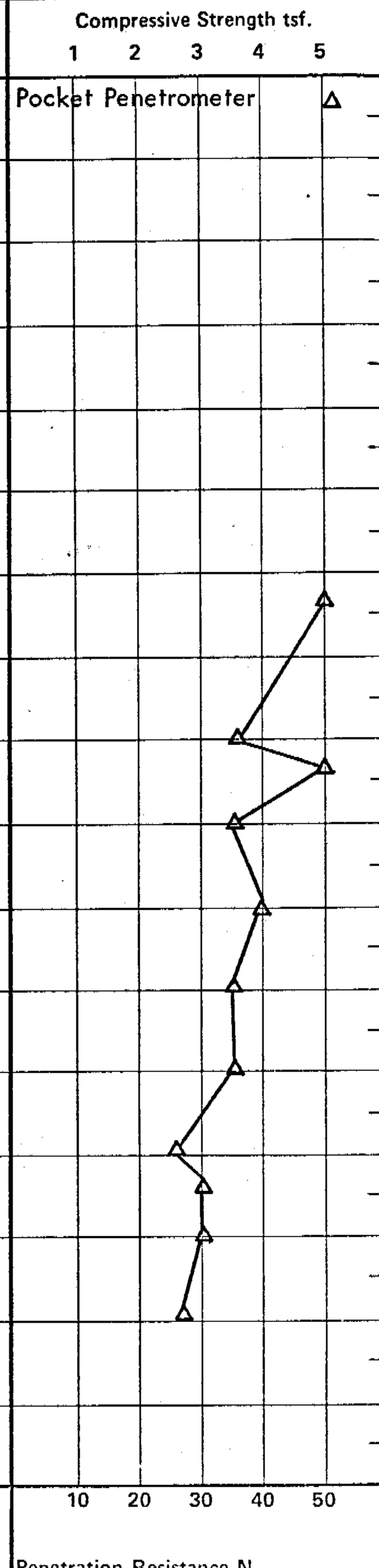
| Depth ft. | SOIL DESCRIPTION | |
|---|---|---|
| 0 | TOPSOIL | - moss & organic cover |
| | SILT | - light brown with some clay<br>light frozen to about 3 feet |
| 4 | CLAY | - very stiff, sandy, light brown |
| 12 | TILL | - hard, dark brown silty with stones coal specks and rust spots |
| 30 | END OF HOLE | |

Depth ft.: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30

Water Content % ●




Compressive Strength tsf.




BROOKER & ASSOCIATES

Completion Depth 30'

Date Feb 6/71

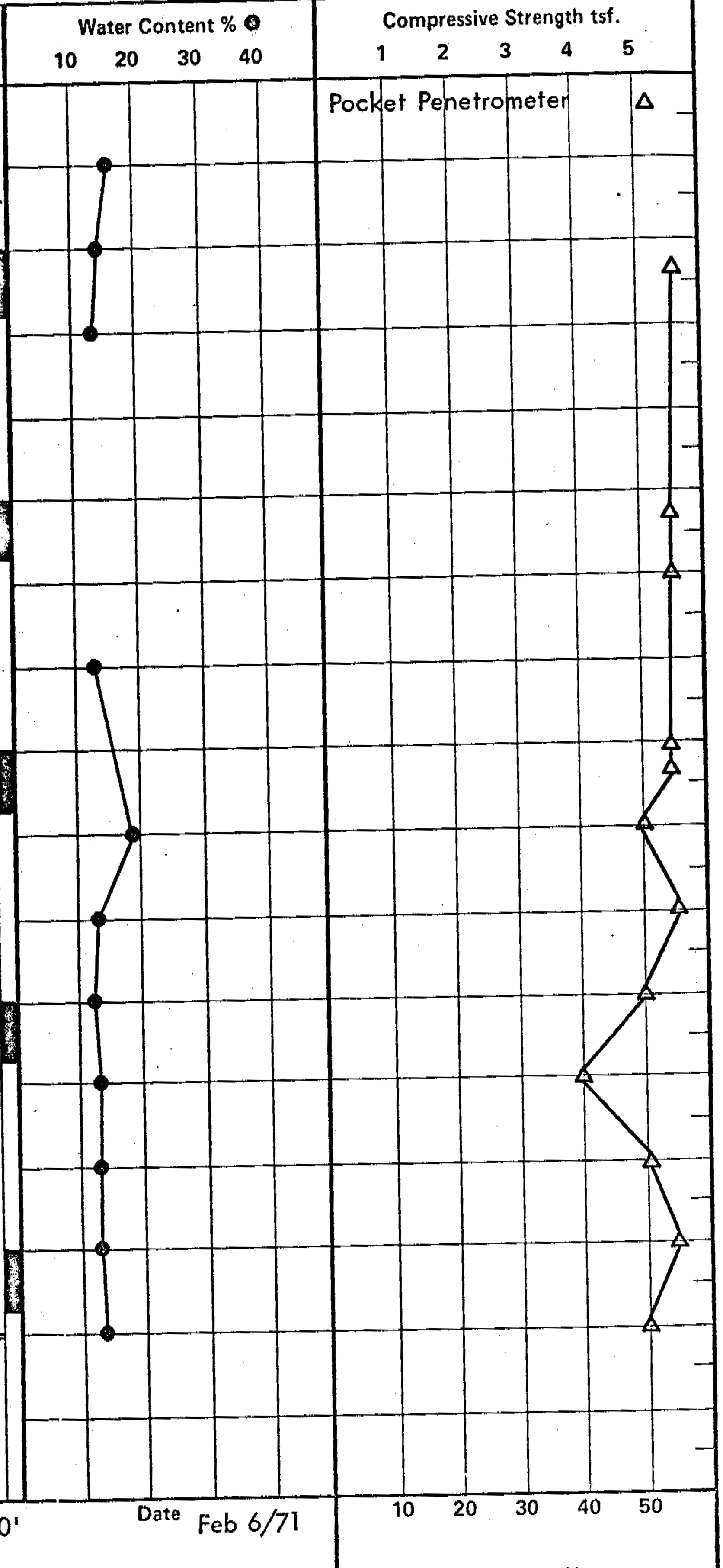
Depth to Water in Boring Nil

Page 1 of 1

Dwg. No. B-9

| PROJECT | POINTED MOUNTAIN GAS PLANT | TESTHOLE No. 7 |
|---|---|---|
| SURFACE ELEVATION | 120.2' | JOB No. E - 310 |

| Depth ft. | SOIL DESCRIPTION |
|---|---|
| 0 | TOPSOIL - moss & organic cover |
| | SILT - light brown with some clay<br>lightly frozen to about 3 feet |
| 4 | CLAY - very stiff, silty, light brown |
| 10 | TILL - hard dark brown silty clay with stones coal specks and rust spots |
| 30 | END OF HOLE |




BROOKER & ASSOCIATES

Completion Depth 30'

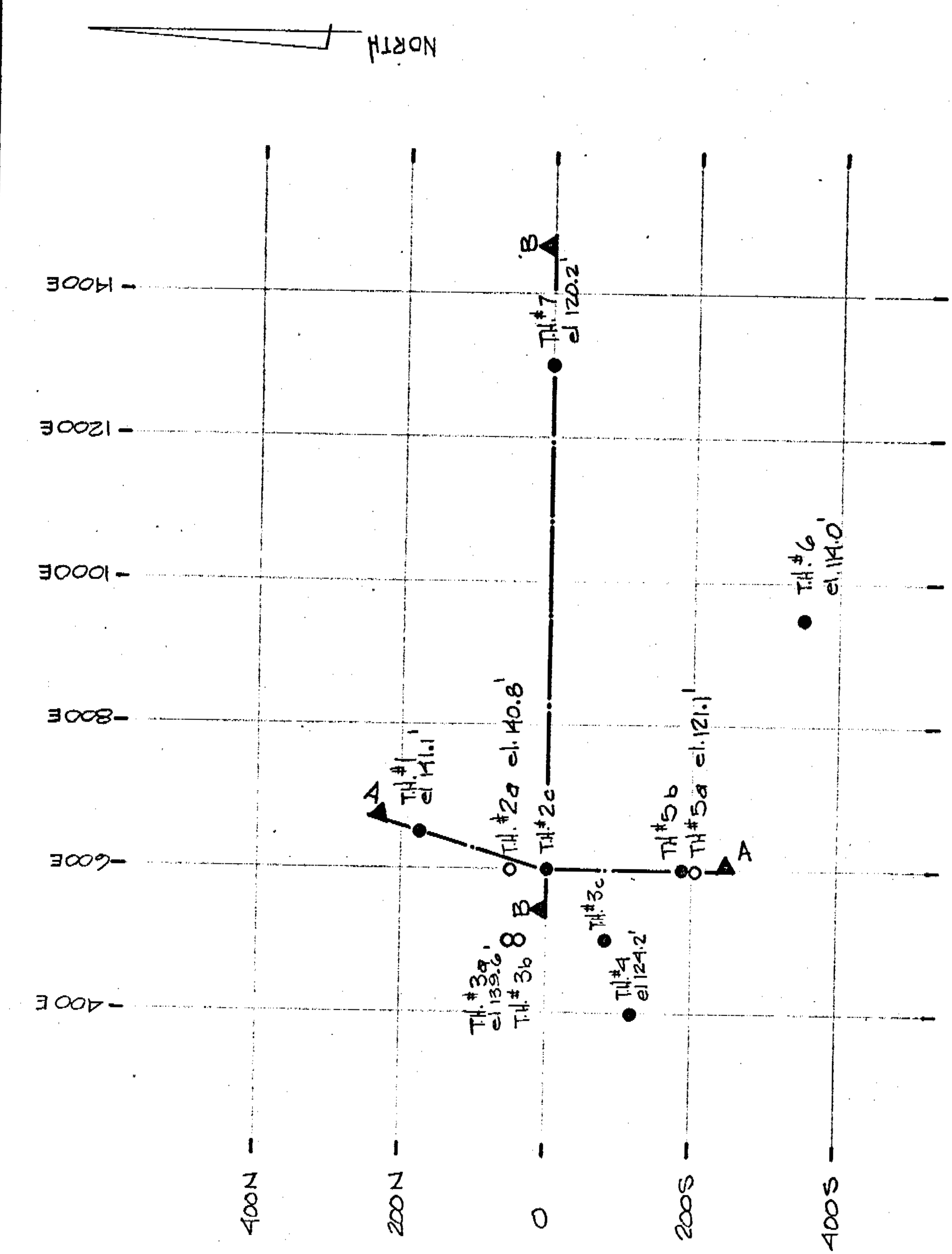
Date Feb 6/71

Depth to Water in Boring Nil

Page 1 of 1

Dwg. No. B-10

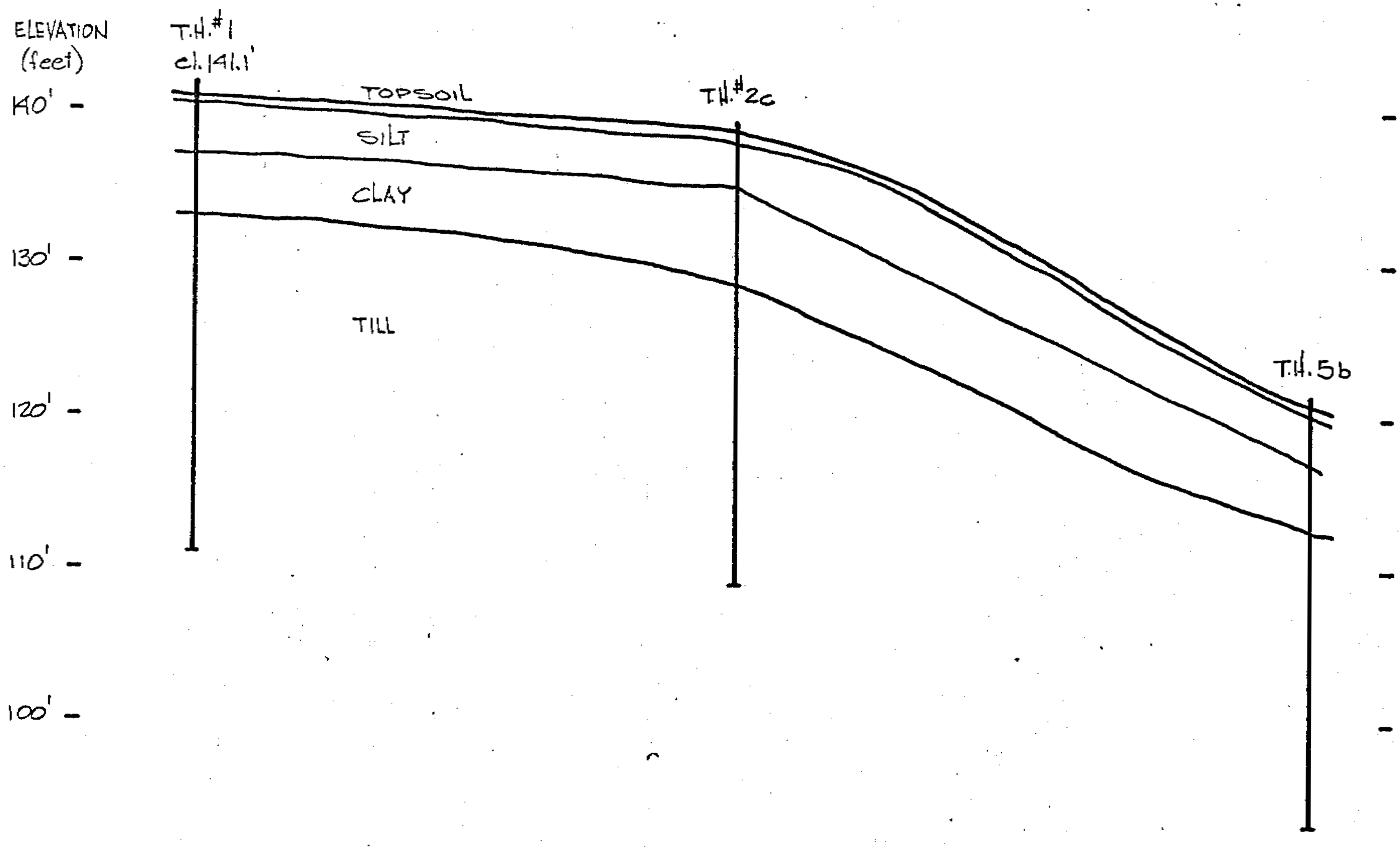
# SITE PLAN




| DATE: 12/2/70 | SCALE: 1"=200' | JOB NO. E-310 | DWG. NO. A-2 |
|---|---|---|---|

DATE: 12|2|71

SCALE: AS SHOWN




## STRATIGRAPHIC SECTION A-A

Scale - horiz. 1" = 50'
vert. 1" = 10'

JOB NO. E-310

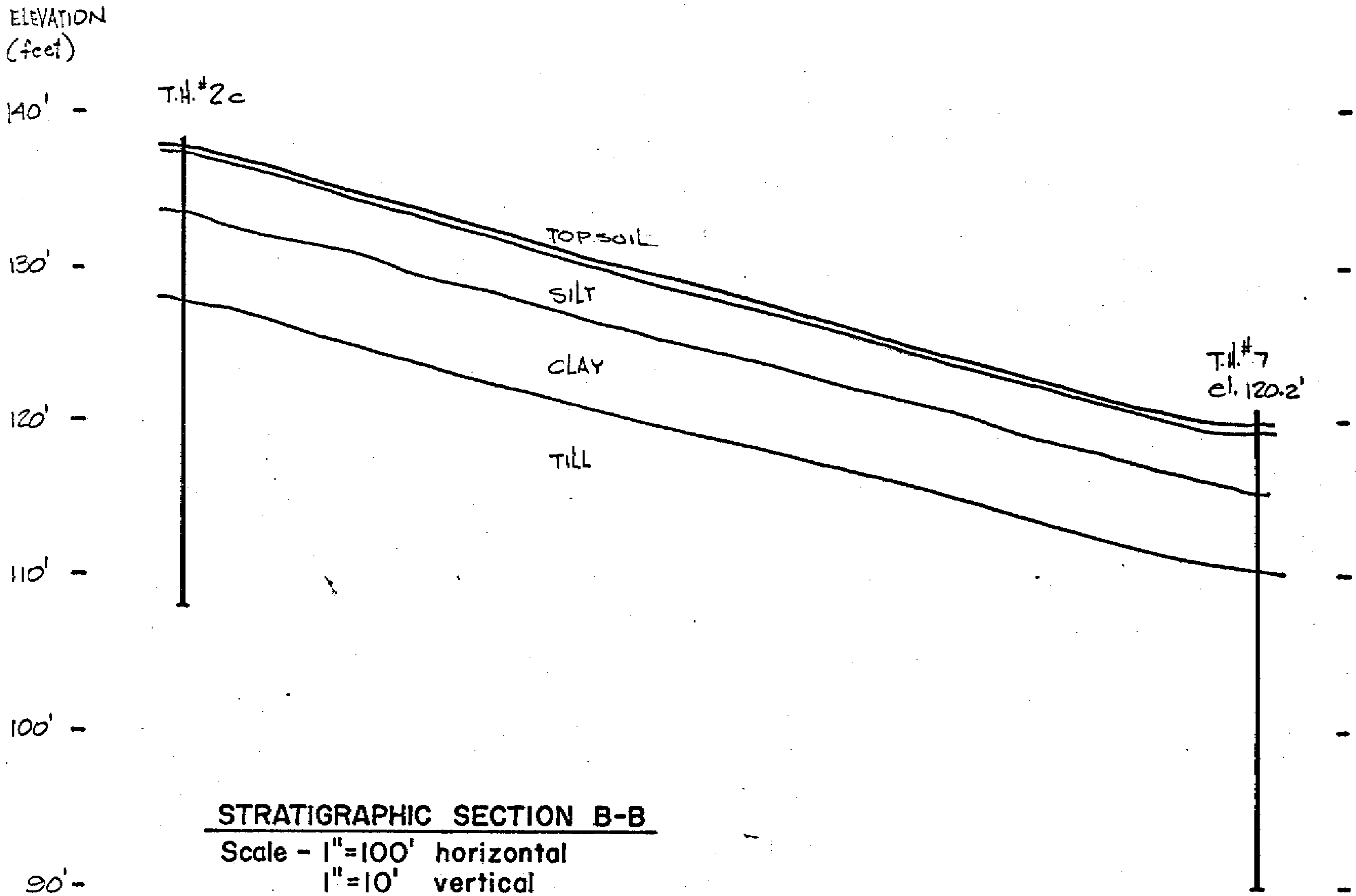
DWG. NO. A-3

DATE: 12/2/71

SCALE: AS SHOWN

JOB NO. E-310

DWG. NO. A-4




**STRATIGRAPHIC SECTION B-B**

Scale - 1"=100' horizontal
1"=10' vertical