

UKAM

GEOTECHNICAL EVALUATION
EXISTING TAILINGS DAMS

UNITED KENO HILL MINES LTD.
ELSA, YUKON TERRITORY

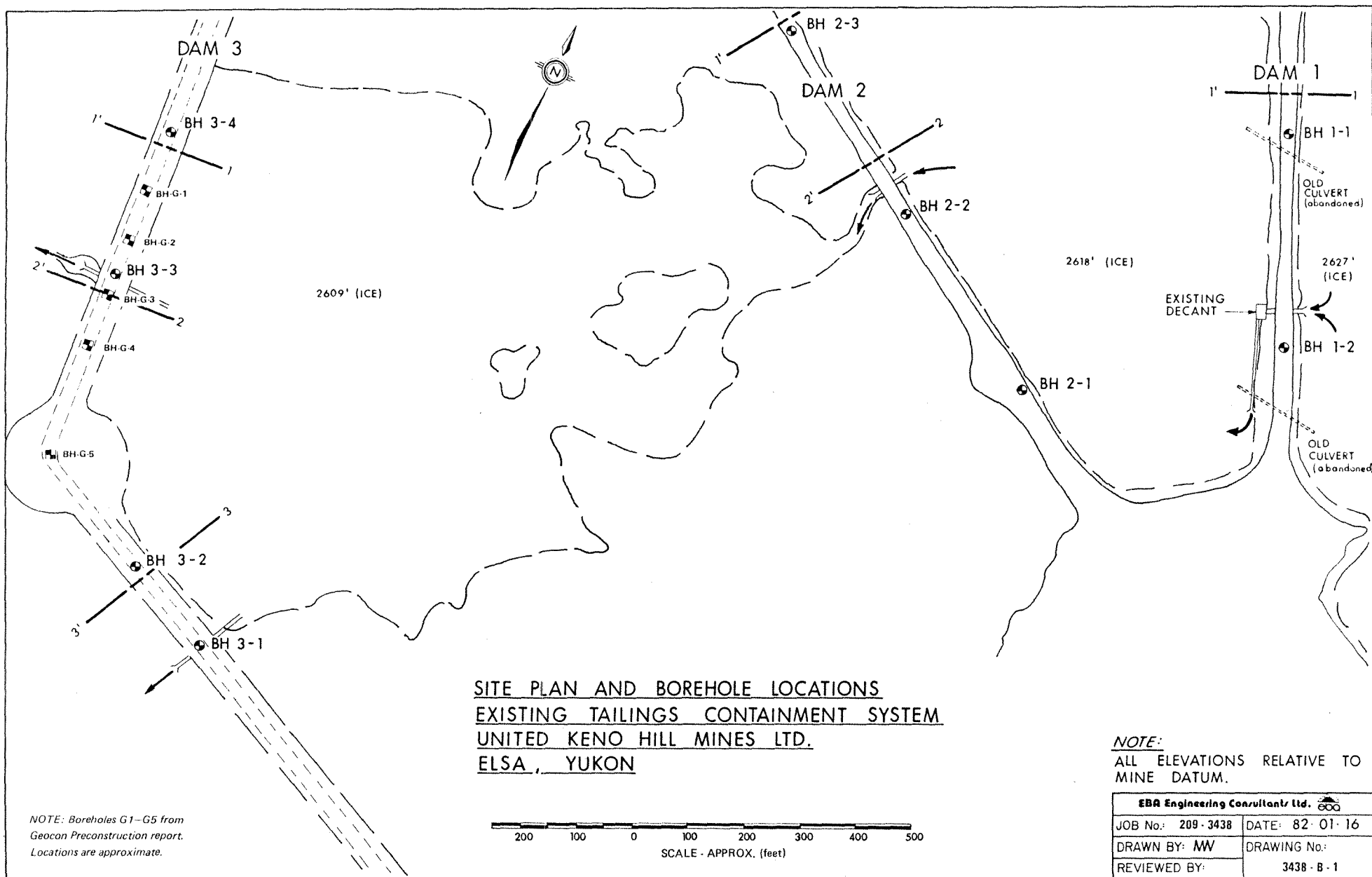
Submitted to:

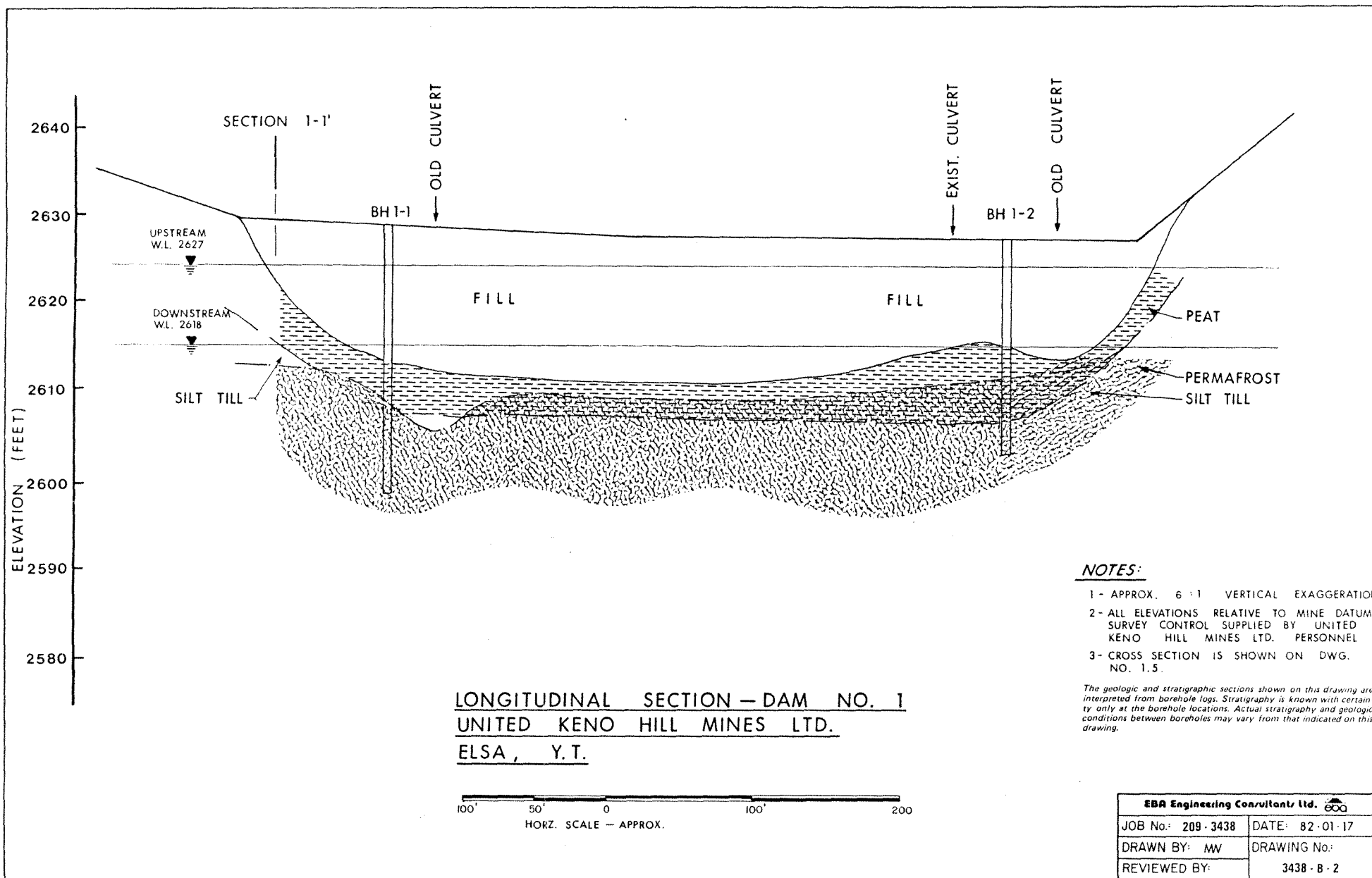
UNITED KENO HILLS MINES LTD.

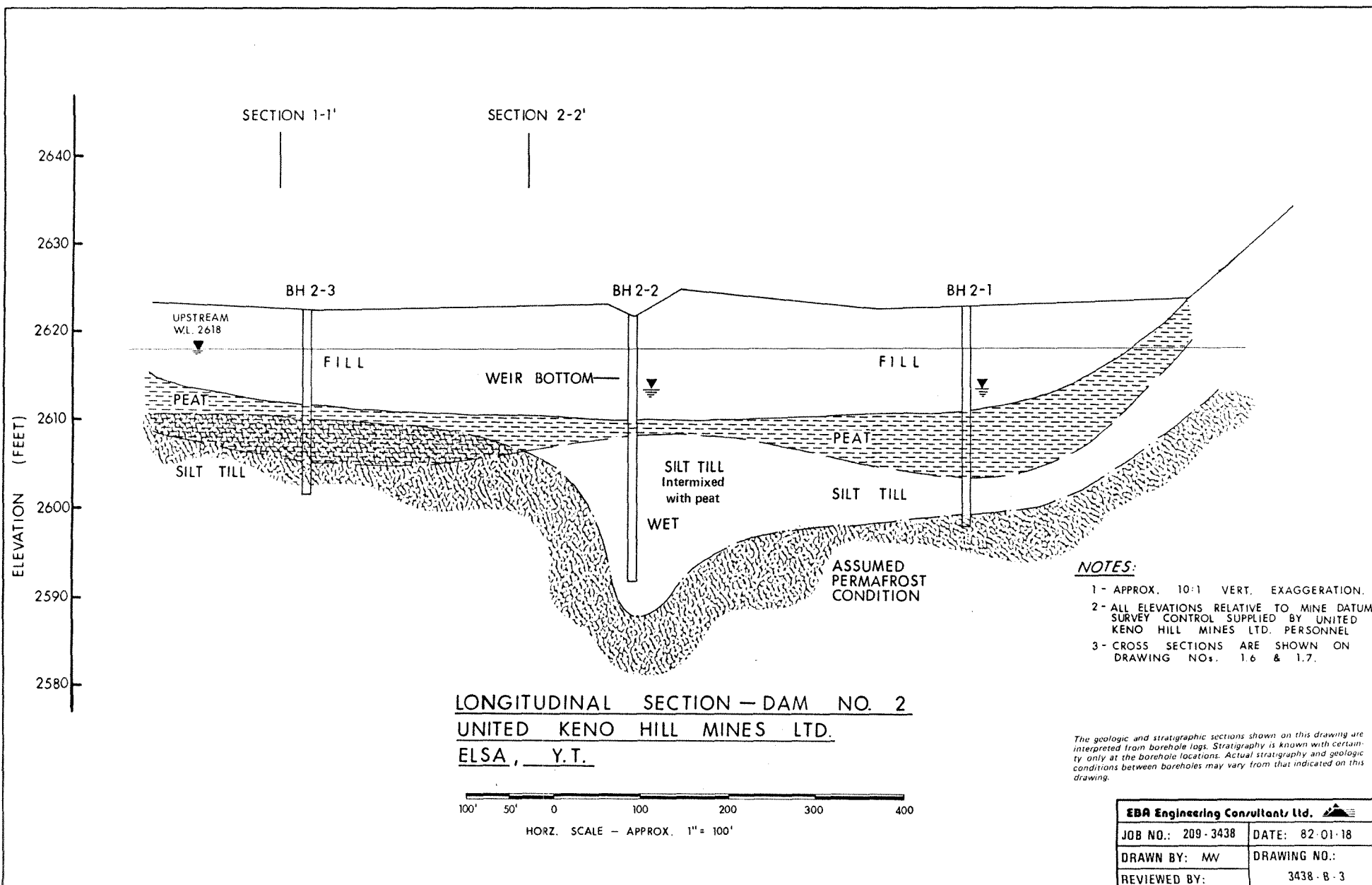
Review Draft Submitted,
JANUARY, 1983

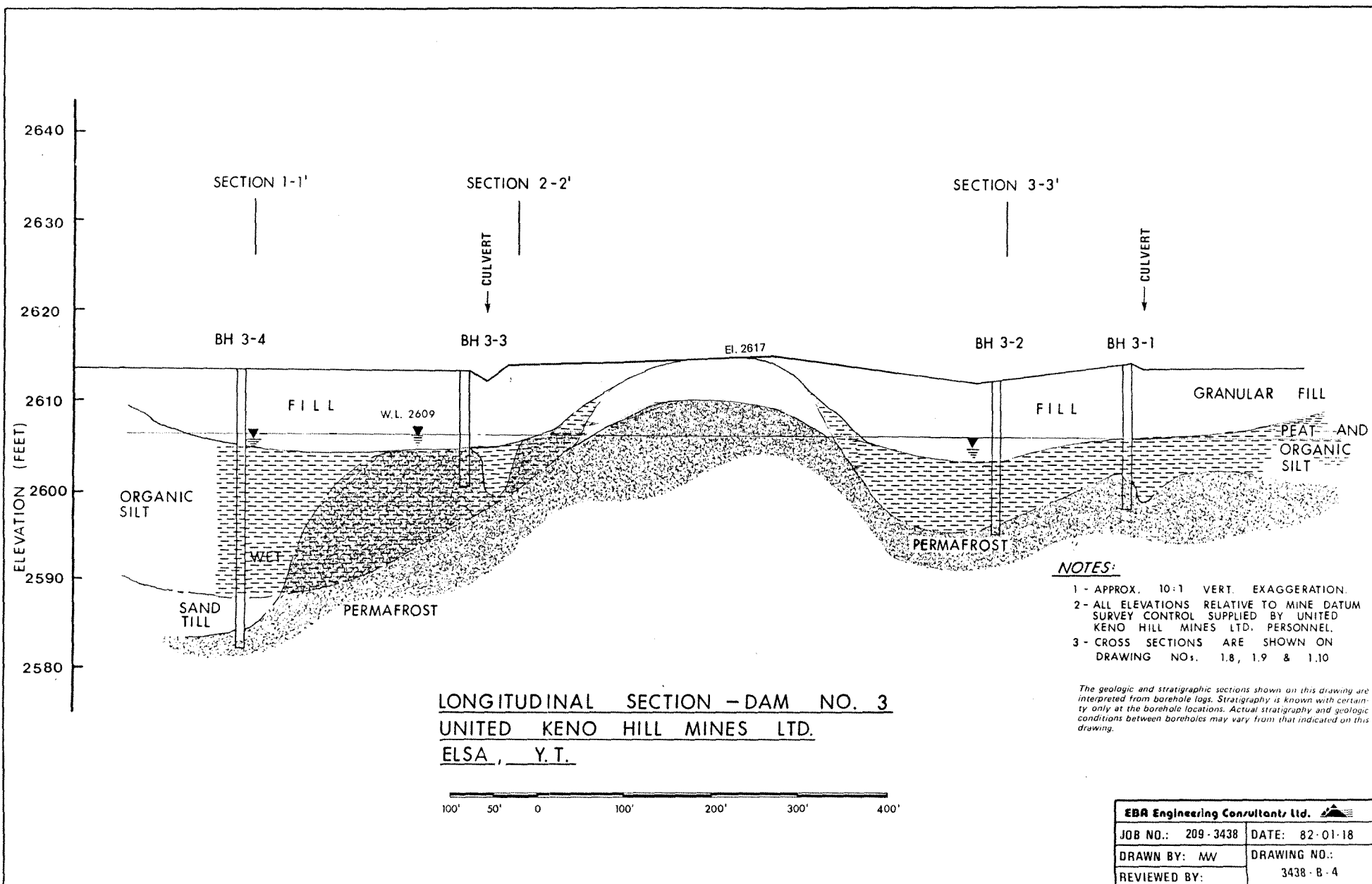
Final,
MARCH, 1983

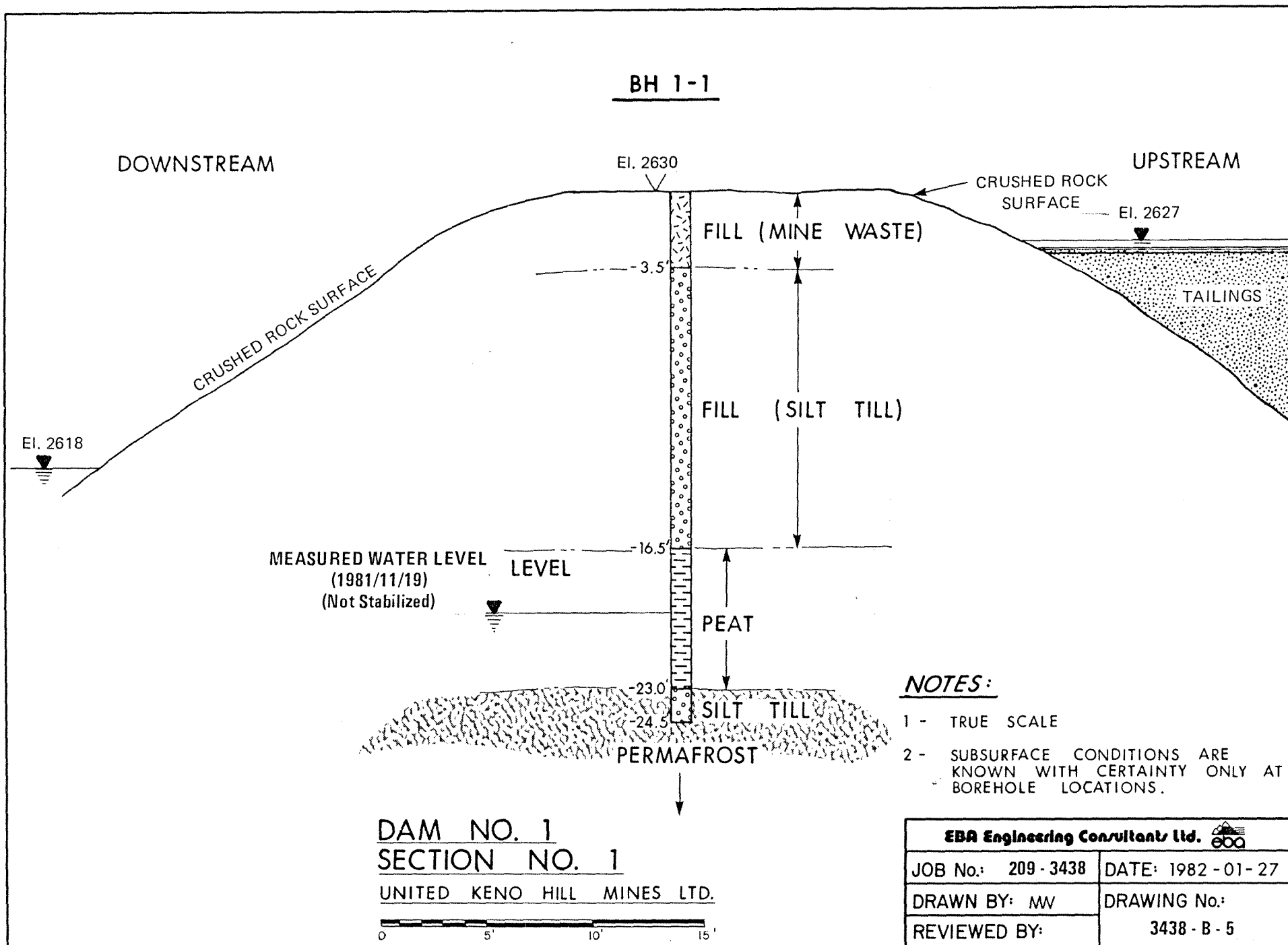
APPENDIX B - DRAWINGS











BH 2-3

DOWNSTREAM

UPSTREAM

El. 2621

El. 2618

FILL (MINE
WASTE)

- 3.5'

FILL (SILT TILL)

- 10.5'

PEAT

- 17.0'

SILT TILL

- 19.0'

DRY ON
COMPLETION

PERMAFROST

NOTES:

- 1 - TRUE SCALE
- 2 - SUBSURFACE CONDITIONS ARE KNOWN WITH CERTAINTY ONLY AT BOREHOLE LOCATIONS.

DAM NO. 2
SECTION NO. 1

UNITED KENO HILL MINES LTD.

0' 5' 10' 15'

EBA Engineering Consultants Ltd.

JOB NO.: 209-3438

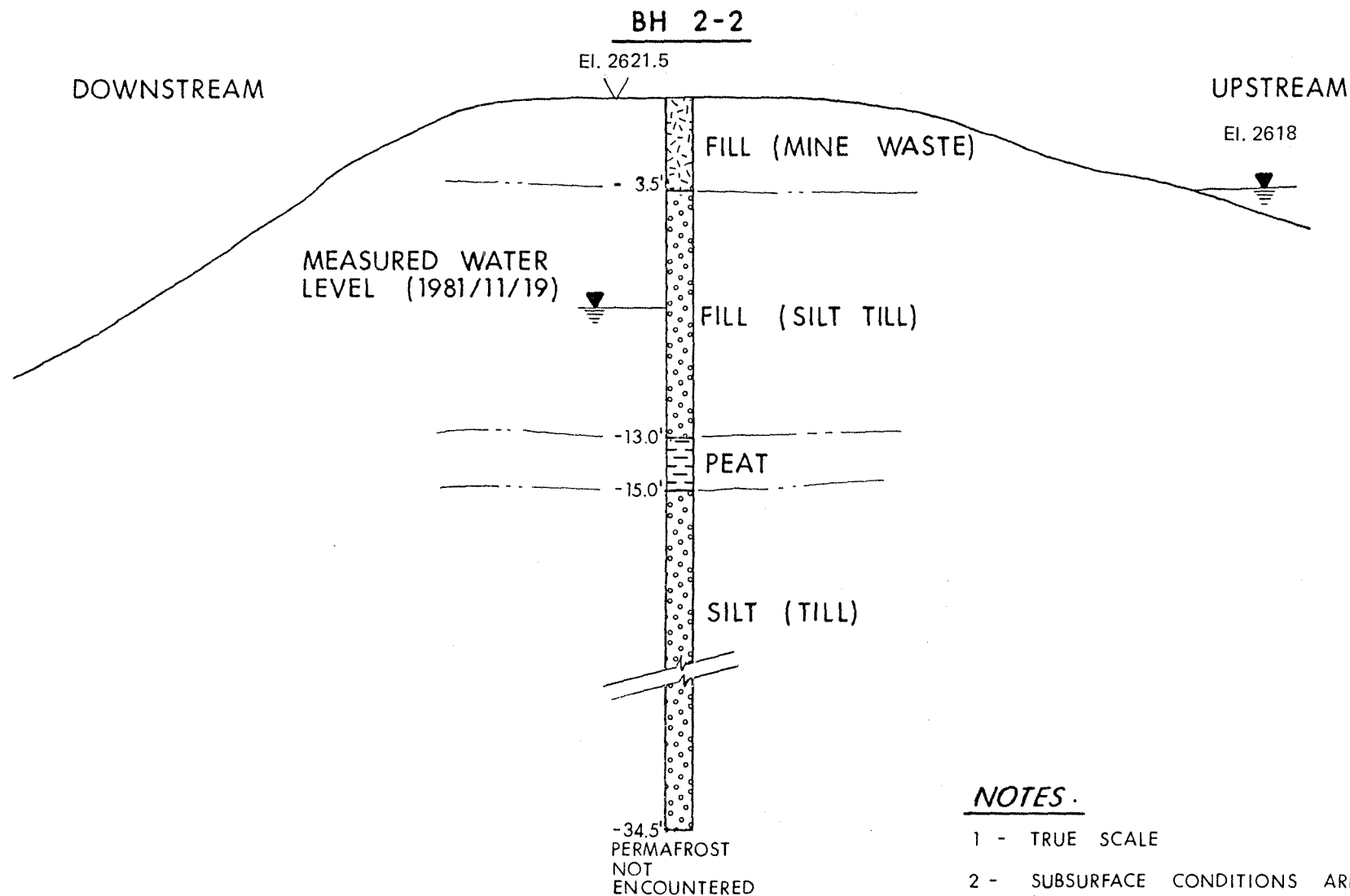
DATE: 1982-01-27

DRAWN BY: MW

DRAWING NO.:

REVIEWED BY:

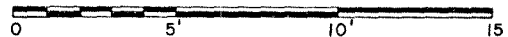
3438-B-6



NOTES.

- 1 - TRUE SCALE
- 2 - SUBSURFACE CONDITIONS ARE KNOWN WITH CERTAINTY ONLY AT BOREHOLE LOCATIONS

DAM NO. 2
SECTION NO. 2
 UNITED KENO HILL MINES LTD.



EBA Engineering Consultants Ltd. 	
JOB NO.: 209-3438	DATE: 1982-01-28
DRAWN BY: MW	DRAWING NO.:
REVIEWED BY:	3438-B-7

BH 3-4

DOWNSTREAM

UPSTREAM

EI. 2614

EI. 2609

MEASURED WATER
LEVEL (1981/11/19)

-10.0'

-29.5'

-33.5'

FILL
(MINE WASTE)

CORE
(SANDY TILL)

PEAT AND ORGANIC SILT

SAND (TILL)

PERMAFROST

CUTOFF

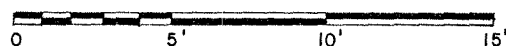
ASSUMED ZONED
SECTION FROM
GEOCON DRAWING

NOTES:

- 1 - TRUE SCALE
- 2 - SUBSURFACE CONDITIONS ARE KNOWN WITH CERTAINTY ONLY AT BOREHOLE LOCATIONS.

**DAM NO. 3
SECTION NO. 1**

UNITED KENO HILL MINES LTD.



EBA Engineering Consultants Ltd.



JOB NO.: 209-3438

DATE: 1982-01-28

DRAWN BY: MW

DRAWING NO.:

REVIEWED BY:

3438-B-8

DOWNSTREAM

BH 3-3

EI. 2614.5

UPSTREAM

EI. 2609

FILL
(MINE WASTE)

FILL
(SAND AND GRAVEL FILTER)

CORE
(SANDY TILL)

PERMAFROST

ORGANIC SILT

CUTOFF

ASSUMED ZONED
SECTION FROM
GEOCON DRAWING

SAND (TILL)

-26.0'
DRY ON
COMPLETION

NOTES:

- 1 - TRUE SCALE
- 2 - SUBSURFACE CONDITIONS ARE KNOWN WITH CERTAINTY ONLY AT BOREHOLE LOCATIONS

DAM NO. 3
SECTION NO. 2

UNITED KENO HILL MINES LTD.

0 5' 10' 15'

EBA Engineering Consultants Ltd. 

JOB NO.: 209-3438 DATE: 1982-01-28

DRAWN BY: MW DRAWING NO.:

REVIEWED BY: 3438-B-9

BH 3-2

DOWNSTREAM

UPSTREAM

El. 2614.5

El. 2609

MEASURED WATER
LEVEL (1981/11/19)

FILL
(MINE WASTE)

CORE
(SANDY TILL)

- 10.0

PEAT

- 13.0

ORGANIC SILT

CUTOFF

ASSUMED ZONED
SECTION FROM
GEOCON DRAWING

- 18.0

PERMAFROST

- 20.0

SAND (TILL)

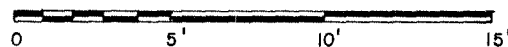
- 22.0

NOTES:

- 1 - TRUE SCALE
- 2 - SUBSURFACE CONDITIONS ARE KNOWN WITH CERTAINTY ONLY AT BOREHOLE LOCATIONS.

DAM NO. 3
SECTION NO. 3

UNITED KENO HILL MINES LTD.



EBA Engineering Consultants Ltd. 

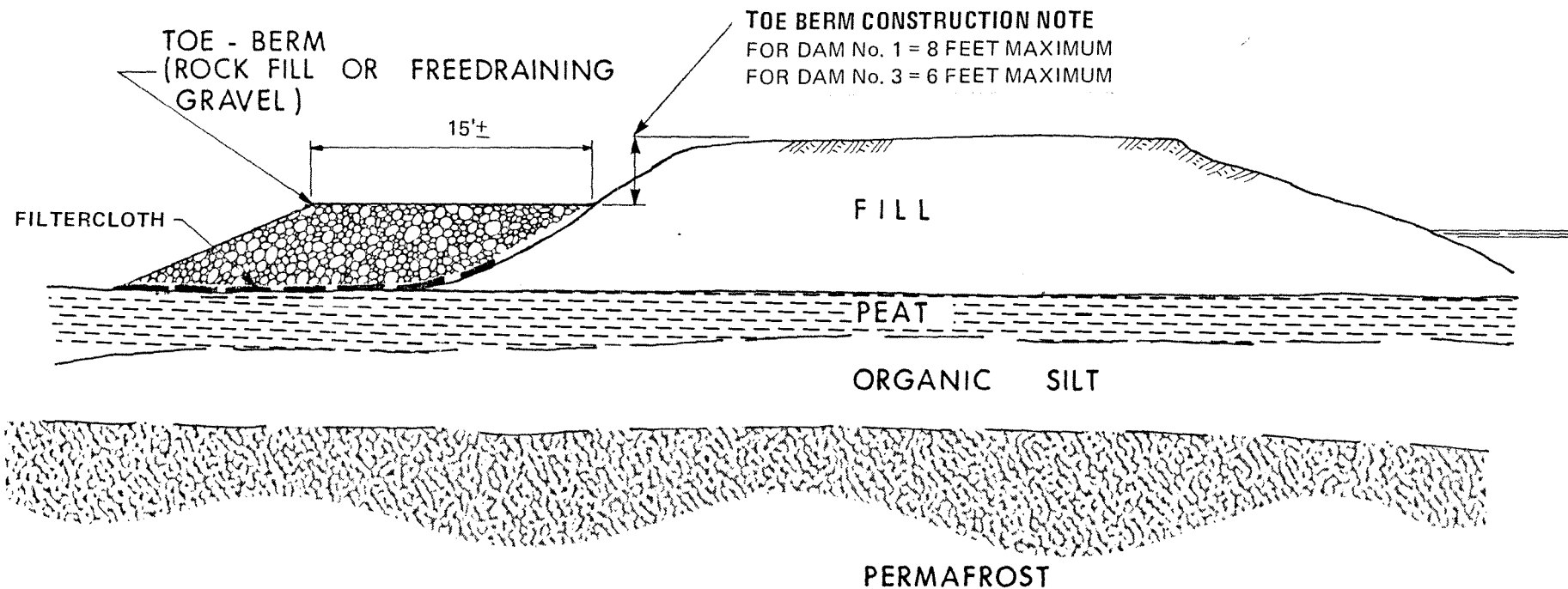
JOB No.: 209 - 3438 DATE: 1982 - 01 - 28

DRAWN BY: MW DRAWING No.:

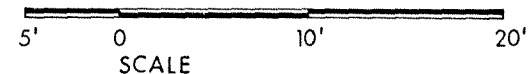
REVIEWED BY: 3438 - B - 10

DOWNSTREAM

UPSTREAM



PROPOSED TOE BERM CONSTRUCTION
DAM No. 1 AND DAM No. 3

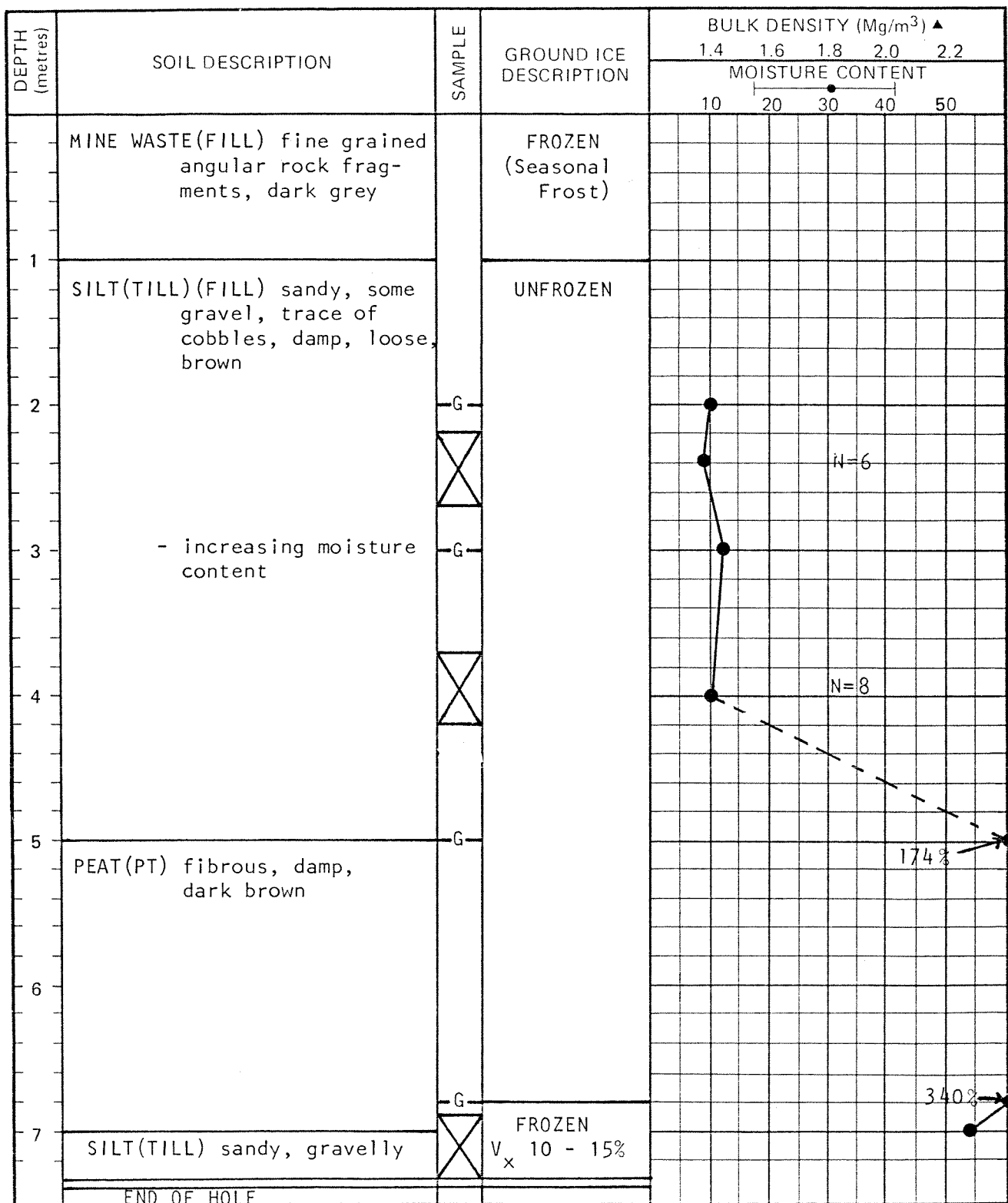


EBA Engineering Consultants Ltd. 	
JOB No.: 209 - 3438	DATE: 82-01-18
DRAWN BY: MW	DRAWING No.: 3438 - B - 11
REVIEWED BY:	

APPENDIX C - BOREHOLE LOGS

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2629.9

DATE DRILLED 1981 11 19

BOREHOLE No.

COMPLETION DEPTH (m) 7.4

LOGGED BY JRT

1 - 1

DRILLING RIG CME 750

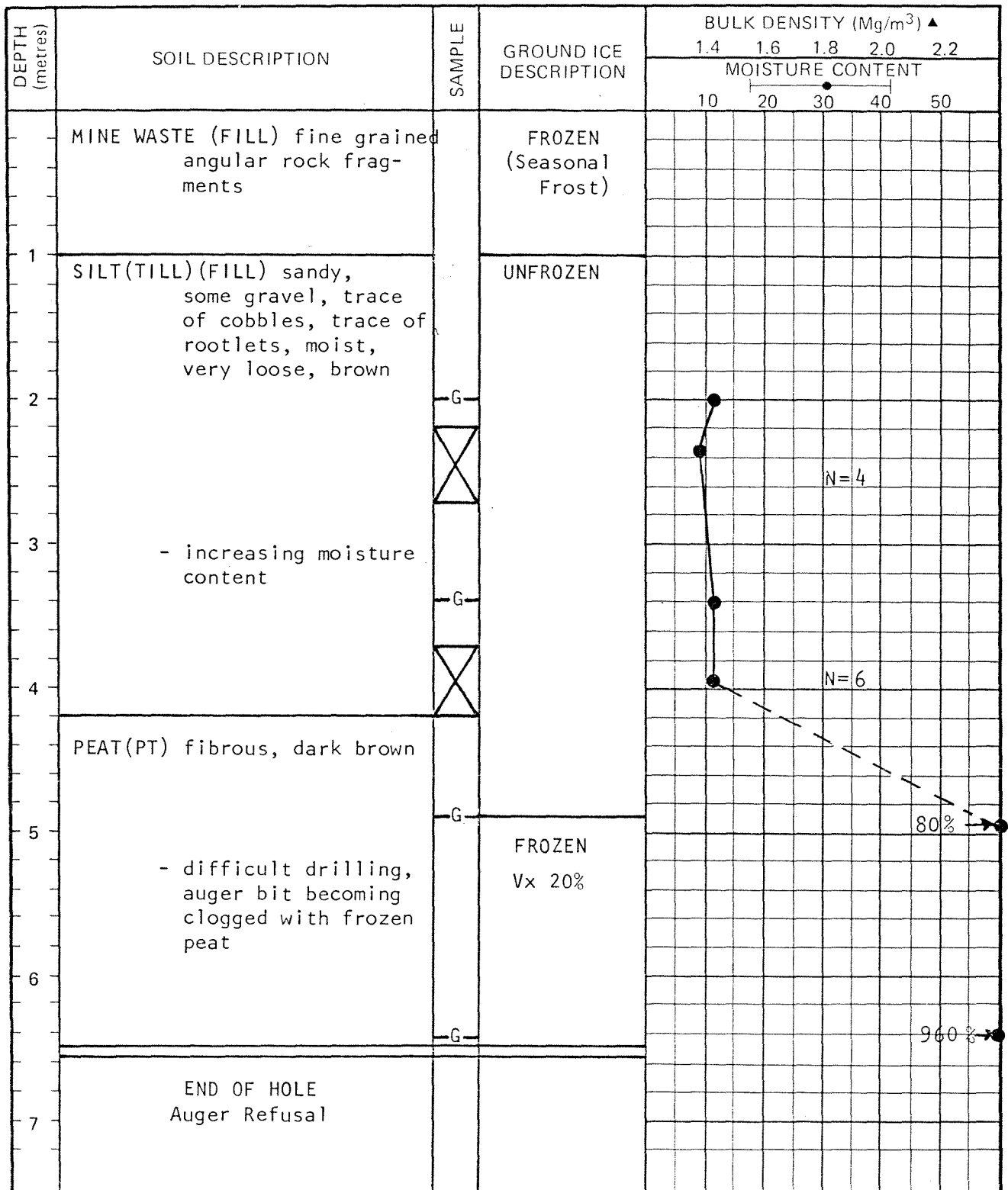
LOCATION Elsa, Yukon

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2630.4

DATE DRILLED 1981 11 19

BOREHOLE No.

COMPLETION DEPTH (m) 6.5

LOGGED BY JRT

1 - 2

DRILLING RIG CME 750

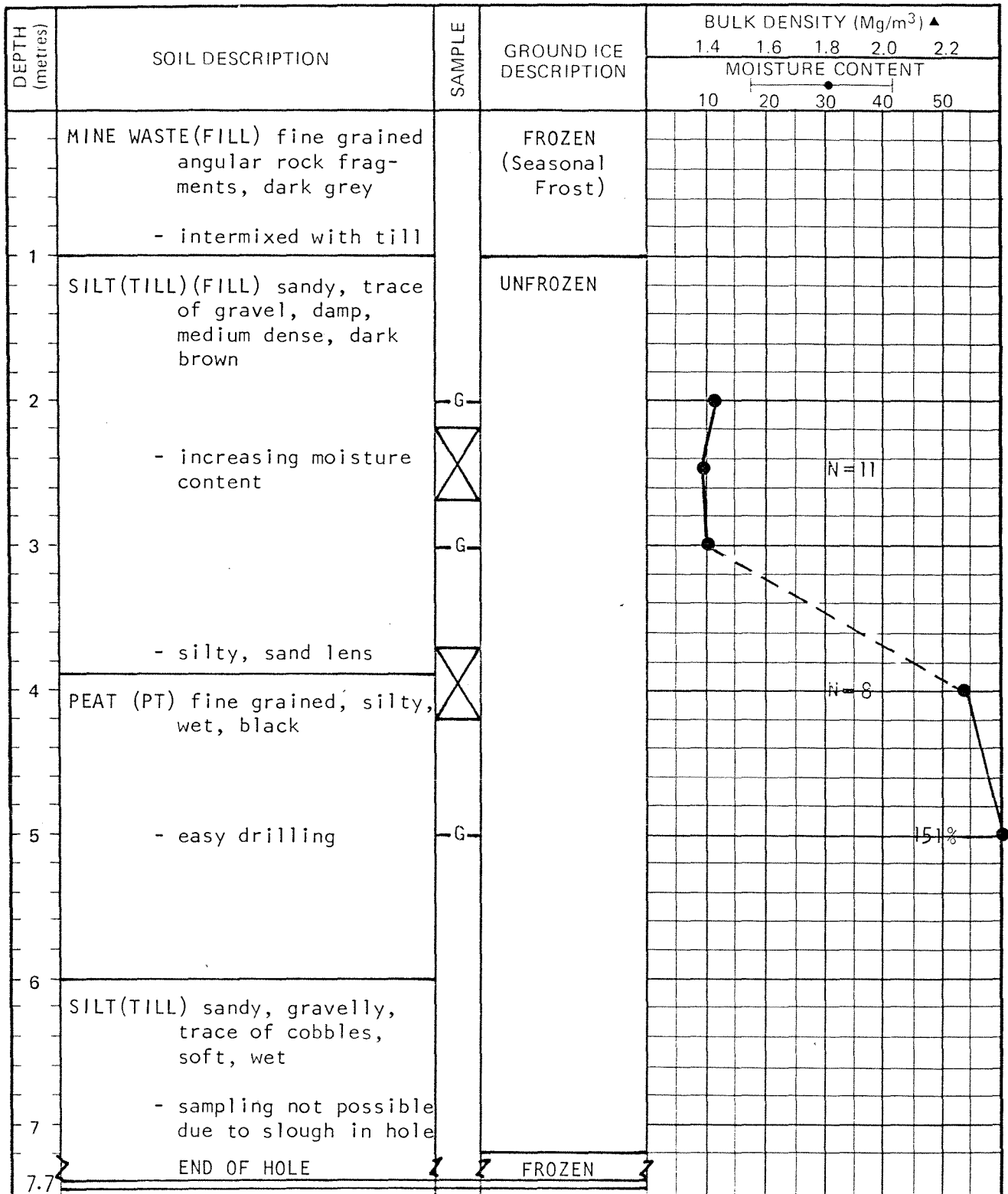
LOCATION Elsa, Yukon

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2622.8

COMPLETION DEPTH (m) 7.7

DRILLING RIG CME 750

DATE DRILLED 1981 11 19

LOGGED BY JRT

LOCATION Elsa, Yukon

BOREHOLE No.

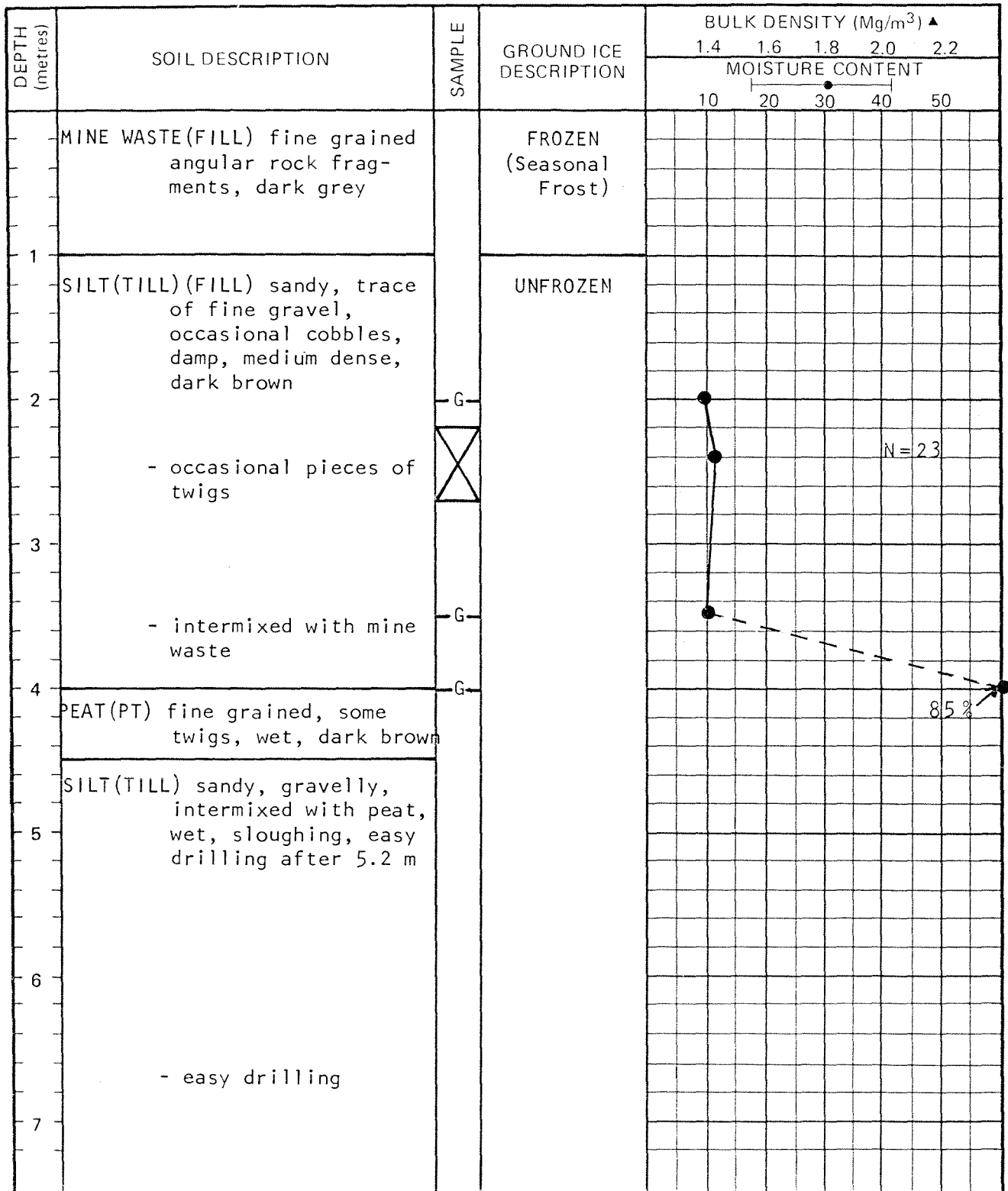
2 - 1

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2621.2

DATE DRILLED 1981 11 19

COMPLETION DEPTH (m) 10.5

LOGGED BY JRT

DRILLING RIG CME 750

LOCATION Elsa, Yukon

BOREHOLE No.

2 - 2

PAGE 1 OF 2

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438

DEPTH (metres)	SOIL DESCRIPTION	SAMPLE	GROUND ICE DESCRIPTION	BULK DENSITY (Mg/m ³) ▲				
				1.4	1.6	1.8	2.0	2.2
				MOISTURE CONTENT				
				10	20	30	40	50
8	SILT(TILL) sandy, gravelly, wet, sloughing, easy drilling - easy drilling		UNFROZEN					
9								
10								
		G						
11	END OF HOLE							
12								
13								
14								



SFC. ELEVATION 2621.2

COMPLETION DEPTH (m) 10.5

DRILLING RIG CME 750

DATE DRILLED 1981 11 19

LOGGED BY JRT

LOCATION Elsa, Yukon

BOREHOLE No.

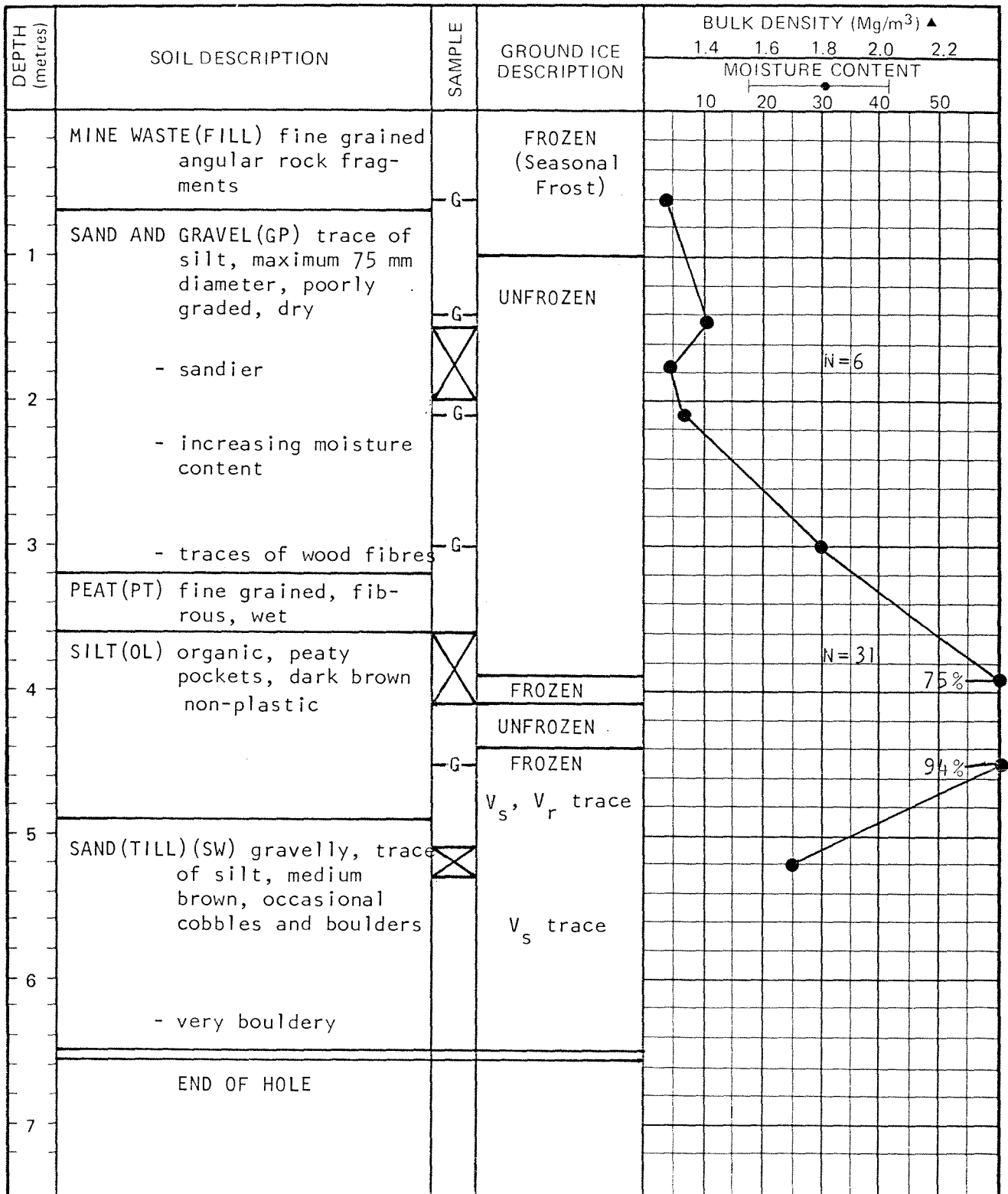
2 - 2

PAGE 2 OF 2

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2614.8

COMPLETION DEPTH (m) 6.5

DRILLING RIG CME 750

DATE DRILLED 1981 11 18

LOGGED BY JRT

LOCATION Elsa, Yukon

BOREHOLE No.

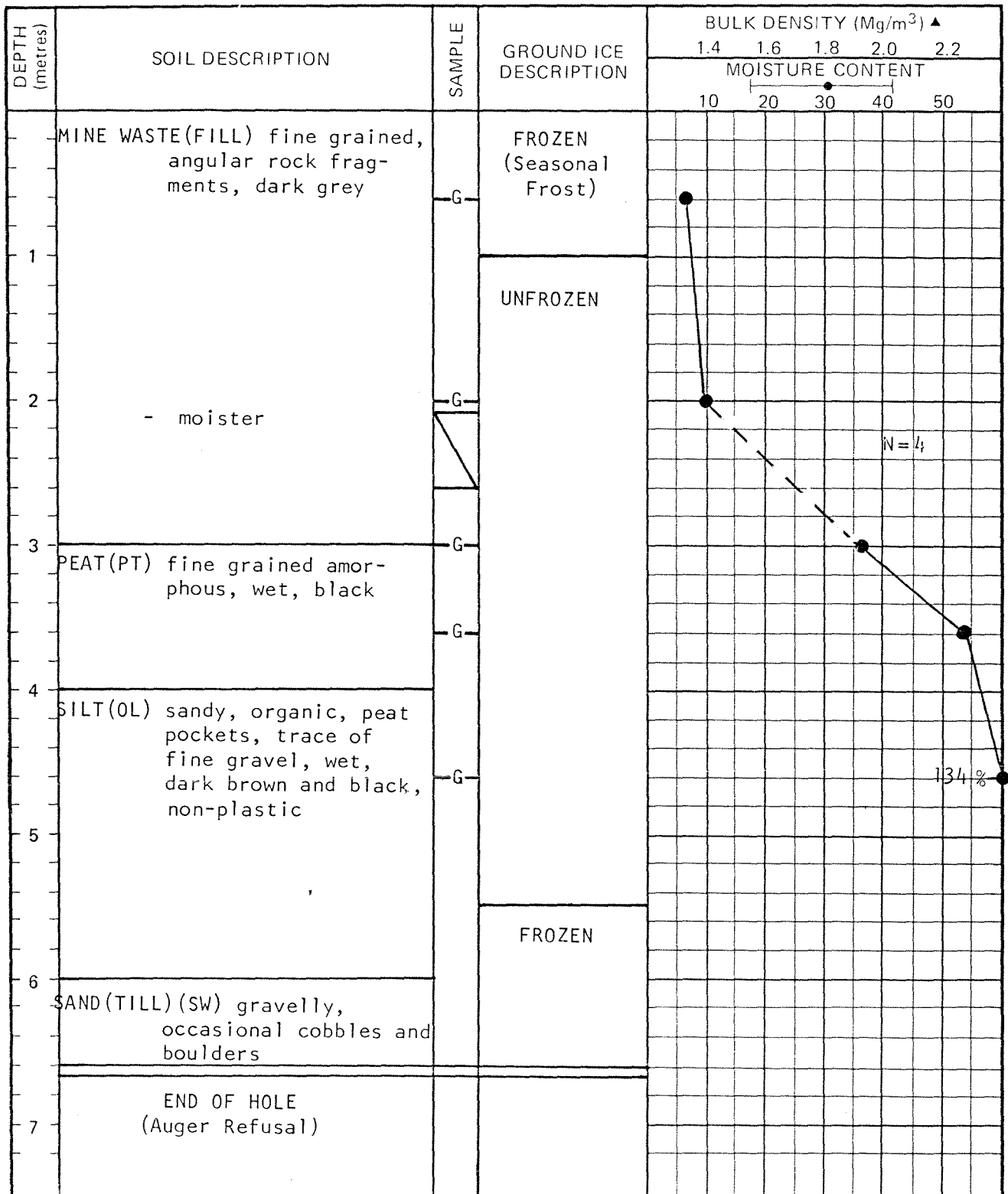
3 - 1

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2613.1

COMPLETION DEPTH (m) 6.6

DRILLING RIG CME 750

DATE DRILLED 1981 11 18

LOGGED BY JRT

LOCATION Elsa, Yukon

BOREHOLE No.

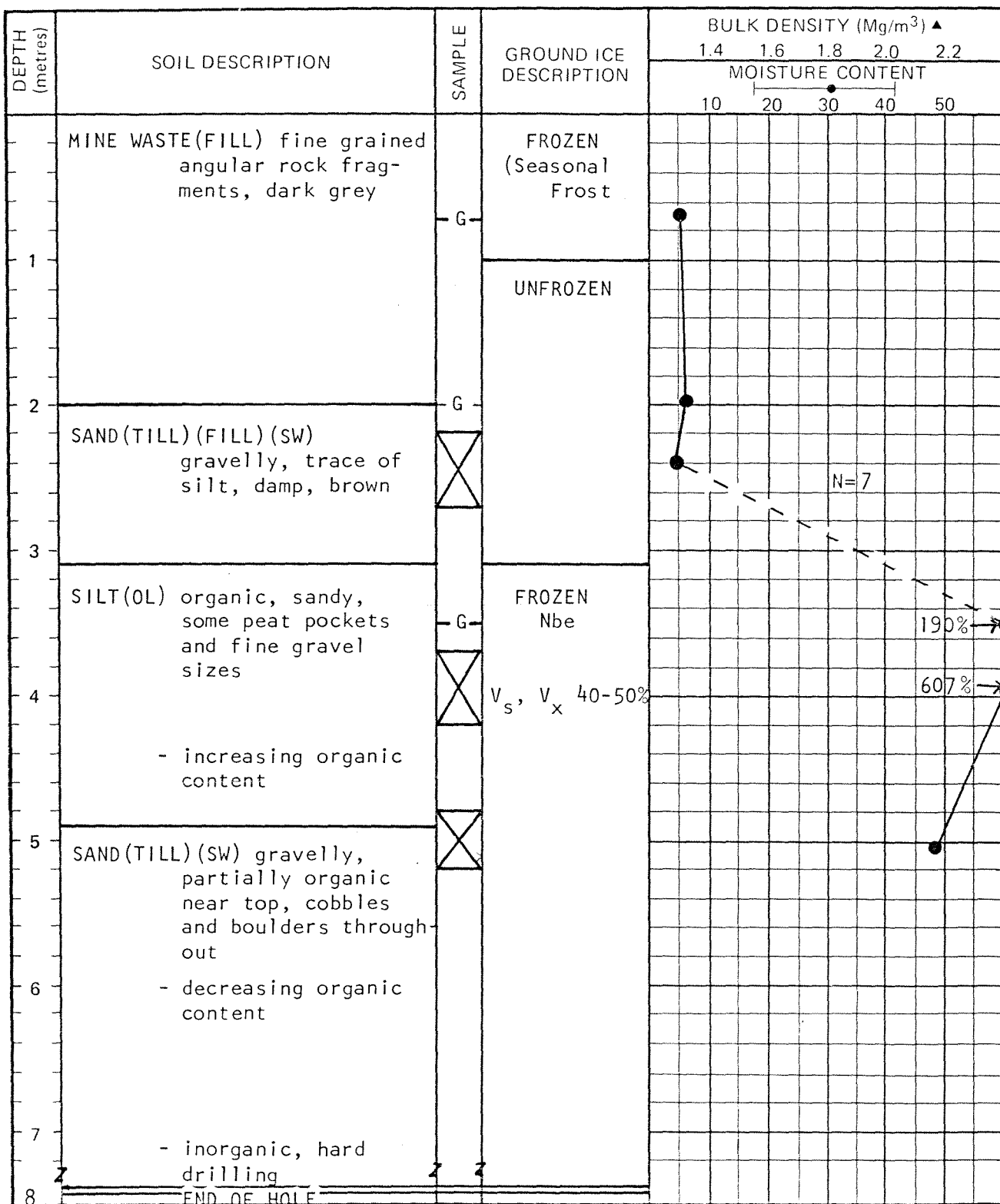
3 - 2

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438



SFC. ELEVATION 2613.1

DATE DRILLED 1981 11 18

COMPLETION DEPTH (m) 8.0

LOGGED BY JRT

DRILLING RIG CME 750

LOCATION Elsa, Yukon

BOREHOLE No.
3 - 3

PAGE 1 OF 1

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

209-3438



PAGE 1 OF 2

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

BOREHOLE LOG – PERMAFROST

209-3438

DEPTH (metres)	SOIL DESCRIPTION	SAMPLE	GROUND ICE DESCRIPTION	BULK DENSITY (Mg/m ³) ▲				
				1.4	1.6	1.8	2.0	2.2
				MOISTURE CONTENT				
				10	20	30	40	50
8	SILT(OL) peaty, organic, trace of fine gravel, soft, wet, dark brown and black		UNFROZEN					
	- hole sloughing							
9	SAND(TILL)(SW) silty, some gravel, dark grey							
	- boulder, hard drilling	G						
10			FROZEN					
	END OF HOLE							
11								
12								
13								
14								



SFC. ELEVATION 2612.7

DATE DRILLED 1981 11 19

COMPLETION DEPTH (m) 10.2

LOGGED BY JRT

DRILLING RIG CME 750

LOCATION Elsa, Yukon

BOREHOLE No.

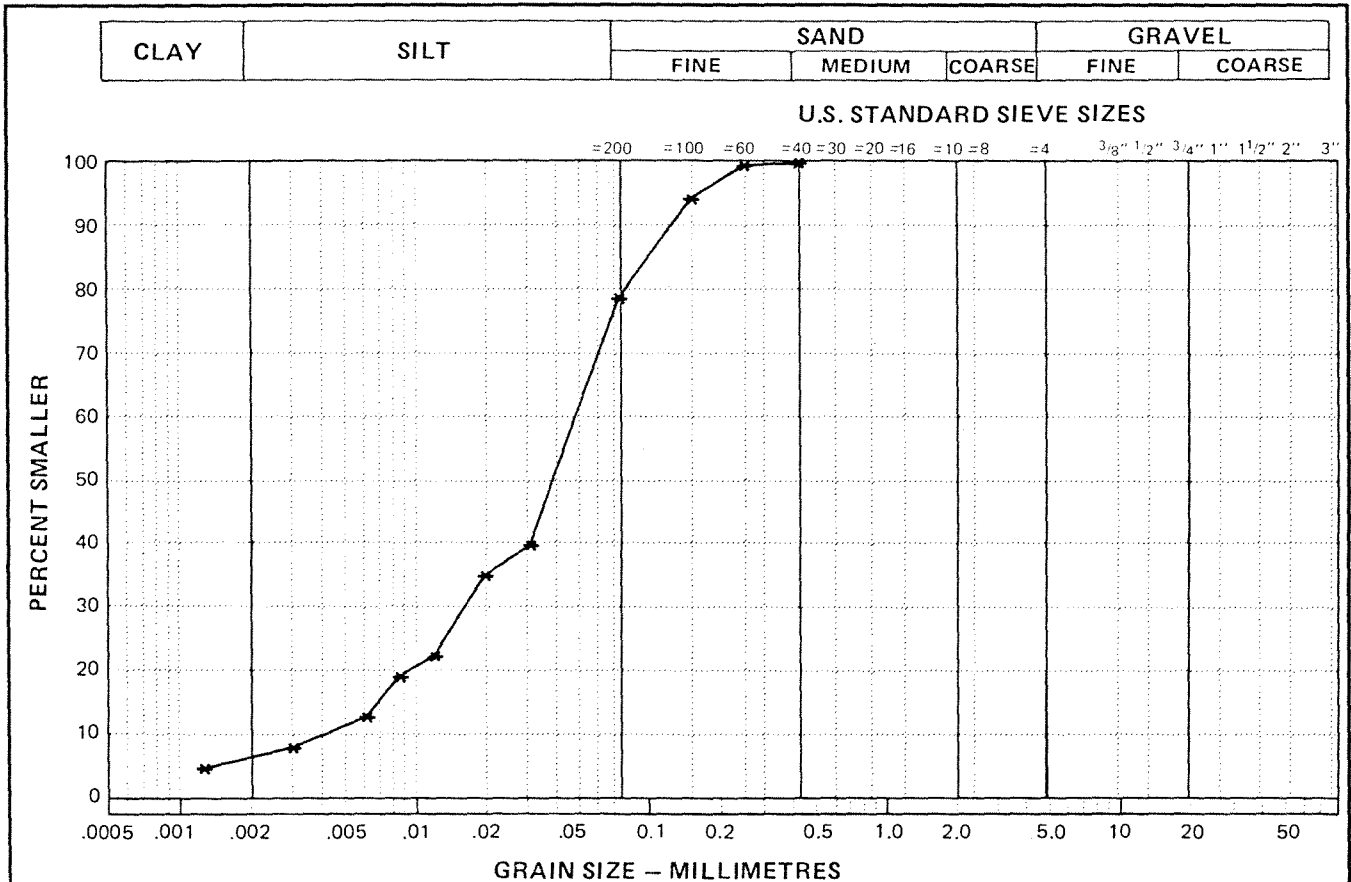
3 - 4

PAGE 2 OF 2

This log is a compilation of subsurface conditions and soil or rock classification obtained from the field as well as from laboratory testing of samples from the boreholes. Soil zones have been interpreted according to commonly accepted practice. The change from one zone to another, as indicated on the log, may be transitional and approximate in nature. Groundwater conditions refer only to those observed at the times and places indicated and that may vary with time, geologic conditions, and construction activity.

APPENDIX D - LABORATORY TEST RESULTS

PARTICLE - SIZE ANALYSIS OF SOILS



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C.
			CLAY (%)	SILT (%)	SAND (%)	GRAVEL (%)			
*	MILL TAILINGS		6.5	72.4	21.1	0.0	12.1	1.3	-

JOB NO. 108-3438

DATE 81-11-13

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 07

Borehole Number: BH 1-1

Depth: 2.2m- 2.7m

Soil Description: _____

Cu: _____

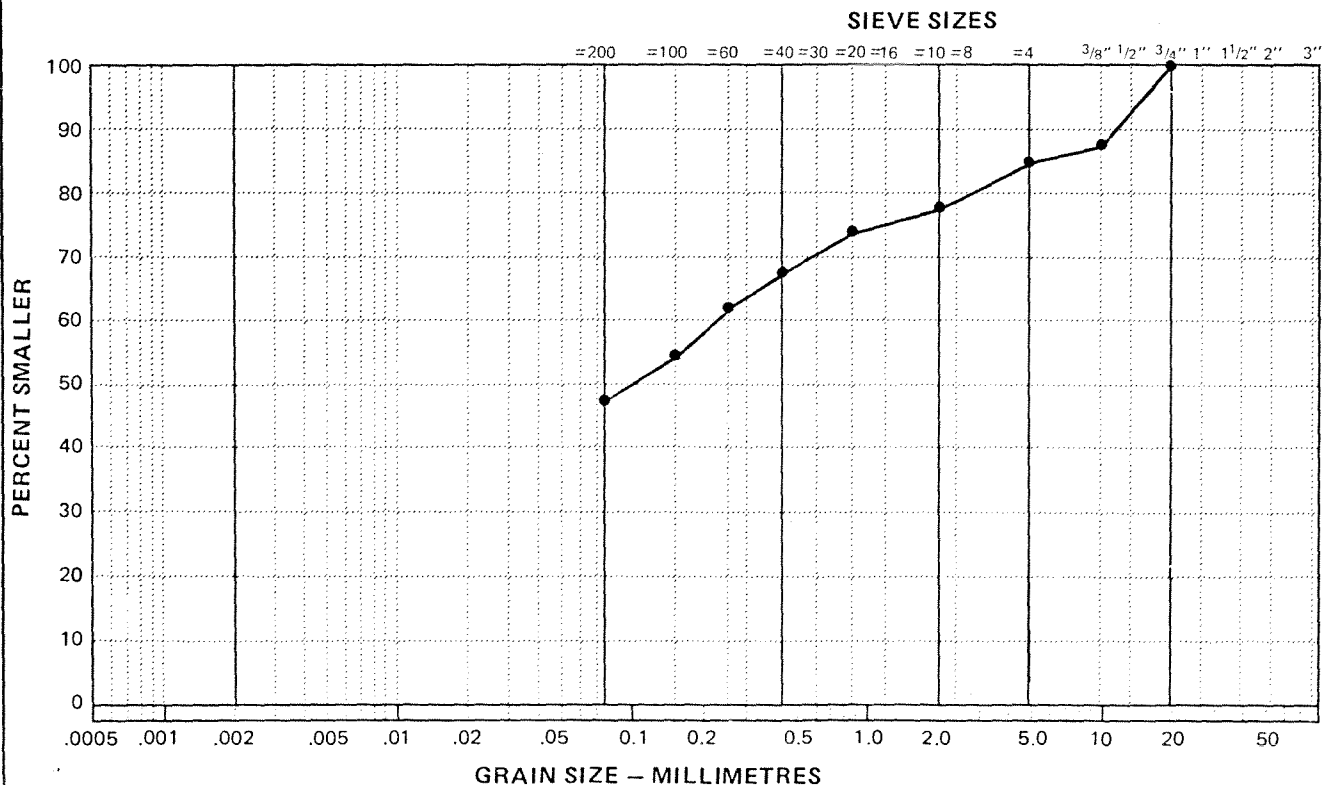
Cc: _____

Natural Moisture Content: _____ %

Remarks: _____

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	
1"	
3/4"	100
3/8"	88
No. 4	85
No. 10	78
No. 20	73
No. 40	68
No. 60	62
No. 100	55
No. 200	48

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.



PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 07

Borehole Number: BH 1-2

Depth: 3.7m - 4.2m

Soil Description: _____

Cu: _____

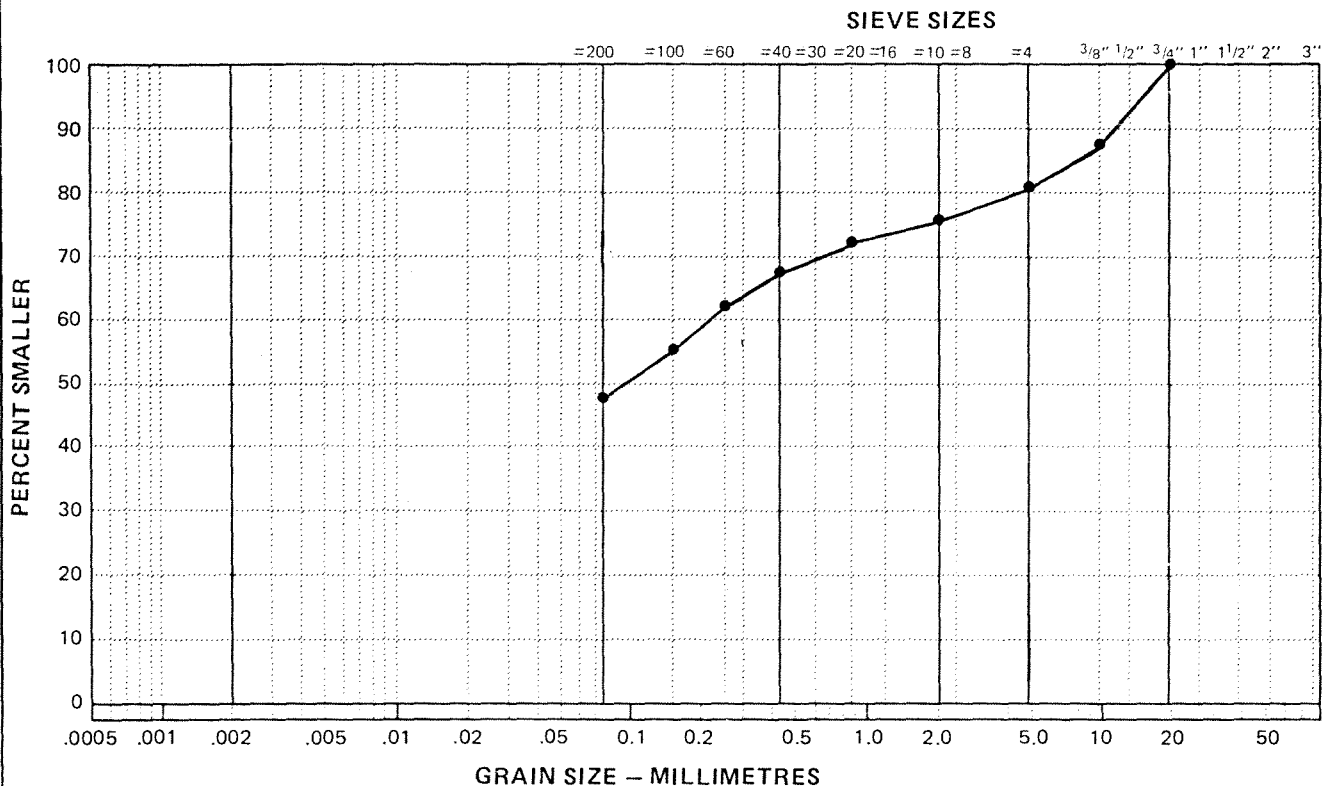
Cc: _____

Natural Moisture Content: _____ %

Remarks: _____

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	
1"	
3/4"	100
3/8"	89
No. 4	81
No. 10	76
No. 20	72
No. 40	68
No. 60	62
No. 100	56
No. 200	48

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 02

Borehole Number: BH 2-1

Depth: 2.2m- 2.7m

Soil Description:

Cu:

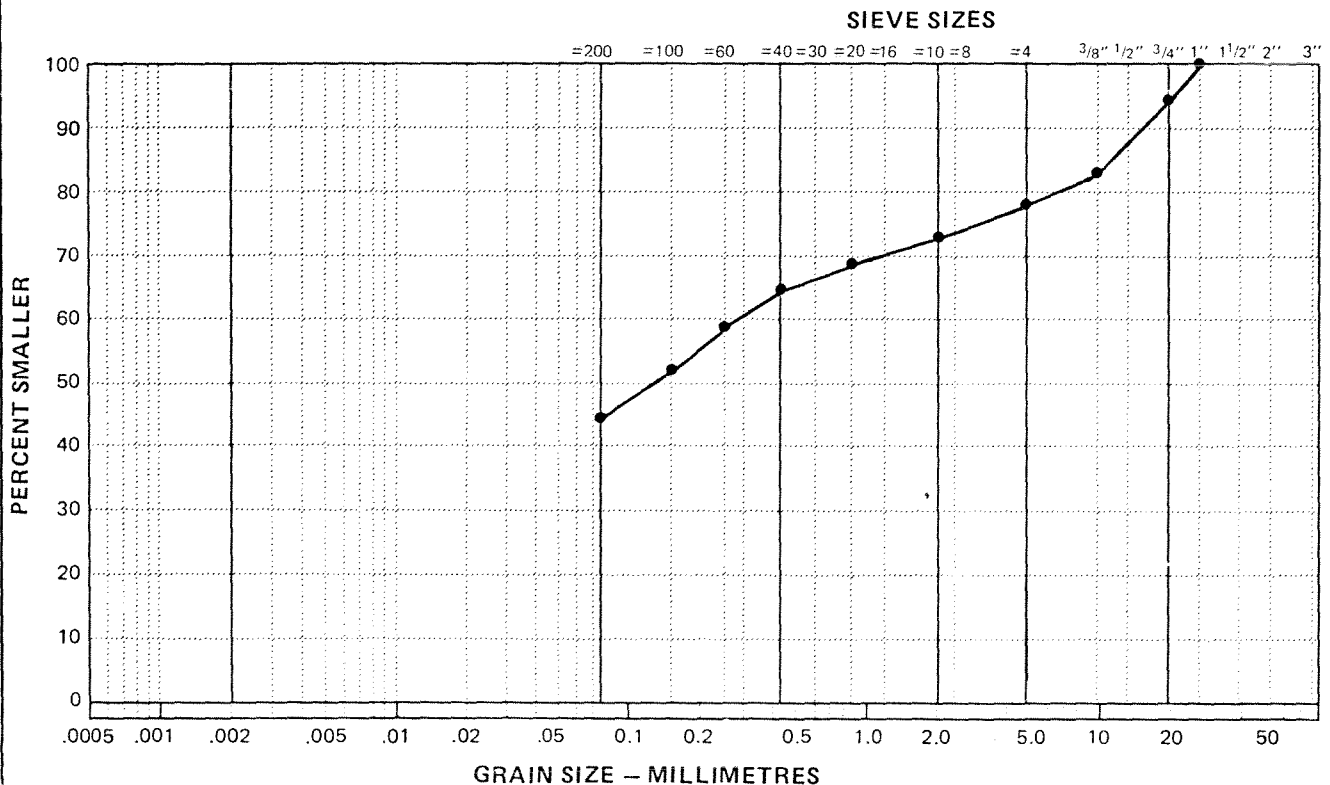
Cc:

Natural Moisture Content: %

Remarks:

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	
1"	100
3/4"	95
3/8"	83
No. 4	78
No. 10	73
No. 20	69
No. 40	64
No. 60	59
No. 100	52
No. 200	44

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 07

Borehole Number: BH 2-3

Depth: 2.1 m - 2.6 m

Soil Description: _____

Cu: _____

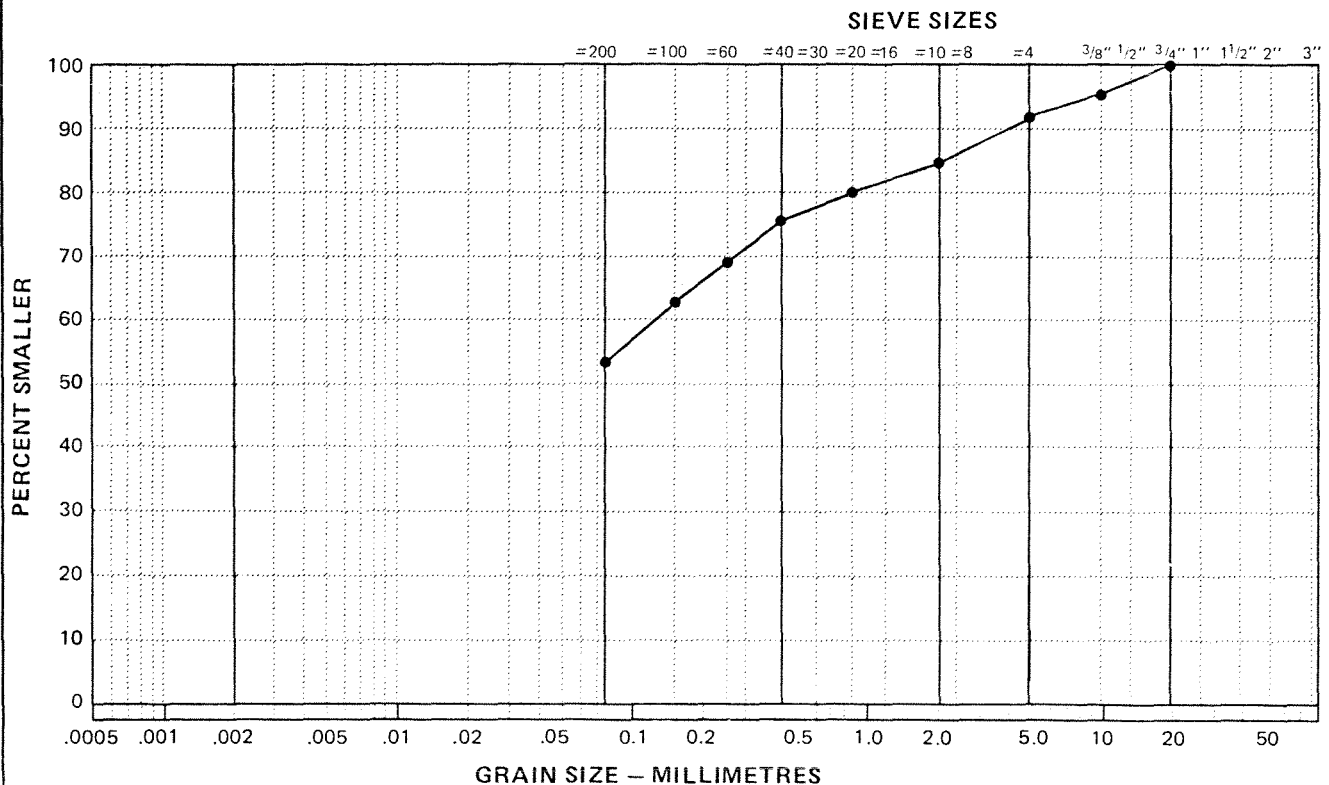
Cc: _____

Natural Moisture Content: _____ %

Remarks: _____

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	
1"	
3/4"	100
3/8"	96
No. 4	92
No. 10	85
No. 20	80
No. 40	76
No. 60	69
No. 100	62
No. 200	53

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 02

Borehole Number: BH 3-1

Depth: 1.5 m and 1.5 m - 2.0 m (mixture)

Soil Description:

Cu:

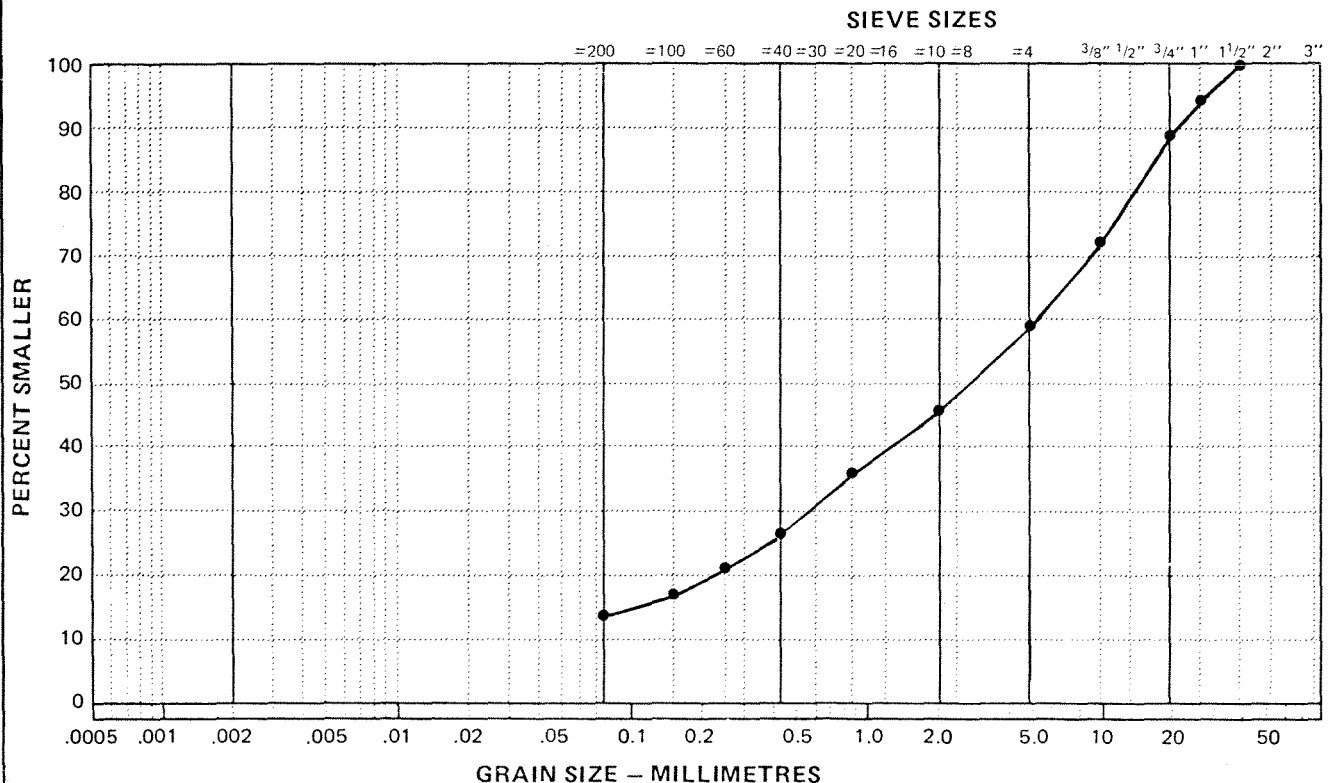
Cc:

Natural Moisture Content: %

Remarks:

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	100
1"	95
3/4"	89
3/8"	72
No. 4	59
No. 10	46
No. 20	36
No. 40	27
No. 60	21
No. 100	17
No. 200	14

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 02

Borehole Number: BH 3-2

Depth: 2.0 m

Soil Description:

Cu:

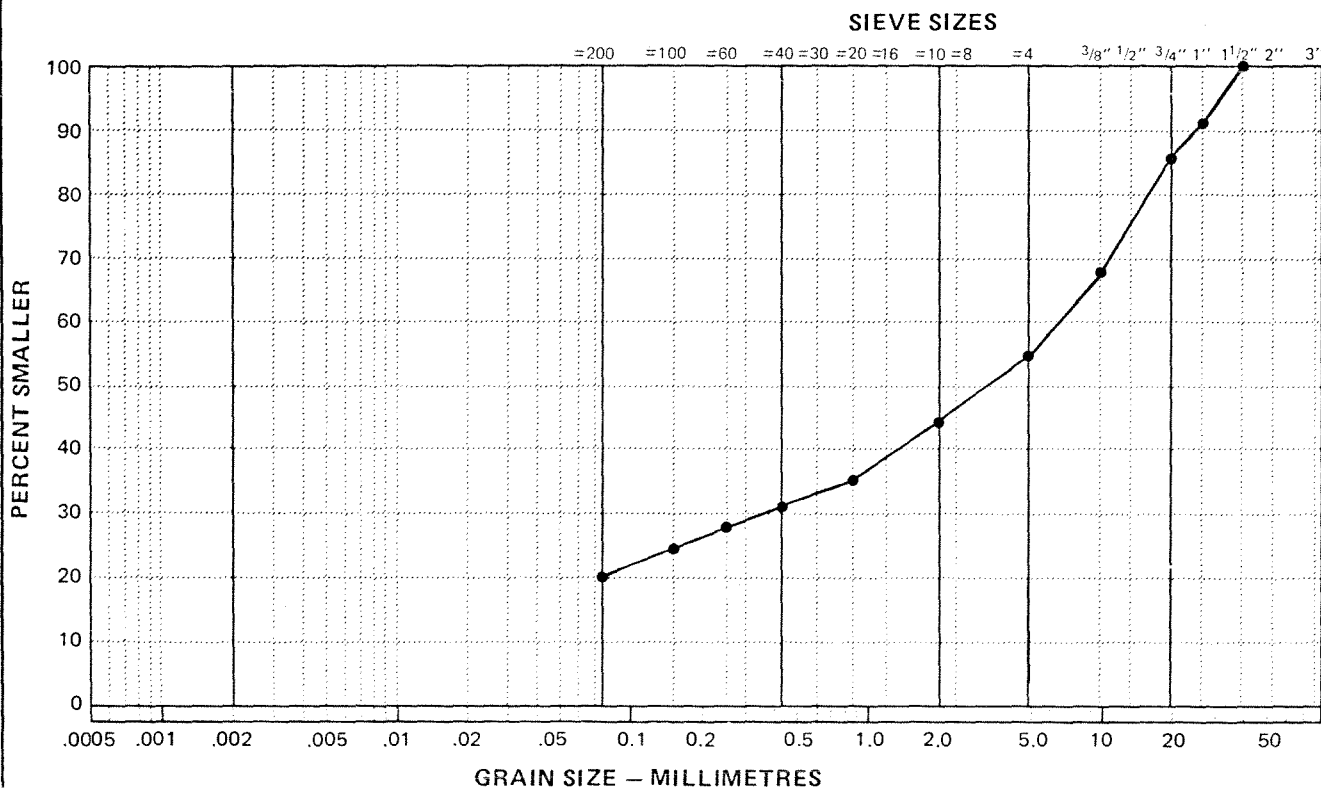
Cc:

Natural Moisture Content: %

Remarks:

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	100
1"	91
3/4"	86
3/8"	68
No. 4	55
No. 10	44
No. 20	36
No. 40	31
No. 60	28
No. 100	24
No. 200	20

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

14535 - 118th AVENUE
EDMONTON, ALBERTA
Phone (403) 451-2121



5664 BURLEIGH CRES. S.E.
CALGARY, ALBERTA
Phone (403) 253-7121

PARTICLE - SIZE ANALYSIS OF SOILS

Project: UKHM - Tailings Pond

Project Number: 108-3438

Date Tested: 1981 12 02

Borehole Number: BH 3-2

Depth: 4.6 m

Soil Description: _____

Cu: _____

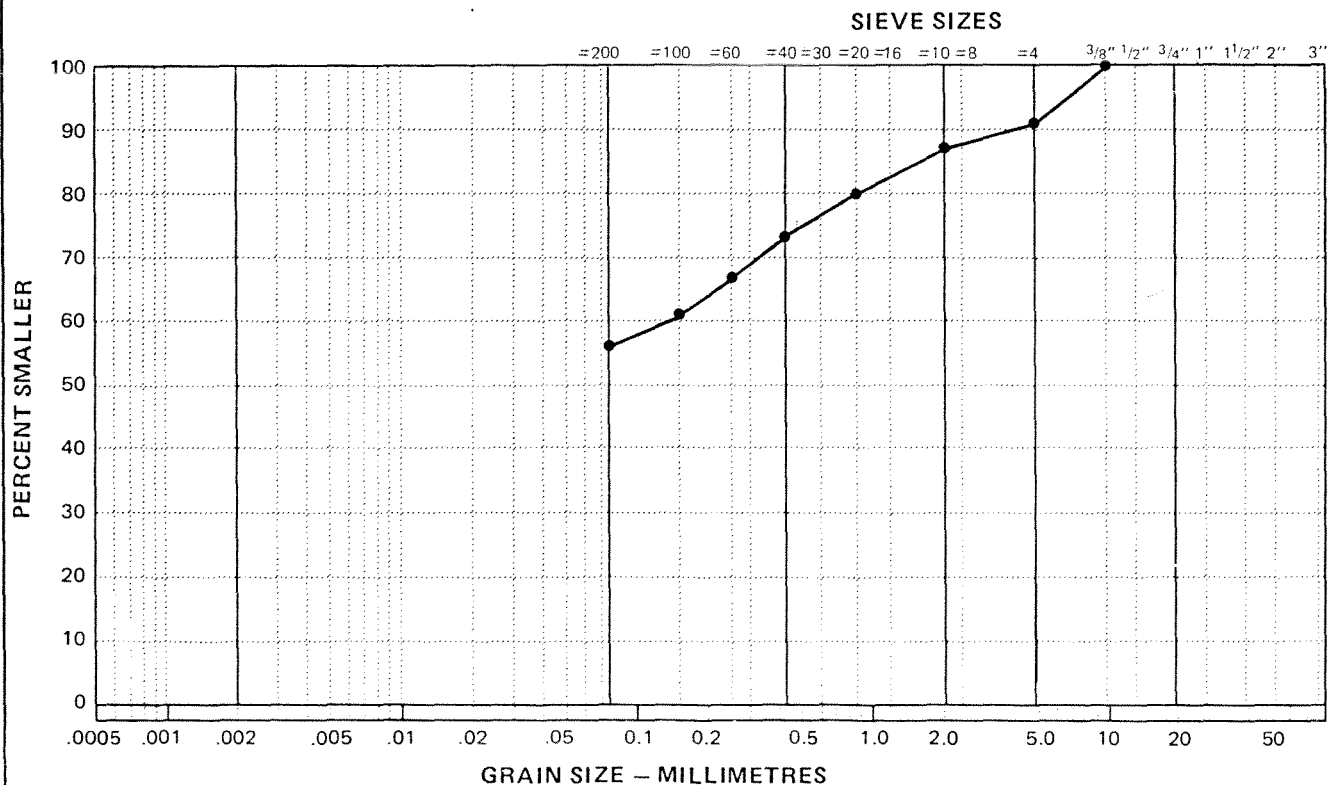
Cc: _____

Natural Moisture Content: _____ %

Remarks: _____

SIEVE	PERCENTAGE PASSING
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100
No. 4	91
No. 10	87
No. 20	80
No. 40	73
No. 60	67
No. 100	61
No. 200	56

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.