HORNSBY SHIRE COUNCIL

OLD MAN'S VALLEY

GEOTECHNICAL INVESTIGATIONS

REPORT S8463/3-AG JULY, 1990

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S8463/3-AG PLV:KMR
18th July, 1990

The Shire Clerk
Hornsby Shire Council
296 Pacific Highway
HORNSBY NSW 2077

ATTENTION: MR. KEVIN SMITH

Dear Sir,

RE: REPORT ON GEOTECHNICAL INVESTIGATIONS, OLD MAN'S VALLEY, HORNSBY

Please find enclosed our report on geotechnical investigations for the proposed filling at Old Man's Valley, Hornsby.

Should you have any queries regarding this report please do not hesitate to contact Mr. Peter Volk or the undersigned.

For and on behalf of
COFFEY & PARTNERS PTY LTD

for C.P. THORNE

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1.0 INTRODUCTION

This report presents the results of geotechnical investigations undertaken at the request of Hornsby Shire Council, at the site of the proposed playing field development at Old Man's Valley, Hornsby. The purpose of the investigations was to supplement earlier studies carried out in the area, the results of which were presented in Report No. S8463/2-AC, July 1989. These earlier studies indicated that the proposed fill batters would probably need to be flattened, from the original slope of 1.5:1 to possibly as flat as 3:1 and that additional work was necessary on foundation material properties, groundwater, and stability into the adjacent quarry.

The work was undertaken in general accordance with our proposal for additional geotechnical investigations, as outlined in Appendix D of the July, 1989 report. The work was commissioned by Hornsby Shire Council in a letter dated 4th October 1989.

It is understood that following our earlier report, the revised proposal for the development is to raise the existing playing field by some 10m to about R140, at the same time extending northwards the area of fill, to create a development area some 430m long by some 120m wide (see Figure 1).

The principal aims of the investigations reported herein were to supplement earlier work and hence to:

- establish whether the poor drainage conditions evident along the toe of the southern playing field extend northwards along the toe, and whether or not there is a dual or single groundwater regime;
- obtain additional strength data on fill, residual soil and highly weathered rock from the southern playing field area to check the applicability of the values previously obtained from further north;
- establish in the northern area, the depth of weathering, the actual groundwater regime, and strength parameters for the existing fill.

Previous investigations undertaken by Coffey & Partners Pty. Ltd. (CAP) in the vicinity of the proposed playing field development included reconnaissance geological mapping, drilling of eight boreholes, excavation of eight test pits, some triaxial and direct shear strength testing and subsequent analysis and reporting. The results of these investigations were presented in Report No. S8463/2-AC, July 1989. This report is supplementary to and should be read in conjunction with our previous report.

Subsequent to the July 1989 report, the following information was provided by Council during April 1990.

- Plan No. 428.28 Old Man's Valley - Hornsby. Revised Layout Incorporating 1 in 3 Batter.
  Sheet 1 - Plan, Scale 1:500
  Sheets 2,3,4,5 + 6 - Cross Sections Ch0 to Ch510, Scale 1:500

Concurrent with the recent geotechnical investigations for the proposed playing field development, CAP have undertaken a rock mechanics study in the vicinity of eastern quarry face of Hornsby Breccia Quarry. The results of this study are presented in Report No. S8463/4-AD, dated May 1990.

2.0 RECENT INVESTIGATIONS

2.1 Field Work

The field work for the recent investigation consisted of drilling 36 boreholes with piezometers installed in each. Borehole depths ranged from 2m to 63m with a total meterage drilled of approximately 440m. The drilling commenced on the 28th November 1989, and was completed on the 21st December 1989. Appendix A contains the borehole logs, together with explanation sheets defining the terms and symbols used in the preparation of the logs. The location of the boreholes is shown on Figure 1.

Following installation of the piezometers, recording of piezometric levels in each of the boreholes was commenced, with regular monitoring continuing over a three month interval from about mid December 1989, to mid March 1990. The results of this monitoring are presented in Appendix B. Since mid March 1990 piezometric levels have been recorded at irregular intervals

In addition to the installation of piezometers, three test pits were excavated by backhoe near the toe of the proposed northern playing field to obtain undisturbed block samples for direct shear strength testing. The location of these test pits, TP9, TP10 and TP11 are shown on Figure 1.

As part of the rock mechanics study of the Hornsby Quarry area, three fully cored inclined boreholes 101, 102 and 103 were drilled. The logs of these boreholes, together with structural defect data, is presented in Report No. S8463/4-AD.

2.2 Laboratory Testing

During drilling of the boreholes, push tube samples were obtained from each of the major material types encountered on the site. The results of laboratory testing on these samples, which included six consolidated undrained triaxials and ten Atterberg limits are presented in Appendix C.

In addition to the above testing, two samples of breccia fill material, from the new fill area located to the south of the existing playing field, were tested in direct shear in standard sized shear box equipment. The results of this testing is presented in Appendix C.

To provide shear strength data on the extremely to highly weathered breccia, which is difficult to sample and test by normal methods, a number of undisturbed block samples of the material were obtained from test pits and subjected to direct shear testing. The results of this testing are presented in Appendix D, together with a brief description of the test procedures.

3.0 SITE DESCRIPTION

3.1 Surface Conditions

The proposed playing field development is located on Council land immediately east of the Hornsby breccia quarry (see Figure 1). The site is presently occupied by a filled area (southern playing field), to the north of which, at a lower elevation, is an area of dumped fill materials. At present, an access road leading from the quarry passes between these two areas.

The original landform of the site comprised a steep sandstone slope at the (east) of the site which fed a westwards flowing creek which ran through the northern half of the site. Subsequent filling has moved the course of this creek further to the north with most of the flow now collected and diverted by pipe to a westwards flowing creek located near the northern boundary of the proposed development. The upper reaches of this northern most creek have also been modified by filling.

Located along the toe of the existing playing field and filled areas, is a northwards flowing, in placed steep sided creek. This creek joins with a south-west flowing creek near the north-west corner of the development and is presently diverted beneath the adjacent quarry haul road into the quarry.

The proposed development is located above the breccia/sandstone contact zone (see Figure 1). This contact passes beneath the existing southern playing field along the eastern boundary of the proposed development, before trending westwards beneath the northmost filled area. Hawkesbury Sandstone outcrops on the slope above the eastern side of the development and in the creek bed at the northern end of the site. Although outcrops of breccia are limited, they were observed along the access track which passes through the site, as well as along several of the creek beds.

3.2 Subsurface Conditions

The site can be divided into four zones, with Zone 1 in the south, through to Zone 4 in the north. Reference should be made to Figure 1 to identify the features referred to.

Zone 1

This zone is underlain by sandstone and lies south of the breccia/sandstone boundary which passes NE-SW through the middle of the existing playing field. This zone consists of breccia fill up to about 10 metres thick overlying shallow residual sandy clays over weathered sandstone. No subsurface drainage was provided beneath the fill in this area.

To the immediate south of Chainage 110m, engineered fill is being placed over an area measuring some 2500m^2. Prior to fill placement in this latter area, subsoil drains were installed.

As indicated by borehole 11, the fill consists of a mixture of cobbles and boulders of breccia in a clayey sandy gravel matrix. The breccia boulders range in size up to about 0.5m across. The fines in the matrix are of medium plasticity. The sandstone underlying the fill is typically extremely weathered for approximately the upper 2.5m, below which highly to moderately weathered sandstone occurs.

Zone 2

The second zone extends northwards from Zone 1 to near the access roadway at about Ch250m. In this zone, breccia underlies all but the easternmost part of the fill. Cross-sections at Ch215m and Ch230m given in Figure 4, show the stratigraphy below the playing field area, which consists of breccia fill overlying the natural breccia land surface, again with no subsurface drainage provisions.

It is understood from Hornsby Quarry personnel, that a "key trench", some 1.5m deep and 4.5m wide was excavated along the toe of the batter and backfilled with compacted fill. The dimensions or nature of this trench were not specifically investigated during the recent study.

Downslope of the fill batter, the creek (see Figures 1 and 4) has incised deeply into the weathered breccia, giving steep sides to the creek, with the fill batter and creek slope forming a more or less continuous slope from the top of the fill to the flat floored sandy creek bed. The lower part of the slope exposed in the bank of the creek, consists of extremely to highly weathered breccia.

Zone 3

The third zone extends northwards from the access roadway at about Ch250m to the east-west drainage course located near Ch335m. In this zone breccia underlies all but the easternmost part of the fill. Cross-sections at Ch310m and Ch330m given in Figures 4 and 5 show that up to about 10m of breccia fill overlies about 1.5m of residual sandy clay, before extremely to highly weathered breccia is encountered.

Prior to filling, a natural drainage depression ran from east to west at about chainage 310m (see Figure 1). Fill has been placed over this depression and the watercourse visible now is north of the natural one and marks the northern limit of the filling. It is understood that the drainage course was cleaned "to rock" prior to fill placement, although it has not been possible to confirm this. It is further understood that no attempt was made to provide any subsurface drainage measures in the depression.

The surface material to the west of the existing fill area consists of deeply weathered breccia at the southern end with sandy clay alluvium to the north-west (see Figure 1). The depth of fresh rock, as shown on cross-sections at Ch270 and Ch310, is near RL90m. The alluvium which generally consists of a sandy clay of low to medium plasticity is approximately 1m thick near borehole 41. Underlying the alluvium is a 1.1m thick layer of residual sandy clay which overlies weathered breccia.

Zone 4

The fourth zone comprises the area north of the east-west drainage depression located near Ch335m. This area is located on an east-west trending ridge and is underlain by residual clays overlying weathered breccia. Borehole 43 located on the ridge encountered at least 5.6m of extremely to highly weathered breccia. Borehole 44 on the midslope showed residual soil and EW breccia to 4.5m depth and "rock" strength HW/MW breccia from about 5.5m depth. Borehole 46 at the base of the slope, showed "rock" strength breccia at about 4m depth. Over most of the area, the residual sandy clay layer varies in thickness from about 0.6m to 1.3m.

To the north, in the northernmost gully, sandstone outcrops along the base of the northern drainage gully and to the east sandstone outcrops on the steeper hillside above the proposed playing field (Figure 1). To the west, a broad area of alluvium exists through which the creek has eroded exposing the underlying weathered breccia. Located between the creek and the quarry haul road is a relatively thin ridge of weathered breccia. The slightly weathered to fresh breccia occurs at about RL90m in the quarry as shown on the geological cross-sections.

3.3 Weathered Breccia Condition

In its fresh condition the breccia is very strong. However, the weathered zone is of considerably lower strength and is of great importance to the stability of the proposed fills. It should be noted that the terms moderately weathered (MW), highly weathered (HW), and extremely weathered (EW), used in this text have standard quantitative definitions which are given on Explanation Sheet 1 in Appendix A.

On the sloping parts of the site the uppermost red clay soils are the result of insitu weathering of the breccia. These residual soils are all of soil strength and show little rock structure. Typically these soils are 1 to 1.5m thick and are underlain by extremely weathered breccia.

The extremely weathered breccia has soil strengths but retains rock-like structure and has some pieces of weathered rock. As the depth increases the rock structure becomes more evident and the proportion of rock strength material increases until highly weathered breccia is encountered with essentially rock type strengths. This transition zone is of substantial thickness in the ridges, especially at BH14 at the southern end. In some instances there is an ordered transition. However, at others there are a series of bands of material alternating between extremely and highly weathered material.

3.4 Effective Strength Parameters

3.4.1 General

The materials tested in the laboratory consisted of breccia fill, residual soil derived from breccia, extremely weathered breccia, and extremely to highly weathered breccia. Details of the tests are given in Appendices C and D, and a general discussion of the types of test are given in Section 2.2. above.

The results of all tests are summarised in Table 1 subdivided into the various material types, and the results for each type are further summarised in Figures 6, 7 and 8.

Atterberg limit test results are also given in Table 1 both to assist in characterising the material and by published correlations of the angle of friction with plasticity index, as a check on the results of triaxial and shearbox tests.

3.4.2 Breccia Fill

As described in Section 3.2, the breccia fill consists of brown, clayey sandy gravel matrix with boulders up to about 500mm. The test results show the fine grained portion to be of medium plasticity with a liquid limit in the middle forties, though it is likely that rather more plastic material will occur in some places. The results of the two shearbox tests were similar (see Figure 8) and design values of 10kPa cohesion and 30 degrees angle of friction have been adopted. This angle of friction is somewhat lower than the values of 30 to 33 degrees estimated from the plasticity index. A check was also made for stability assuming cohesionless fill as per sample 1-SE Field.

3.4.3 Residual Breccia Soils

The results of the tests on residual breccia soils are given in Figure 6. These soils are red or red and brown and vary in plasticity from medium to high plasticity with liquid limits as high as 77%, and plasticity indices of 23 to 45, which implies angles of friction of 26 to 29 degrees. The results of the laboratory testing fell into this range for the most part, except for the direct shear test on the block sample from TP1 where it is suspected that a gravel piece affected the test. The test results are closely grouped and a lower quarztile value of 5kPa cohesion and 28.5 degrees angle of friction has been adopted for design.

3.4.4 Extremely and Highly Weathered Breccia

Tests on the extremely (EW) and extremely to highly weathered (EW/HW) breccia were difficult because of the rock-like structure. For this reason a number of large size shearbox tests were undertaken on block samples cut from test pits. There is a gradual change in the ground from the residual soil/extremely weathered breccia to highly weathered breccia, and this is reflected in the substantial scatter of the results. If the results from

TABLE 1

SUMMARY OF EFFECTIVE STRENGTH PARAMETERS

MATERIAL	BOREHOLE	DEPTH	DENSITY t/m^3	M/C INITIAL	c'	Ø'	W_L	W_P	I_P	L.S.
Residual	16	0.8-1.15	1.8	35.7	25	29	71	26	45	10
	26	0.7-1.0	1.83	40.0	11.5	29	66	29	37	17.5
	41	2.3-2.6	2.02	19.1	10	28	38	15	23	10.0
	TP1	0.4	1.99	21.6	0	41				
	BH6	1.5-1.85	2.09	15.0	4	29				
EW	33	0.7-0.95	1.74	30.5	21	20	51	31	20	11.0
	45	0.8-1.15	1.88	27.1	13.5	34.5	49	29	20	10.0
	46	2.4-2.7	1.87	23.3	0	33.5	37	15	22	9.0
	TP11-1	1.2-1.5	2.13	32.0	0	27.0				
	TP11-2	1.2-1.5	2.13	36.4	25	26.0				
	TP11-3	1.2-1.5	2.13	31.30	40	24.0				
	TP1	0.8	1.83	32.5	25	26				
	TP1	0.9	1.88	23.0	80	32				
	TP3	13	1.92	20.0	80	17				
EW/HW	TP10	1.0-1.3	2.20	-	28	39				
Fill	1-SE Field	-	1.96	20.7	0	35	44	22	22	10.5
	2-Stock-pile	-	1.98	19.7	15	29.5	46	24	22	10.5

test pit 10, which was on EW/HW material, are excluded, the lower quartile value is a cohesion of 20kPa and an angle of friction of 25 degrees. This value has been adopted for the general EW rock.

As a check, analyses have been made of existing weathered breccia slopes in the existing quarry. Strengths of the order given above are consistent with the existence of 20 to 30m high slopes at 50 degrees in the adjacent quarry, provided the slope is not subject to water pressures.

At the south end, especially on BH14, the HW and EW material is banded and in this area the average results have been adopted.

For the weaker highly weathered breccia and material marginal between highly and extremely weathered, with a low clay component and which breaks into essentially granular pieces, the values obtained from the material out of test pit 10 have been adopted i.e. c' = 28kPa, Ø' = 39 degrees.

The stronger highly weathered breccia has essentially rock properties and critical failure surfaces would not pass through this material.

3.4.5 Shale Fill

The same values were adopted for shale fill as was used in earlier reports (see Table 2).

3.4.6 Summary of Design Parameters

A summary of properties assumed in the analyses, including densities is given in Table 2.

TABLE 2

SUMMARY OF PARAMETERS FOR STABILITY CALCULATIONS

MATERIAL	COHESION kPa	ANGLE OF FRICTION DEGREES	TOTAL DENSITY TONNES/M^3
Fill	10.0	30.0	2.0
Residual	5.0	28.5	1.95
EW Breccia	20.0	25.0	1.95
EW/HW Banded (south end)	30.0	27.0	1.95
HW Breccia*	28.0	39.0	2.0
Shale Fill	25.0	25.0	2.0

* See text.

4.0 SURFACE AND SUBSURFACE WATER CONDITIONS

4.1 Surface and Subsurface Drainage

The surface runoff from the slope uphill (to the east) of the playing field development is intended to be intercepted by surface drains located along the base of the slope. These surface drains lead to a pipe which runs from about the centre of the site northwards to discharge into the valley to the north of the proposed fill area. It has been observed during wet periods that almost all of the flow from the centre and southern slope disappears south of the drain into the fill.

As noted in Section 3.1, the original landform of the site has been modified with drainage depressions being infilled. In particular, the main east-west drainage depression has been shifted north to its present location.

Following periods of heavy rainfall, seepage emerges from a number of locations throughout the site, particularly near the fill/natural surface interface. Significant flows were noted at the following locations:

- near the toe of the fill batter on the line of the old depression, i.e. at about Ch320. Flows from this area have been measured at 5 litres/sec, approximately 6 hours after rain had stopped;
- emerging along the western toe of the existing playing field, in particular, near Ch215; and
- emerging from halfway along the access road located at the northern end of the playing field. This access road is cut into natural soil on the uphill side over part of its length. The seepage from this particular area, as well as general seepage from along the northern toe of the fill area is presently collected by an unlined drain and led westwards to the north flowing creek.

4.2 Piezometer Readings

Appendix B presents the results of regular monitoring of piezometric levels in 37 boreholes over the period from about mid-December 1989 to mid-March 1990. Since mid-March 1990, piezometric levels have only been recorded at irregular intervals. Also included in Appendix B is a plot of rainfall registrations for the period of regular monitoring.

The rainfall readings are for Wahroonga, obtained from the Bulletin of Daily Metropolitan Rainfall prepared by the Bureau of Meteorology. All rainfall registrations are based on telegraphic reports.

Over the three month monitoring period the highest rainfall events took place on the following days:

Date	Rainfall Registration
5/12/89	39mm
9/1/90	41mm
10/1/90	41mm
5/2/90	188mm
7/2/90	70mm
13/2/90	50mm
25/2/90	46mm

During the month of February 1990 a total of 430mm of rainfall was recorded at the Wahroonga Station.

4.3 Groundwater at Southern End

This section deals with the groundwater conditions at the southern end of the site i.e. Zones 1 and 2 as described in Section 3.2.

Figure 9 shows a diagrammatic representation of the groundwater system at the southern end of the site beneath the playing field. A proportion of the rain falling on the fill runs off as surface water and the remainder seeps into the fill. This water becomes ponded on the old land surface, and it appears that the residual soil is less permeable than the fill or underlying weathered breccia. The ponded water runs along the old land surface, following the old surface gradients, and emerges as seepage along the western and northern toes of the fill. Water levels in piezometers near the fill/residual soil interface showed response to rainfall events, with water ponding up to 2.2m deep over the old surface at BH13, and up to 0.5m deep at BH20. Piezometers at BH10 and BH7 were at levels close to the top of the residual soil, or were in the residual soil but exposed to fill above the old land surface levels near the toe, and these showed peak water levels approximating the old land surface level.

Piezometers actually within the residual breccia soil (BH15, BH17 and BH22) did not show any pore pressures, indicating that in this zone free vertical drainage was occurring.

Some water does penetrate though the residual soil into the extremely and highly weathered rock beneath, and there appears to be a second water table within the highly weathered breccia, with restricted drainage into the fresh rock beneath and also sideways drainage into the creek to the west. The water levels in these materials at the south end are shown in Figure 10 plotted as the depth of the water level beneath the natural surface versus the depth of the base of the piezometer below the natural surface. The plot shows the range of water levels recorded at each location and a study of the time plots show that in dry times between rainfall events the piezometers are often dry or close to it. The piezometers near the toe of the bank (BH9, BH14, BH16 and BH23) show a wide range of readings giving pore pressures up to about 5m head. Piezometers 12 and 19 are beneath the body of the fill and show a smaller response. It appears therefore that rainfall events create a greater flow in the weathered rock, resulting in steeper hydraulic gradients to the creek and a reduction in the unsaturated zone in that area (Figure 9).

The responses to rainfall in the HW rock were not very sharp and it is unlikely that the levels rose significantly above the recorded values. The rainfall in the period of observation was high, but higher could occur. In contrast with earlier work, recent research at the University of NSW with landslide areas, has assessed that correlation of groundwater levels with rainfall events cannot, at this time, be reliably undertaken. A conservative approach must therefore be undertaken.

For design purposes the following assumptions were adopted:

Fill: water level 3m above the natural ground surface below the existing crest and further east, dropping to natural surface level at the existing toe.

Residual Soil: water level as above.

EW rock: natural surface level.

HW rock: natural surface level but with a maximum water pressure of 5m.

These design values assume that the drainage measures described in later sections are implemented.

4.4 Groundwater in the Central Area

This section describes groundwater conditions in the central area, i.e. Zone 3 as defined in Section 3.2. This zone can be further subdivided into two sub-zones consisting of the main old gully which has been filled with up to 15 or more metres of fill, and the "flank" sub-zone which comprises the natural slope between the access road, the base of the existing fill and the creek.

In the "flank" sub-zone, none of the holes showed any water other than water introduced during drilling and this slowly dissipated. This includes BH26, BH32, BH33, BH35 and test pits TP3, 5, 8, 9 and 10. The deepest of these (BH32) extended to 7.1m below natural ground surface level into HW breccia and it is likely that a lower water level exists in the fresh rock as occurs elsewhere.

The main gully sub-zone encompasses the old watercourse which ran from between BH27 and 35, past BH36, 37/38 and passes out just north of BH39/40 and BH41/42 (see Figure 1). BH28 and the group BH29/30/31 are on the sides of the old gully but on the existing fill. The mechanisms at work here are similar to those described for the southern section.

The fill in the gully showed frequent water loss during drilling indicating permeable zones. All piezometers in the fill showed fluctuating water levels, which reached up to about 5m above natural surface near the centre of the gully and rather less at BH28. It is likely that the responses are rapid and the peak levels may not have been recorded. Further, it must be expected that rainfall events will occur in the life of the final construction that may result in greater depths of flow in the fill.

Piezometers in the filled area installed beneath the natural surface in the EW to HW breccia (BH30 and 37) showed very rapid response to the major rainfall event, with piezometric levels reaching 3.3 to 4.5m above the natural surface level, though these were still lower than the levels in the overlying fill. The piezometric level in the fresh rock 30m below the surface in BH29 was about 25m below the natural surface. It is concluded

that the water level in the fill is ponded on the EW/HW breccia in the same way as at the south end, with vertical drainage down to the fresh rock beneath and from there into the quarry.

Downhill from the fill in BH39/40 and BH41/42 there is a water level within the EW/HW breccia but this, too is perched as evidenced by the deep water level in the fresh breccia at BH41, where the water level is about 26m below the natural surface.

In this central area it is feasible to install drainage measures to control the groundwater levels in the fill, and in the design profiles water levels in the fill have been assumed taking into account the drainage measures described in Section 6.

In the weathered breccia, pore pressures can be assumed to drop from that associated with the piezometric head in the fill at the top of the weathered rock, decreasing to zero at a depth of about 10m below.

4.5 Groundwater in the Northern Area

The northern area comprises Zone 4 as described in Section 3.2 above. It's main components are the steep breccia ridge and the alluvial flat beneath.

Underdrainage is again apparent with gradients from the HW breccia down into the fresh rock at both BH44/45 and BH46/47. The water level in the EW/HW breccia in BH47 is actually lower than creek level.

It will also be feasible in this zone to install drainage measures. There will inevitably be some build up of water above the natural surface of the fill, and the water levels in the design profiles have assumed that the drainage measures described in Section 6 are installed.

5.0 STABILITY ANALYSES

5.1 General

The previous analysis presented in report S8463/2-AC, indicated that upper slopes of about 3:1 and a toe berm over most of the western side at 1.75:1. It was also suggested that some modification of the western slope of the existing playing field might be needed.

This section describes, firstly, the results of analyses of the layouts and batters proposed by Council following our earlier report and then examines variations to provide a basis for revised designs.

In judging the acceptablity of designs, a minimum factor of safety of 1.5 has been adopted. This is consistent with the method of choosing the parameters and with conventional practice.

The stability of the proposed development can be considered in five different segments:

- A southern profile which encompasses Zones 1 and 2 as described in Section 3.2. The creek approaches closest to the toe at chainages 170 and 215m, the latter being slightly worse because the creek is lower at that location. The profile analysed corresponds to these sections, but draws on ground data from the full length.
- Ch270 where there will be relatively shallow fill over the residual slope and where it will be difficult to keep water levels low.
- Ch310 where the fill extends close to the existing creek.
- Ch330 where the greatest depth of fill occurs.
- Ch390 where the fill drops over the steep ridge onto the alluvial flat. This also serves to give guidance for the sections further round the ridge on the northern side.

5.2 Stability Analyses - West Facing Slope of Existing Fill

The section chosen for analysis has the profile below the toe of the fill corresponding to the closest approach of the creek. The breccia profile assumed was that found at BH14 which shows banded EW and EW/HW breccia to at least the drilling depth. This is worse than is found further to the north along the toe of the slope.

Figure 11 shows the results of the analysis of the existing circumstance which yielded a factor of safety of 1.31. Figure 12 shows that flattening the upper slope does not substantially improve this situation since it is the lower natural slope which is relatively unstable.

Figure 13 shows the result of adding a rockfill berm against the natural creek bank. The width of the berm at the base was chosen to pick a straight line between the western "ridges" along the creek bank (see Figure 31). This resulted in a factor of safety of 1.45 with the existing fill slope.

Figure 14 shows the result of flattening the upper slope to 1:2.5. This shows an acceptable factor of safety even when the additional fill was placed to the required design level.

Figures 16 and 17 show analyses corresponding to a cohesionless fill ($c' = 0$, $\emptyset' = 35$ degrees) and a clay/shale fill ($c' = 25$kPa, $\emptyset' = 25$ degrees). Both have acceptable factors of safety.

As noted, these analyses represent the situation as at BH14 for the strength of the breccia at the toe of the slope. If the moderately weathered and highly weathered breccia with rock properties occurs at a depth of about 5m at the toe of the fill slope, as is the case at BH16 and BH21, then the stability of the lower slope is not an issue. However, a similar slope is required in the fill as shown in Figure 15.

There are two locations where the bank steepens. If it can be shown that material with rock strength properties occurs in the breccia bank at high levels then no action is required for the lower slope. If this is not the case then the two hollows in the breccia bank should be filled with rockfill, as discussed in Section 6.8.

5.3 Stability Analyses at Central Drainage Depression

This section is based on the data at chainage 330m and represents the area with the greatest height of fill. The initial analysis is shown on Figure 18. The lower slope gave a factor of safety which was marginally too low. A second analysis, which is shown on Figure 19, gave acceptable factors of safety for an upper and lower slope of 2:1 with a 15m berm.

Two checks with alternative fill properties are given in Figures 20 and 21. Both showed acceptable factors of safety.

5.4 Stability Analyses Opposite Northern Ridge

Figure 22 shows the results of analysis of the present design slope at chainage 390m which is on the point of the northern ridge. The analysis indicated that there was an inadequate factor of safety for the lower slope which had only a thin veneer of fill over it.

Figure 23 shows the result of maintaining the lower slope at 1.75:1 but moving it westwards, together with an upper slope steepened to 2:1. The analysis indicated that while the upper slope had a reasonable factor of safety, the lower slope needed further flattening.

Figure 24 shows the result of flattening the lower slope to 2.5:1 and maintaining the upper slope at 2:1. This gave satisfactory results for the lower slope but the toe of the upper slope was brought close to the weaker residual soils and has an inadequate factor of safety.

Figure 25 shows the analysis of a slope with a 2.5:1 lower slope and a 2.25:1 upper slope, both of which showed acceptable factors of safety.

As a further check, three non circular analyses were undertaken of the same configuration and these are shown in Figures 26, 27 and 28, all of which show acceptable factors of safety. One of these (Figure 27) models the effect of provision of a sand drainage blanket.

Figures 29 and 30 show analyses for granular and shale fill, both of which show acceptable factors of safety except for the lower slope on Figure 29 (F of S = 1.44) which considers purely granular fill. This highlights the need to avoid shallow fills over steep residual slopes and in future layouts, rather more cover should be provided.

5.5 General Conclusions from Stability Analyses

The analyses above indicate that, with the exception of the western facing slope of the existing playing fields, the slopes can be steepened from 3:1 to those described for the various sections.

Remedial works for the west slope of the existing playing field involve flattening the existing slope to 2.5:1 and, depending on mapping, a rockfill support of the slope to the creek.

6.0 DRAINAGE MEASURES AND CONSTRUCTION PROVISIONS

6.1 Surface Drainage

Stability of the proposed fill is critically dependent on the provision of surface and subsurface drainage measures.

It must be recognised that the placement of fill over natural watercourses above the edge of an operating quarry is an inherently difficult and potentially dangerous undertaking, unless done in a carefully controlled manner.

Control of surface and subsurface drainage and close attention to fill quality will be essential.

If ever the drainage systems become inoperative, for example by blocking of drains above the slope, the potential exists for a flow slide to develop and hence ongoing maintenance is essential.

The surface drainage must prevent ponding of surface water and allow rapid runoff so as to reduce infiltration of water into the fill. Drainage at the rear (eastern) side of the site is inadequate in its present form and must be modified to divert surface water into the drain system. It will, as a minimum, be necessary to provide a concrete cutoff wall to rock along the western side of the lowest section of the N/S catch drain, near chainage 280m on the eastern side of the present access road, to divert the water which now enters the fill and, in the same location, to provide a lined drain to carry concentrated flows direct to the main drain (Figure 11). In addition, all entrances must be substantially upgraded and provided with measures to prevent blockage.

To reduce infiltration into the fill it is essential that the final design surface provide positive and effective surface drainage back from the crest of the fill slope into lined drainage systems.

As a further measure, the final 1m of fill, excluding topsoil, is to be clay fill compacted to 100% of standard compaction. The purpose of this is to provide a relatively impermeable seal to the top of the fill. If services are planned which might penetrate this layer, than the layer should be deepened.

Surface drainage should be designed to cope with flows greater than usual and must prevent ponding of water near the crest of the fills in a 1 in 100 year event.

It has not been feasible to measure accurately all the observed seepages at the site, except for the major flow from the old central drainage depression, where 5 l/sec was measured some 6 hours after rain. The E-W drain at the toe of the existing fill (CD on Figure 31) flows at up to a litre or two per second.

The drainage has been designed by allocating catchment areas to each drain, taking conservative infiltration rates, and sizing them to accept flow rates for the 1 in 50, 12 hour duration storm.

6.2 Subsurface Drainage, Southern End

The layout and cross sections of subsurface drainage are shown on Figures 31 and 32. In the area of the eastern portion of the existing playing field there are stormwater drainage pipes which must be checked to see if they can sustain the additional loading from the weight of the additional fill and if not they must be modified to take the load or removed and other provisions made for surface drainage.

A subsoil drain should be provided at the base of the existing sandstone cuttings to the east of the playing field over the length of the cuttings where fill is to be placed against them (AN in Figure 31). Where the drain is placed on rock, the filter cloth should be omitted from the base of the drain. For protection, these should be filled over to a depth of 0.5m by sandy clay or gravelly sand fill as obtained from the adjacent quarry. These subsoil drains should be drained into the overall drainage system to the north and also linked to the new drains placed beneath the southern extension to the fill.

In areas where the sandstone cutting shows weathering or fracturing, vertical drainage wicks should be placed and joined into the horizontal drains. Wick drains should be Mebra wick drain 7007 or similar, fastened to the rock face. Alternatively, sand could be placed locally against the face, as has been done in the southernmost area. The locations of such drains should be decided by geotechnical viewing of the exposed faces. If the fill extends higher, additional contour and local drains will be required. The extent of these should be determined on site.

The seepage from the fill currently emerges at the western toe of the embankment. As noted in Section 4.3, this water is ponded on the residual soil. Deep excavation for drains is undesirable since this would encourage water to enter the underlying EW to HW rock and this would adversely affect the creek bank stability. Nevertheless, it is important to lead the seepage water away from the top of the creek bank, and hence a drain (ABC in Figure 31) is proposed to catch the emergent seepage and lead it away from the slope. The drain should be connected at it's northern end to the EW drain (DC on Figure 31) along the existing access road, and at its southern end to the outlet constructed for the new section of fill. To get

the required falls of 1%, it may prove necessary to provide other outlets leading to the creek in some locations and this is best determined on site at the time of construction. It will be essential to construct this drain in sections not longer than 5m and each section must be backfilled immediately after excavation because of the danger of causing instability in the overlying slope.

6.3 Subsurface Drainage, Central Area

The subsurface drainage measures proposed for this portion are typically as set out below. However, because the slopes are liable to alteration, this scheme can be considered as a general outline only and some further detailing will be required as the slopes are finalised and some aspects will be best finalised onsite as the work progresses.

- A drain along the southern side of the existing access road to intercept seepage from the existing fill (DC on Figure 31). An open drain currently exists in this area and it is intended that this drain be cleaned out and a subsurface drain installed as shown on Figure 31. A sand blanket 0.5m thick should also be placed up the existing slope to RL123m to lead emergent seepage into the drain, and the outlet of the drain should be led to the creek to the west.

- A drain along the southern side of the existing fill to intercept seepage from the slope above down to the creek (EF on Figure 31). This could probably share a common outlet to that above.

- Drains from the depressions above E on Figure 31, these were described in our letter dated 21st June 1990.

- A drain from point E along the existing creek line to the new central drain.

- A new central drain excavated to the old creek level as shown in Figure 31 from Q to O.

- A layered drain in the area of the existing alluvium, extending south as an underdrain to the existing access track. This rockfill drain is protected by graded sand filters above and below, and it has to be of high capacity to transmit the flows from the old creek area. The detail in the toe area will require further attention since the conceptual drawing of the fill outline results in an unusual arrangement in portions of the toe where it comes very close to the north south creek. If the stripping exposes relatively permeable fractured rock, a bitumen seal must be sprayed onto the surface to inhibit water flow into the rock below.

- Blanket drains immediately above the residual soil on the steeply sloping northern ridge.

6.4 Subsurface Drainage, Northern Area

The decision has still to be made as to whether the creek is to be piped in this area or not. Because of the steep natural slope, there are problems associated with the placement of a thin veneer of fill down it. For the option where the creek is piped and the fill is carried across to the northern bank, the extension of the pipe must have incorporated in the design a subsurface drain with a graded gravel surround. In the area where the fill extends up onto the opposite bank it is possible that the drainage blanket over the residual soil may be deleted. This will depend on the actual layout of fill batter slopes, since as discussed in Section 5, thin veneers of fill over such steep slopes should be avoided. Detail design of drains in this area is not feasible until the slope design is finalised.

6.5 General Subsoil Drain Detail

It is recommended that a non-woven needle punched geotextile be used as the filter cloth, such as BIDIM U34 or similar. Where the base for a drain is uneven, a sand layer should be used to provide an even bed for the fabric.

Drainage gravel should consist of durable 20mm stone satisfying the requirements for concrete aggregate. It should contain no more than 2% by weight finer than 5mm. Sand bed material must have less than 5% passing 75 microns.

Graded filter drain material for use in the alluvial area should also satisfy the durability for concrete aggregate and to the grading shown in Figure 34. The rock component of the drain may be sandstone provided it is checked and found to be sufficiently durable. Not all sandstone will satisfy this requirement, even when fresh.

If desired, graded filters may be used elsewhere to replace filter cloth.

At the exits of the main drains, a perforated pipe should be placed back into the drain for 5m and an outlet structure should be built at the end of the drain as in Figure 33. These structures are to facilitate cleaning to prevent blocking of the outlets.

6.6 Staging and Construction

Prior to placement of fill on the natural surface, all vegetation and topsoil should be removed and the surface graded to an even slope. Care must be taken not to excavate through the residual soils. This is to reduce the flow of water through to the lower fractured rock aquifer. Excessive water into this aquifer could affect the stability of the adjacent quarry.

The fill should be placed in layers and compacted to a minimum density ratio of 95% by standard compaction. The stability calculations assume the strength of either ripped sandstone or clay/shale fill compacted to this density, and failure to maintain this minimum standard will endanger stability. For the same reason, other forms of fill should not be used

without further consultation. Density tests to check fill compaction should be undertaken in accordance with the publication "Guidelines for the Specification and Testing of Earthworks" prepared by a sub-committee of the Australian Geomechanics Society. In addition, periodic effective strength tests should be done on the actual fill used to check design assumptions.

The staging of construction must be managed such that:

(a) surface water is diverted around and away from the fill and the subsurface drains. Falls of 2% should be maintained on the general fill surface to promote runoff; and

(b) the disposition of more permeable (e.g. sandstone) and less permeable (e.g. clay) fill must be organised so that water cannot build up within the permeable material. In particular, the placement of more permeable fill behind (i.e. further from the toe) impermeable fill must be avoided. If necessary, additional subsurface drainage should be provided to drain permeable zones in the fill.

The main central drain should be constructed prior to filling and be covered by 1m of fill to protect it from erosion.

Similarly, the edge of drainage blankets must not be left exposed after placement since otherwise they will feed water into the drainage system.

Monitoring of groundwater levels and flows from the outlets of drains should be undertaken on a regular basis.

6.7 Western Facing Fill Slope at Southern End

As noted in Section 5.2 above, it will be necessary to provide a rockfill berm to stabilise the creek bank at approximately chainages 170m and 215m. It is therefore recommended that:

a) A slot be cleared at the centre of each of the "hollows" and the condition of the breccia logged. If rock strength breccia is not evident over most of the depth of the slope, then a rockfill berm should be constructed as in b).

b) The slope should be cleared of brush and timber by cutting them off at ground level, but no attempt should be made to remove the roots or any grass cover. The alluvium at the base for the width of the berm, which will vary from 0 to approximately 7m, should be stripped. The berm should then be constructed with a slope of 1.5:1 against geofabric laid up the natural slope. The rockfill should be from 75mm up to a maximum size of approximately 500mm (see Figure 33).

The existing and future fill slopes should be flattened to 2.5:1.

7.0 CONCLUSIONS

The additional work has shown that conditions at the site are for the most part somewhat more favourable than was assumed to be the case after the initial work. For this reason, steeper slopes can be used and the slopes concluded from the analyses described in Sections 5.3 and 5.4 may be used as a guide to develop new layouts. Attention should be given to the problems inherent in having thin veneers of fill over the breccia slopes. This occurs with the present design on the northern ridge and also in the vicinity of chainage 310m. With the steeper slopes now available it should be possible to avoid these occurrences.

For the same reason, it is likely to be advantageous to carry the fill at the northern end across to the opposite side of the east west running creek.

It is not known what is intended along the eastern boundary and further advice should be sought concerning this area.

The western facing slope of the existing playing field requires remedial action as described in Sections 6.2 and 6.7

It is recommended that once a new layout is devised, further consultation should occur and possibly some further stability analyses will be needed.

For and on behalf of
COFFEY & PARTNERS PTY LTD

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used*:

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage,* to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

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A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT *

Final boring logs are developed by geotechnical engineers based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report* prepared or authorized for their use. Those who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by The Institution of Engineers Australia, National Headquarters, Canberra, 1987.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist geotechnical engineers' liabilities onto someone else. Rather, they are definitive clauses which identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. Your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, ASFE has developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

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0788/3M

APPENDIX A

APPENDIX A

BOREHOLE LOGS AND EXCAVATION LOGS

S8463/3-AG
18th July, 1990

LIST OF BOREHOLES

BOREHOLE NUMBER	CO-ORDINATES E	N	COLLAR RL (m)	DEPTH (m)	PIEZOMETER DEPTH (m)
9	308553.1	1269731.6	118.4	5.8	4.8 - 5.8
10	308553.3	1269732.8	118.9	3.0	2.5 - 3.0
11	308599.7	1269765.5	130.7	20.75	14.75-20.75
12	308601.0	1269765.7	130.7	6.5	6.0 - 6.5
13	308600.7	1269764.6	130.7	3.0	2.15- 3.0
14	308558.9	1269771.5	117.7	8.85	7.85-8.85
15	308559.0	1269773.2	117.7	3.0	2.5 - 3.0
16	308561.5	1269811.9	115.2	8.8	7.8 - 8.8
17	308561.7	1269813.7	115.0	2.0	1.5 - 2.0
18	308623.0	1269837.2	129.8	63.0	60.0-63.0
19	308625.2	1269836.9	129.8	11.2	9.2 -11.2
20	308623.5	1269835.1	129.9	6.8	6.6 - 6.8
21	308565.7	1269849.9	113.6	35.3	32.3-35.3
22	308565.0	1269851.9	113.5	2.0	1.5 -2.0
23	308565.4	1269848.7	113.6	9.1	7.6 -9.1
26	308562.8	1269879.0	111.0	5.9	4.9 -5.9
27	308671.1	1269911.4	114.3	7.3	4.4 -6.9
28	308624.8	1269910.2	113.3	7.25	4.5 -7.0
29	308587.4	1269919.9	112.8	42.52	37.5-42.5
30	308588.5	1269921.2	112.8	14.10	12.8-13.8
31	308589.5	1269922.5	112.8	7.25	5.4 -6.4
32	308560.5	1269926.4	105.2	7.1	6.05-7.05
33	308560.8	1269927.9	104.8	2.05	1.55-2.05
34	308543.0	1269924.6	102.5	2.2	1.7 -2.2
35	308668.0	1269934.36	112.9	5.0	3.2 -4.2
36	308638.0	1269935.8	113.3	5.0	4.0 -5.0
37	308606.9	1269938.6	112.8	17.1	15.6-17.1
38	308605.2	1269938.1	112.9	10.0	8.9 -9.9
39	308553.2	1269954.6	97.5	4.1	3.6 -4.1
40	308554.6	1269953.7	97.5	2.85	1.8 -2.8
41	308534.7	1269971.8	94.9	33.0	30.0-33.0
42	308534.5	1269972.9	94.9	3.35	2.7 -3.2
43	308635.8	1270001.6	118.2	5.65	4.9 -5.6
44	308578.8	1270007.8	104.7	32.35	26.95-31.95
45	308579.7	1270006.2	105.0	7.5	6.4 -7.4
46	308551.8	1270020.6	93.5	27.9	24.9-27.9
47	308551.7	1270018.1	93.4	3.5	2.0-3.5

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descriptive terms soil and rock

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Explanation Sheet 1

SOIL DESCRIPTIONS

Classification of Material based on Unified Classification System (refer SAA Site Investigation Code AS1726–1975 Add. No. 1 Table D1).

Moisture Condition based on appearance of soil

dry	Looks and feels dry; cohesive soils usually hard, powdery or friable, granular soils run freely through hands.
moist	Soil feels cool, darkened in colour; cohesive soils usually weakened by moisture, granular soils tend to cohere, but one gets no free water on hands on remoulding.
wet	Soil feels cool, darkened in colour; cohesive soils weakened, granular soils tend to cohere, free water collects on hands when remoulding.

Consistency based on unconfined compressive strength (Qu) (generally estimated or measured by hand penetrometer)

term	very soft	soft	firm	stiff	very stiff	hard
Qu kPa		25	50	100	200	400

If soil crumbles on test without meaningful result, it is described as **friable.**

Density Index (generally estimated or based on penetrometer results).

term	very loose	loose	medium dense	dense	very dense
density index I_D %	15	35	65	85	

ROCK DESCRIPTIONS

Weathering based on visual assessment

term	criterion
Fresh:	Rock substance unaffected by weathering.
Slightly Weathered:	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Moderately Weathered:	Rock substance affected by weathering to the extent that staining extends throughout whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Highly Weathered:	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and signs of chemical or physical decomposition of individual minerals are usually evident. Porosity and strength may be increased or decreased when compared to the fresh rock substance, usually as a result of the leaching or deposition of iron. The colour and strength of the original fresh rock substance is no longer recognisable.
Extremely Weathered:	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.

Strength based on point load strength index, corrected to 50 mm diameter - Is(50) (refer I.S.R.M., Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1). (Generally estimated: x indicates test result).

classification	extremely low	very low	low	medium	high	very high	extremely high
Is (50) MPa		0.03	0.1	0.3	1	3	10

The unconfined compressive strength is typically about 20 x I_{S50} but the multiplier may range, for different rock types, from as low as 4 to as high as 30.

Defect Spacing

classification	extremely close	very close	close	medium	wide	very wide	extremely wide
spacing m		0.03	0.1	0.3	1	3	10

Defect description uses terms contained on AS1726 table D2 to describe nature of defect (fault, joint, crushed zone, clay seam (etc.) and character (roughness, extent, coating etc.).

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graphic symbols soil and rock

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Explanation Sheet 2

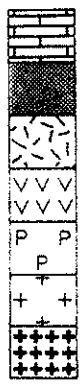
SOIL

Asphaltic Concrete or Hotmix
Concrete
Topsoil
Fill
Peat, Organic Clays and Silts (Pt, OL, OH)
Clay (CL, CH)
Silt (ML, MH)
Sandy Clay (CL, CH)
Silty Clay (CL, CH)

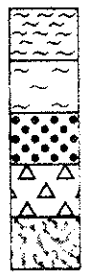
Gravelly Clay (CL, CH)
Sandy Silt (ML)
Clayey Sand (SC)
Silty Sand (SM)
Sand (SP, SW)
Clayey Gravel (GC)
Silty Gravel (GM)
Gravel (GP, GW)

ROCK

Claystone (massive)
Siltstone (massive)
Shale (laminated)
Sandstone (undifferentiated)
Sandstone, fine grained
Sandstone, coarse grained
Conglomerate



Limestone
Coal
Dolerite, Basalt
Tuff
Porphyry
Granite
Pegmatite



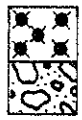
Schist
Gneiss
Quartzite
Talus
Alluvium

SEAMS

Seam >0.1 m thick
(on a scale 1:50)
Seam 0.01 m to 0.1 m thick
(on a scale 1:50)

INCLUSIONS (Special purposes only)

Rock Fragments
Swamp



Ironstone Gravel, Laterite
Shale Breccia in Sandstone

Water Level

Surfaces —— Known Boundary — — — Probable Boundary ——?——? Possible Boundary

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COFFEY

borehole no: 9

sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	18.12.89
principal:		hole completed:	18.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308553.1 N 1269731.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 118.4 m
hole diameter:	100mm	bearing:	datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C	5.1.90		118	0			FILL: Gravelly Sandy CLAY medium plasticity, coarse grained, angular, brown				FILL cobbles of Breccia
					117	1			CLAY: medium plasticity, brown				RESIDUAL?
					116	2			SANDSTONE: red brown, medium grained, extremely to highly weathered				EW SANDSTONE
					115	3							
					114	4							EW zone 50mm
					113	5							
					112	6			Borehole 9 Terminated at 5.80m Piezometer at 5.80m, slotted 1m, Sand at 4.90m (1.4m of sand), Bentonite at 4.05m (350mm of Bentonite pellets)				
					111	7							
						8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 10
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308553.3 N 1269732.8

hole commenced: 19.12.89
hole completed: 19.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 118.9 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R			5.1.90		118	1			FILL: Gravelly sandy CLAY medium plasticity, coarse grained, angular, brown				Cobbles of Breccia throughout fill soft zone
					117	2			SANDSTONE: light brown, medium grained, extremely weathered				EW SANDSTONE
					116	3							
					115	4			Borehole 10 Terminated at 3.00m Piezometer at 3.0m, 0.5m slotted, Sand at 2.2m (0.8m of sand), Bentonite at 1.75m (0.45m of bentonite pellets), grout (cement & water) to surface				
					114	5							
					113	6							
					112	7							
					111	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 11
sheet 1 of 4

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308599.7 N 1269765.5

hole commenced: 15.12.89
hole completed: 15.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter:
slope: -90 DEG
bearing:
R.L.Surface: 130.7 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					130	0			FILL: Sandy CLAY, medium plasticity, coarse grained, light brown				FILL, with cobbles and boulders of Breccia
									grey				Breccia boulder
						1			light brown				
					129				grey				Breccia boulder
						2			light brown				
									FILL: Gravelly Sandy CLAY, medium plasticity, coarse grained, angular gravel, brown				
					128	3							
					127								
						4							
					126								
						5			SANDSTONE: red brown, medium grained, extremely weathered				EW SANDSTONE
					125								
						6							White
													Red White Brown
					124	7							
									Continued on Cored Borehole Sheet				
					123	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Coffey & Partners Pty. Ltd.
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COFFEY

borehole no: 11

sheet 2 of 4

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	15.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308599.71 N 126765.45	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	130.7 m		
datum:	AHD		

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
			130	1						
			129	2						
			128	3						
			127	4						
			126	5						
			125	6						
			124	7		Continued from non-core borehole				
NMLC			123	8		SANDSTONE: medium grained, red, brown, indistinct bedding, cross bedded at 30deg	HW MW			JT 30deg PL RO clay coated JT 30deg PL RO clay coated Root fibres at 7.25m

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- * not measured
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

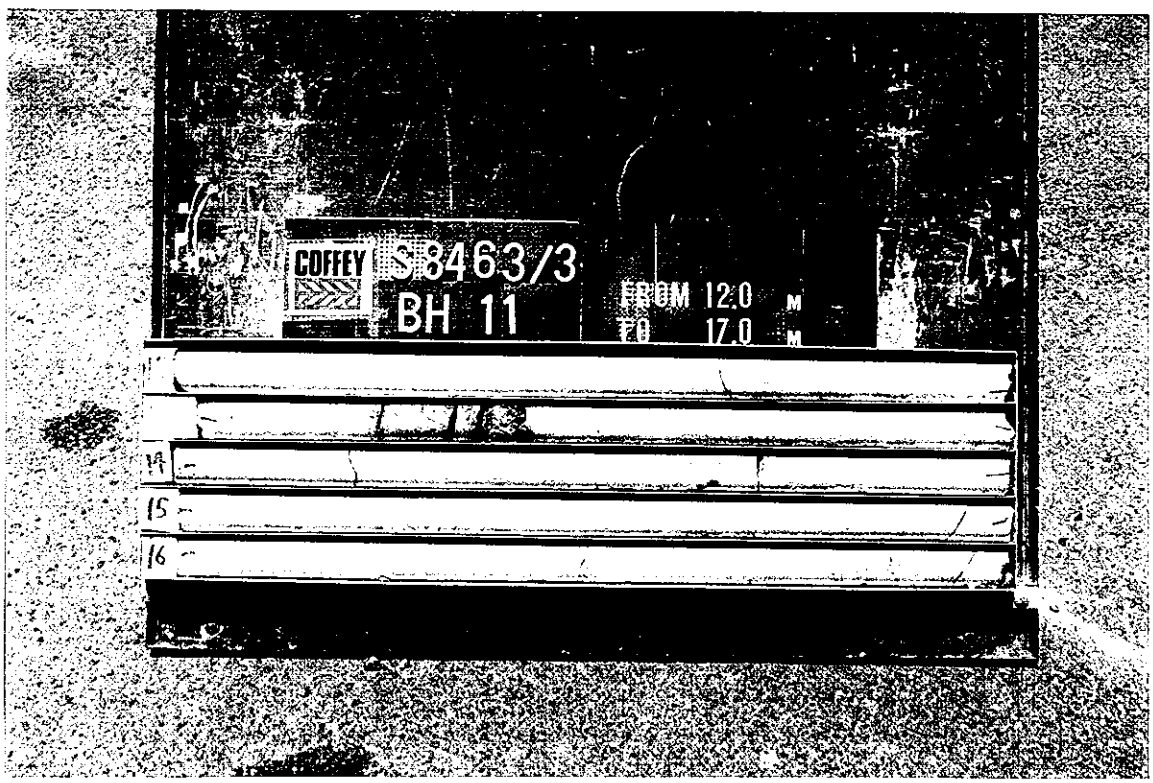
GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular


COFFEY S8463/3
BH 11
FROM 7.2 M
TO 12.0 M


COFFEY S8463/3
BH 11
FROM 12.0 M
TO 17.0 M

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COFFEY

borehole no: 11

sheet 3 of 4

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	15.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308599.71 N 126765.45	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 130.7 m
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing: datum: AHD

drilling information					rock substance				rock mass defects	
method	core lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength; point load test Is(50) MPa	defect spacing mm	defect description: type, inclination, planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			122	9		SANDSTONE: medium grained, red brown, indistinct bedding, cross bedded, at 30deg	MW			JT 30deg PL RO Fe
										JT 60deg PL RO crushed infill
										JT 10deg IR RO clean
			121	10		red yellow				JT 75deg IR RO Fe
										JT 45deg IR RO Fe
										JT 0deg IR RO clean
										JT 45deg PL RO clay coated
			120	11		light grey, grading into cross bedded and random shale laminations	SW			JT 45deg IR RO clay coated
							FR			JT 90deg IR RO clay veneer
										JT 45deg PL RO clay coated
			119	12						JT 0deg PL RO clay coated
										PT 30deg PL RO Shale laminae
			118	13						PT 30deg PL RO Shale laminae
						red brown				JT 0deg PL RO Fe
						light grey	SW			JT 0deg IR RO Fe
							MW			60mm EW zone
			117	14						JT 0deg IR RO clay coated
							FR			
			116	15						JT 0deg IR RO clay coated
			115	16						JT 30deg PL RO clay coated

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- * not measured
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

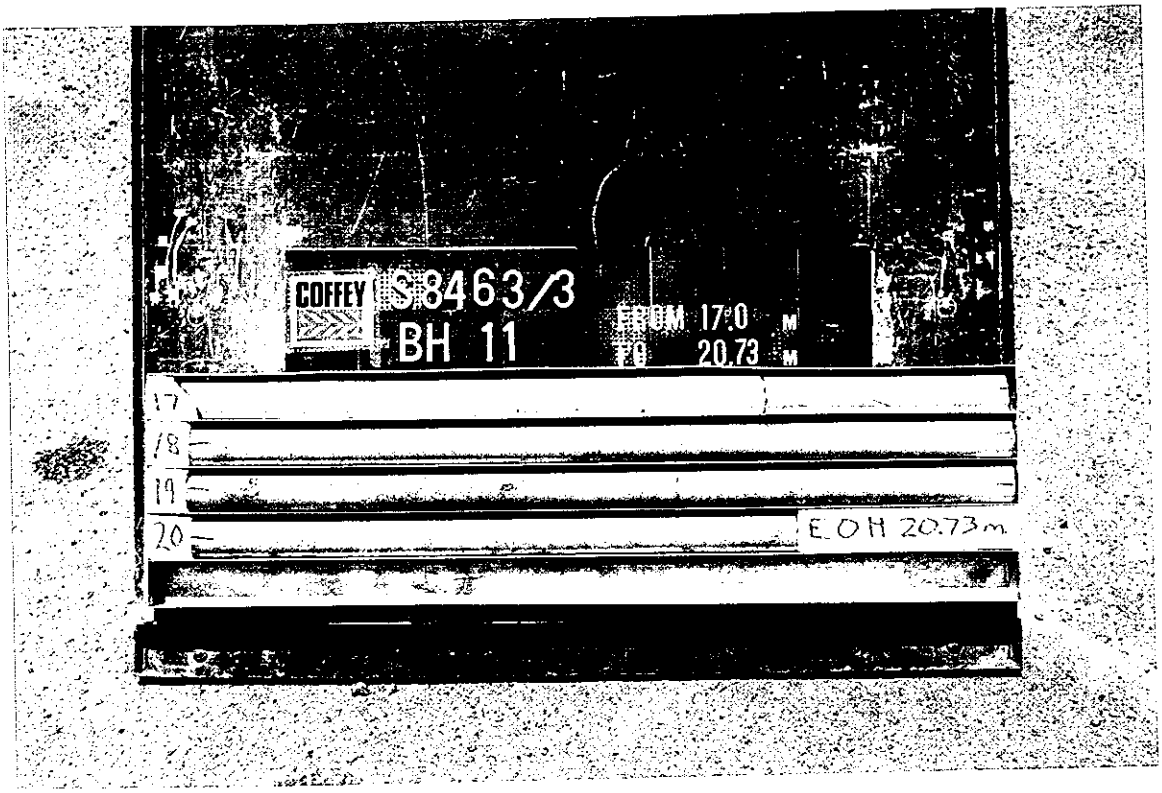
GRAPHIC LOG/CORE LOSS
- core recovered (notching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

187-229


COFFEY
S8463/3
BH 11
FROM 17.0 M
TO 20.73 M
17
18
19
20
E.O.H 20.73m

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Incorporated in Queensland.

COFFEY

borehole no: 11

sheet 4 of 4

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	15.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308599.71 N 126765.45	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L. Surface:	130.7 m		
datum:	AHD		

drilling information					rock substance					rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type, grain characteristics, colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 60 200 600 2000 6000)	defect description: type, inclination, planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			114	17		SANDSTONE: medium grained, light grey, indistinct bedding, cross bedded, at 30deg	FR				JT 10deg PL RO clean
			113	18							JT 30deg PL RO clay coated
			112	19							JT 0deg IR RO clean
			111	20							
			110	21		Borehole 11 Terminated at 20.75 m					
			109	22		Piezometer at 20.70m, 6m slotted sand at 13.8m (6.90m of sand) Bentonite at 13.30m (0.5m of Bentonite tablets) 25 litres of cement/water grout.					
			108	23							
			107	24							

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

- water level
- water inflow
- * not measured

Drilling Water:
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

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Incorporated in Queensland.

COFFEY

borehole no: 12
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	18.12.89
principal:		hole completed:	18.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308601.0 N 1269765.7	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	130.7 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index/exc	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C			130	1			FILL: Sandy Gravelly CLAY medium plasticity, coarse grained, angular brown coarse grained, sand				FILL small Breccia cobbles in clay matrix
					129	2							
					128	3							
					127	4							
				U50	126	5			SANDSTONE: medium grained, orange brown				EW SANDSTONE hard sandstone cap
			5.190		125	6			red				trace of organic material in sample
					124	7			Borehole 12 Terminated at 6.50m Piezometer at 6.50m, 0.5m slotted, sand at 5.45m (1.05m of sand), Bentonite at 4.90m (0.55m of Bentonite pellets) 15 litres of grout (cement & water)				
					123	8							

METHOD
- AS auger screwing*
- AD auger drilling*
- R roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- *bit shown by suffix
- B blank bit
- V V bit
- T TC bit
- e.g. ADT

SUPPORT
- C casing
- M mud

PENETRATION
1 2 3 — no resistance / ranging to / refusal

WATER
- * not measured
- water level
- water outflow
- water inflow

NOTES samples and tests
- U50 undisturbed sample 50 mm diameter
- D disturbed sample
- N standard penetration test:
- N* SPT + sample recovered
- Nc SPT with solid cone
- V vane shear
- P pressuremeter
- Bs bulk sample
- R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
- D dry
- M moist
- W wet
- Wp plastic limit

CONSISTENCY/DENSITY INDEX
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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COFFEY

borehole no: 13
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	18.12.89
principal:		hole completed:	18.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308600.7 N 1269764.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	130.7 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					130	1			FILL: Sandy Gravelly CLAY medium plasticity, coarse grained, angular, brown coarse grained, sand				Fill small Breccia cobbles in clay mixture, grey Breccia
					129	2							
					128	3							
					127	4			Borehole 13 Terminated at 3.00m Piezometer at 3.0m, 0.85m slotted, sand at 1.5m (1.5m of sand), Bentonite at 1.0m (0.5m of Bentonite pellets), 10 litres of grout				
					126	5							
					125	6							
					124	7							
					123	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 14
sheet 1 of 3

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	19.12.89
principal:		hole completed:	19.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308558.9 N 1269771.3	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	90mm	bearing:	
R.L.Surface:	117.7 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					117	1			FILL: Breccia, brown grey				FILL Breccia boulders and cobbles through fill
									FILL: Gravelly Sandy CLAY, medium plasticity, coarse grained, angular, brown				
					116	2			BRECCIA: light orange, extremely weathered				RESIDUAL
					115	3			Coring Commenced at 2.2m				
					114	4							
					113	5							
					112	6							
					111	7							
					110	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION 1 2 3 — no resistance; ranging to; refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230


COFFEY
S 8463/3
BH 14
FROM 2.2 M
TO 6.65 M
BH14
3
4
5
6
CORING CEASED AT 6.65m

Coffey Partners International Pty. Ltd.
Incorporated in NSW

engineering log - cored borehole

COFFEY

borehole no: 14

sheet 2 of 3

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	19.12.89
principal:		hole completed:	19.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308558.9 N 1269771.5	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	117.7 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (50 100 300 1000 3000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
			117	1							
			116	2		Continued from non-core borehole					
NMLC			115	3		BRECCIA: medium grained, brown, with light brown, grains, massive.	EW / HW				EW zone JT IR RO Fe JT fractured zone, 50mm 10mm JT 30deg PL RO CL JT 0deg PL RO CL
			114	4							JT 0deg PL RO CL JT 0deg PL RO CL JT 0 - 30deg IR RO CL JT 30deg PL RO CL, JT 60deg IR RO CL, 2mm JT 75deg IR RO CL JT 75deg IR RO CL 2mm JT 75deg PL RO CL 50mm Clay seam 150mm EW zone
			113	5		BRECCIA: medium grained, brown,	EW				JT 45deg IR RO Fe JT 0deg PL RO Fe JT 0deg IR PL Fe JT 75deg IR RO CL, 2mm 26mm clay seam 100mm jointed zone clay infill 250mm JT zone 0 - 45deg IR RO CL
			112	6							30mm clay seam JT 60deg IR RO Fe 350mm EW zone
R			111	7							ROLLER BIT USED TO 8.85m
			110	8							

General Defect Description:
JT 10mm 0-45deg IR RO CLAY

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 14

sheet 3 of 3

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	19.12.89
principal:		hole completed:	19.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308558.9 N 1269771.5	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	117.7 m		
datum:	AHD		

drilling information					rock substance						rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
R			109			BRECCIA: medium grained, brown, with light brown, grains, massive,	HW				
			108	9		Borehole 14 Terminated at 8.85 m Piezometer at 8.80m, 1.0m slotted sand at 7.35m (1.45m of sand) Bentonite at 7.10m (0.25m of bentonite pellets) up to surface (cement/water).					
			107	10							
			106	11							
			105	12							
			104	13							
			103	14							
			102	15							
				16							

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- * not measured
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 15

sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308559.0 N 1269773.2

hole commenced: 19.12.89
hole completed: 19.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 117.7 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
R					117	1			FILL: Gravelly Sandy CLAY, grey brown				Cobbles and boulders of Breccia with clay fill
					116	2			BRECCIA: extremely weathered, light brown				RESIDUAL
					115	3							
					114	4			Borehole 15 Terminated at 3.0m Piezometer at 3.0m, 0.5m slotted, Sand at 1.95m (1.05m of sand), Bentonite at 1.35m (0.6m of bentonite dust & pellets) grout to surface (cement & water)				
					113	5							
					112	6							
					111	7							
					110	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube

*bit shown by suffix

B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

borehole no: 16
sheet 1 of 2

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308561.5 N 1269811.9

hole commenced: 19.12.89
hole completed: 19.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 115.2 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro-meter kPa 100 200 300 400	structure and additional observations
R				U50	115	0		CH	SANDY CLAY: medium plasticity, coarse grained, red brown				RESIDUAL
					114	1							
						2			BRECCIA: light brown				grading EW, many clay bands
					113	3							
					112	4							
					111	5							grading into HW
					110	6							
					109	7							
					108	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3
no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 16
sheet 2 of 2

engineering log – borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308561.5 N 1269811.9

hole commenced: 19.12.89
hole completed: 19.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 115.2 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index/exc	hand penetrometer kPa 100 200 300 400	structure and additional observations
R			5.1.90		107				BRECCIA: light brown				grading EW, many clay bands
					106	9			Borehole 16 Terminated at 8.8m Piezometer at 8.80m, 1m slotted, Sand at 7.50m (1.3m of sand) Bentonite at 7.40m (0.10m of Bentonite plug)				
					105	10							
					104	11							
					103	12							
					102	13							
					101	14							
					100	15							
						16							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

COFFEY

borehole no: 17

sheet 1 of 1

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	20.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308561.7 N 1269813.7	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	115.0 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro-meter kPa	structure and additional observations
R			5.1.90	U50	115			CH	SANDY CLAY: medium plasticity, fine grained, brown	M	VSt	×	RESIDUAL trace of root fibres
					114	1							
					113	2			Borehole 17 Terminated at 2.00m Piezometer placed at 2.0m, 0.5m slotted sand at 1.35m (0.65m of sand), Bentonite at 1.1m, (0.25m of bentonite pellets).				
					112	3							
					111	4							
					110	5							
					109	6							
					108	7							
					107	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

167-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 18
sheet 1 of 9

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308623.0 N 1269837.2

hole commenced: 15.12.89
hole completed: 20.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 129.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
W R		C			129	1			FILL: Clay, Gravel and Sand some boulders	M	MD D		FILL (Note: Several unsuccessful attempts at U50 samples)
				U50	128	2							
					127	3							
					126	4							
					125	5			FILL: Boulders, Gravel, Sand and Clay				
					124	6							
					123	7							
				U50	122	8		CL	SILTY CLAY: low to medium plasticity, mottled brown and grey, trace of fine sand, some cementation	<Wp	H		EW BRECCIA

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

borehole no: 18
sheet 2 of 9

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308623.0 N 1269837.2

hole commenced: 15.12.89
hole completed: 20.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 129.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					121	9		CL	SILTY CLAY: low to medium plasticity, mottled brown and grey, trace of fine sand, some cementation		H		EW BRECCIA
									BRECCIA highly weathered	M D			
									Continued on Cored Borehole Sheet				
					120	10							
					119	11							
					118	12							
					117	13							
					116	14							
					115	15							
					114	16							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

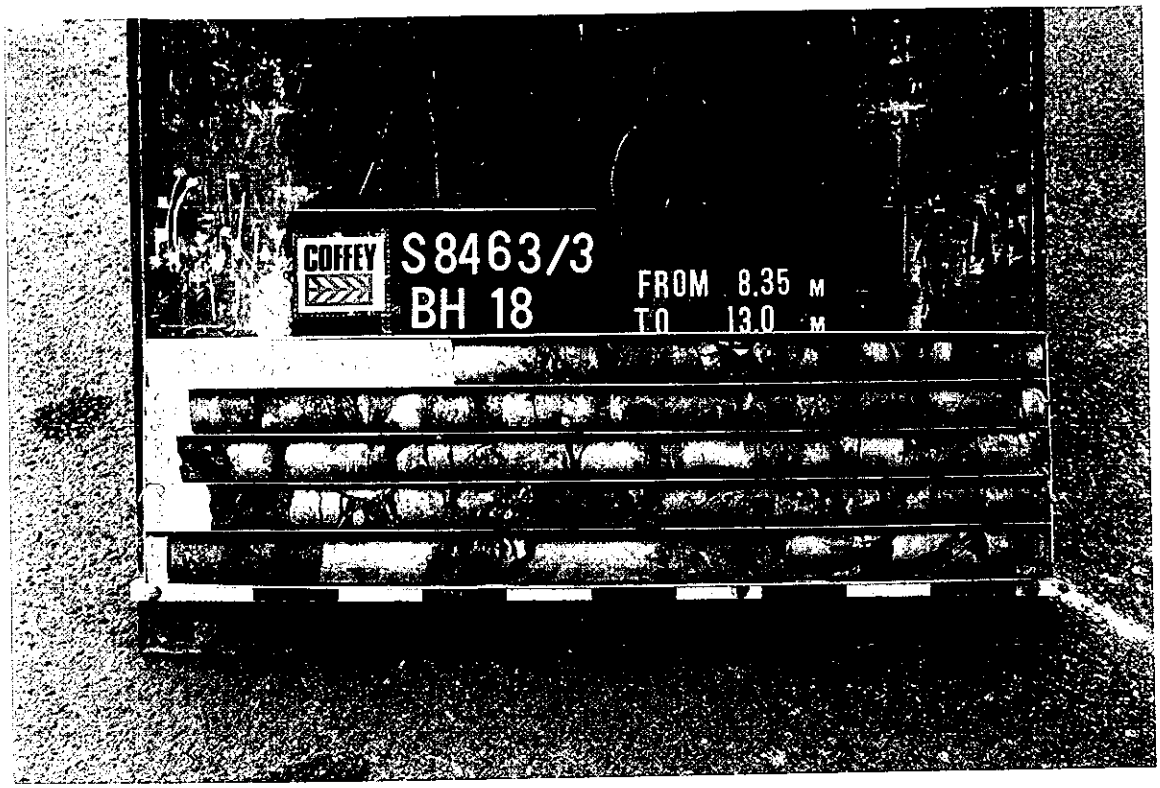
WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense


COFFEY
S8463/3
BH 18
FROM 8.35 M
TO 13.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland

engineering log - cored borehole

borehole no: 18
sheet 3 of 9

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC - 3.0m	fluid: WATER	bearing:
R.L.Surface:	129.8 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
						Continued from non-core borehole					
NMLC			121	9		BRECCIA: fine to coarse grained, brown, indistinct bedding.	HW				crushed SM 25mm thick 8.52 - 8.91 Vertical joint with numerous crushed seams
			120	10							
							EW				10.76 - 11.33m Vertical joint, ironstained with some crushed seams
			119	11							11.36 - 11.57m EW crushed seam
							HW				11.62 - 11.85m JTs 45deg IR RO ironstained & crushed infill
			118	12							12.08 - 12.17m jointed zone, crushed
						BRECCIA: fine to coarse grained, banded light grey, & brown, indistinct bedding.	MW				12.33 - 12.41m jointed crushed seam
							MW				12.56 - 12.90 Vertical JT IR RO, ironstained and crushed infill
			117	13							JT 45deg PL RO ironstained & crushed JTs 60 - 30deg IR RO ironstained
							HW				JT 45deg PL RO ironstained clay/crushed SM 30mm
			116	14							13.77 - 13.91m JT 70deg PL SM ironstained clay/crushed SM, 120mm thick crushed SM, 20deg, 5mm thick crushed SM, 15deg, 12mm thick
							MW				clay/crushed SM, 80mm thick
			115	15							
							HW				EW SM 10mm thick JT 90deg IR RO ironstained EW SM 25mm thick EW SM 20mm thick
			114	16			MW				JT 45deg PL RO ironstained

General Defect Description:
Partings, 0-20deg PL to IR generally Fe stained to 44m

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

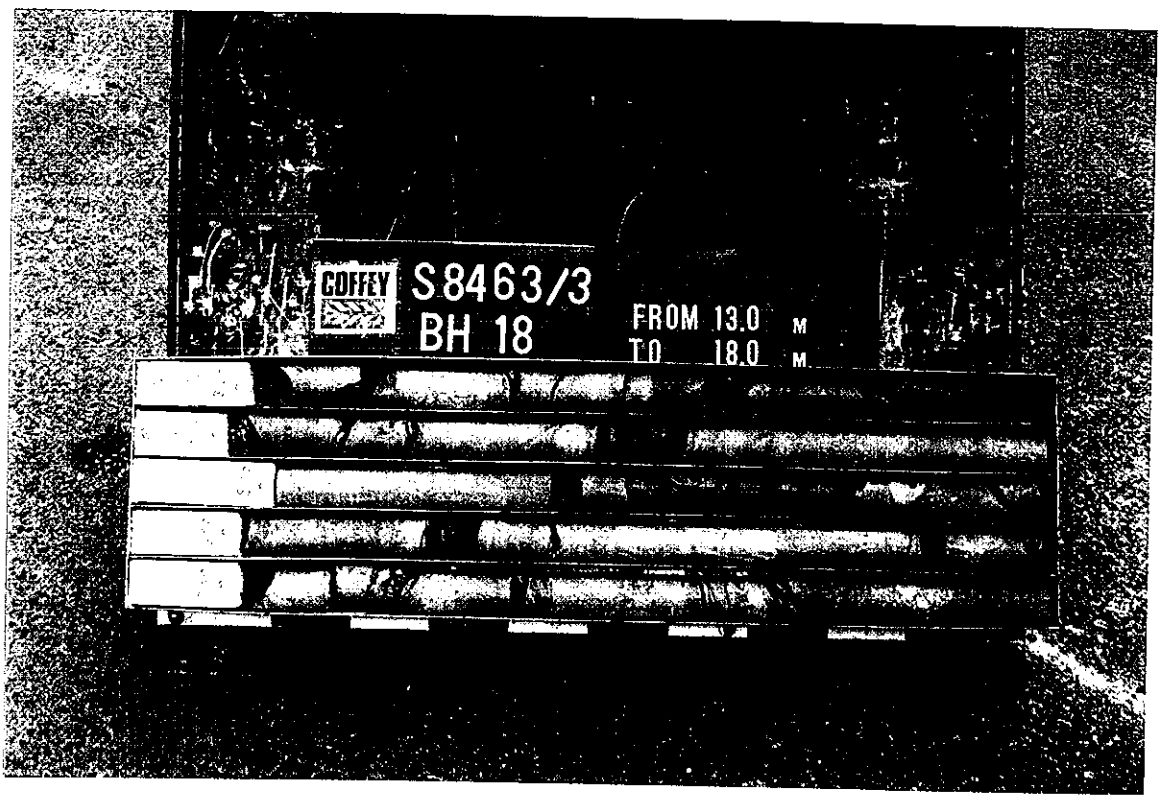
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 18
FROM 13.0 M
TO 18.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 18
sheet 4 of 9

engineering log - cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308623.0 N 1269837.2

hole commenced: 15.12.89
hole completed: 20.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC - 3.0m
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 129.8 m
datum: AHD

drilling information					rock substance				rock mass defects	
method	case-iiit	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	defect spacing mm 30 100 300 1000 3000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			113	17		BRECCIA: fine to coarse grained, banded light grey, & brown, indistinct bedding,	MW				crushed SM 20mm thick crushed SM 10mm thick
							HW				crushed SM 25mm thick JT 45deg PL RO ironstained & crushed infill
			112	18			MW				clay/crushed SM 60mm thick JT 35deg IR RO ironstained
							HW				jointed crushed SM 20mm
			111	19			MW				clay/crushed SM 20mm JT 40deg PL RO ironstained JT 60deg IR RO ironstained
											clay/crushed SM 70mm JT 60deg IR RO trace crushed infill JT 50deg IR RO ironstained
			110	20							JT 50deg IR RO ironstained
											JT 50deg IR RO ironstained
			109	21							JT 45deg IR RO ironstained JT 60deg IR RO ironstained & some crushed 19.89 - 20.20 JT 90deg IR RO ironstained & some crushed infill SM 20mm, crushed JT 35deg PL RO crushed infill crushed SM (0deg) 7mm thick
			108	22		BRECCIA: fine to coarse grained, grey, & light grey, some brown, indistinct bedding,	SW				JT 50deg IR RO ironstained JT 60deg PL RO, 10mm crushed and ironstained infill JT 60deg IR RO ironstained
			107	23							crushed SM 30deg 20mm
			106	24							

General Defect Description:
Partings, 0-20deg PL to IR, generally Fe stained to 44m

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

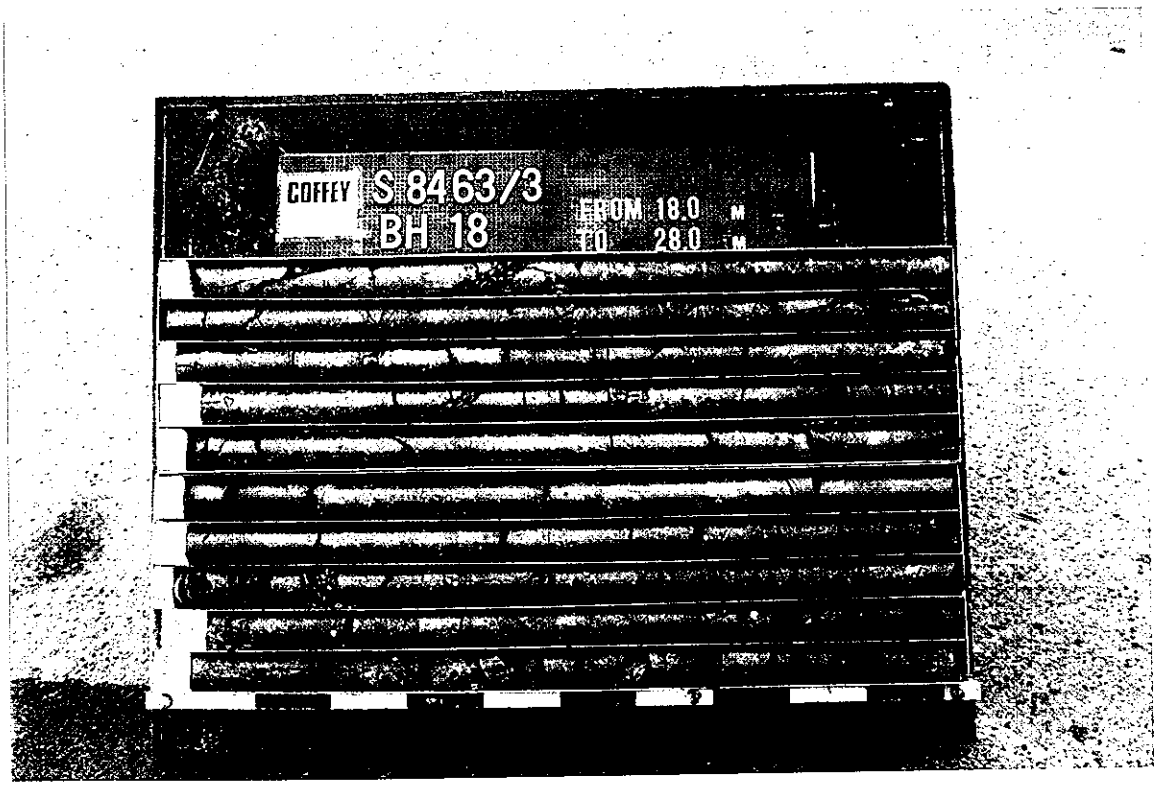
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S 8463/3
BH 18
FROM 18.0 M
TO 28.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 18
sheet 5 of 9

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 129.8 m
barrel type and length:	NMLC - 3.0m	fluid: WATER	bearing: datum: AHD

drilling information					rock substance			rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength	point load test Is(50) MPa	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			105	25		BRECCIA: fine to coarse grained, grey, & light grey, some brown, indistinct bedding.	SW				crushed SM 50mm crushed SM 50mm
			104	26							
			103	27							
						BRECCIA: fine to coarse grained, brown, & grey, indistinct bedding.	HW				27.33-27.69 numerous JTs 30-60deg ironstained with crushed & clay infills
			102	28			MW				JT 60deg IR RO ironstained & crushed infill 28.24-28.38 JT 45deg IR RO ironstained & crushed infill
						BRECCIA: fine to coarse grained, grey, & light grey, some brown, indistinct bedding.	SW				
			101	29							
			100	30							Closed JT 75deg IR
			99	31							
			98	32							JT 45deg IR RO trace crushed infill

General Defect Description:
Partings, 0-20deg PL to IR, generally Fe stained to 44mm

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
not measured Drilling Water
partial loss
complete loss

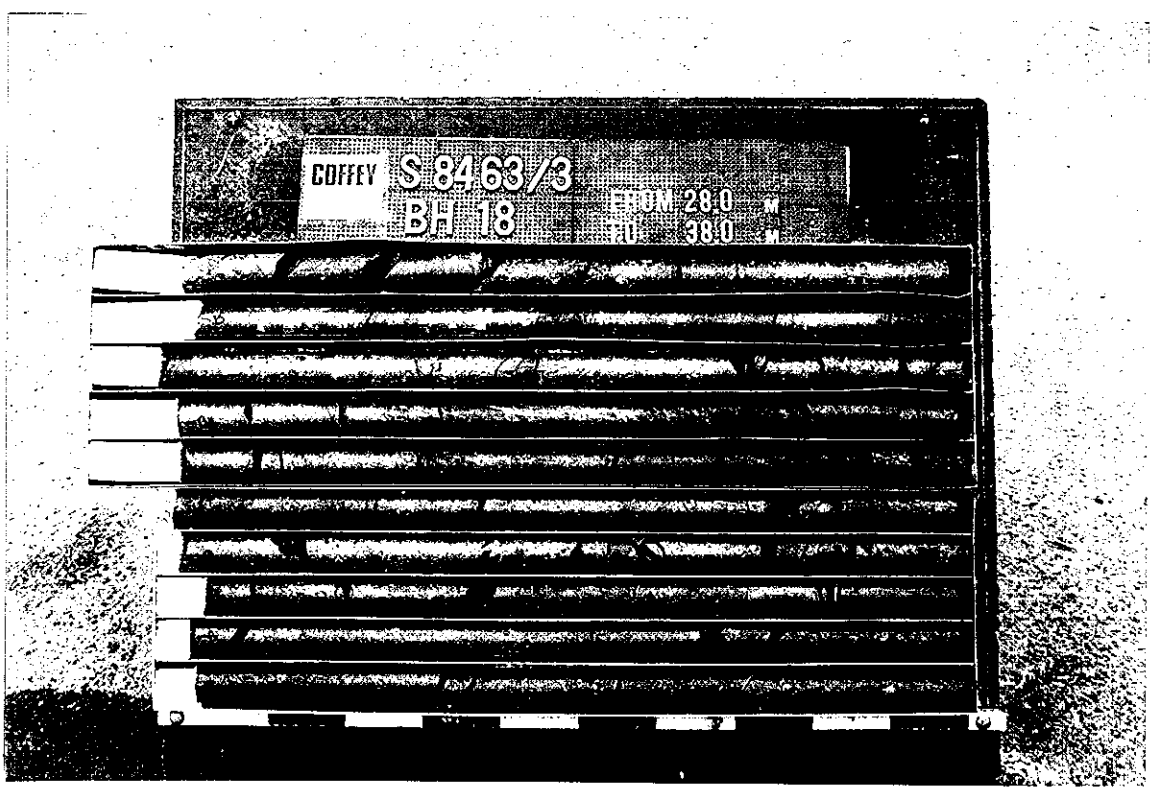
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY S 8463/3
BH 18
FROM 28.0 M
TO 38.0 M

Coffey & Partners Pty Ltd
Incorporated in Queensland

engineering log - cored borehole

borehole no: 18
sheet 6 of 9

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
borrel type and length:	NMLC - 3.0m	fluid: WATER	bearing:
		R.L.Surface:	129.8 m
		datum:	AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics colour, structure, minor components)	weathering	Est. Strength	point load test Is(50) MPa	defect spacing mm	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
NMLC			97	33		BRECCIA: fine to coarse grained, grey, & light grey, some brown, indistinct bedding.	SW				JT 90deg IR RO ironstained JT 60deg IR RO clean clay SM 20deg 10mm thick
			96	34			MW				
			95	35			SW				JT 45deg PL RO ironstained JT 45deg PL RO ironstained crushed SM 50mm thick JT 40deg IR RO crushed infill JT 50deg PL RO ironstained JT 45deg PL RO crushed infill
			94	36							
			93	37							crushed SM (0deg) 10mm thick JT 45deg PL RO crushed infill
			92	38							
			91	39			MW HW				JT 45deg IR RO ironstained JT 45deg IR RO ironstained JT 45deg IR RO ironstained JT 45deg IR RO ironstained 38.70-39.43m JTs 60-90deg, IR RO ironstained and crushed infills
			90	40			SW				39.70 - 40.20m JT 90deg IR RO ironstained

General Defect Description:
Partings 0-20deg PL to IR,generally Fe stained to 44m

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

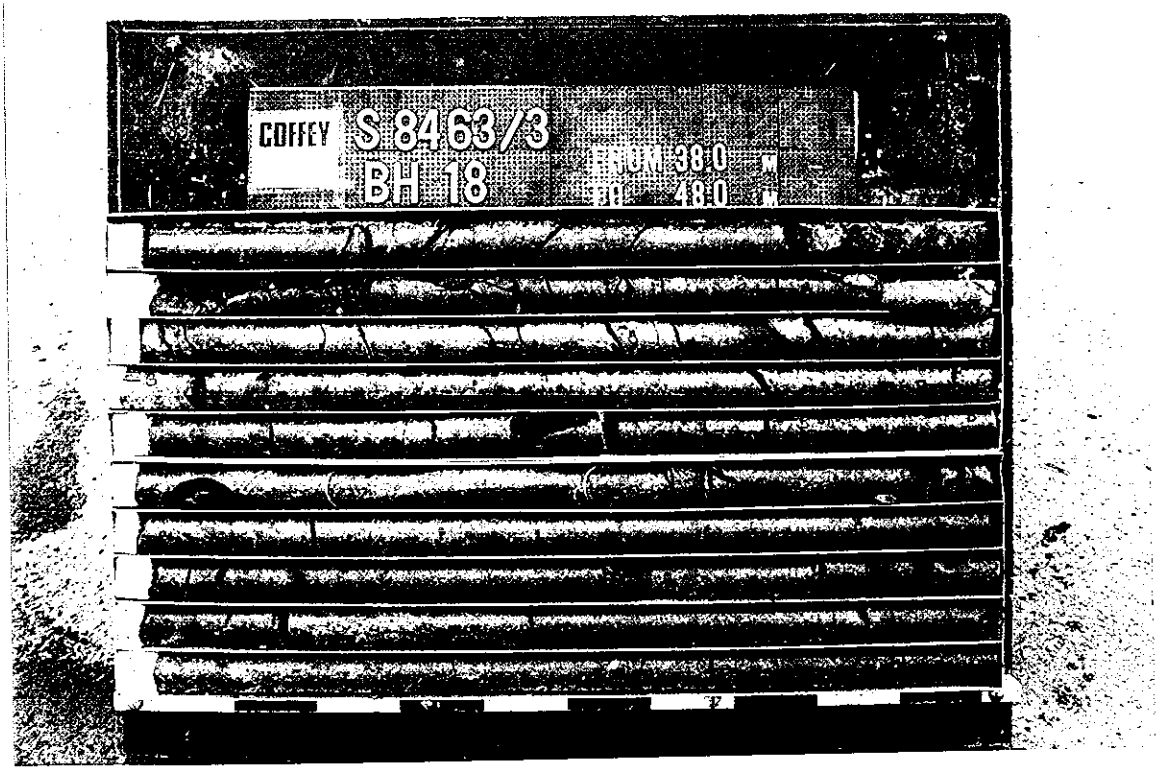
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S 8463/3
BH 18
FROM 38.0 M
TO 48.0 M

Coffey & Partners Pty. Ltd
incorporated in Queensland.

COFFEY

borehole no: 18
sheet 7 of 9

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC - 3.0m	fluid: WATER	bearing:
		R.L.Surface:	129.8 m
		datum:	AHD

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type, grain characteristics, colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH) / point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			89	41		BRECCIA: fine to coarse grained, grey, & light grey, some brown, indistinct bedding.	SW			JT 50deg IR RO ironstained
			88	42						JT 50deg PL RO ironstained JT 60deg IR RO ironstained
			87	43						JT 90deg IR RO ironstained
			86	44		BRECCIA: fine to coarse grained, grey, & light grey, indistinct bedding.	FR			JT 60deg IR RO ironstained crushed SM 30deg 10mm thick
			85	45						
			84	46						crushed SM 15mm thick
			83	47						
			82	48						

General Defect Description:
Partings 0-20deg PL to IR,generally Fe stained to 44m

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

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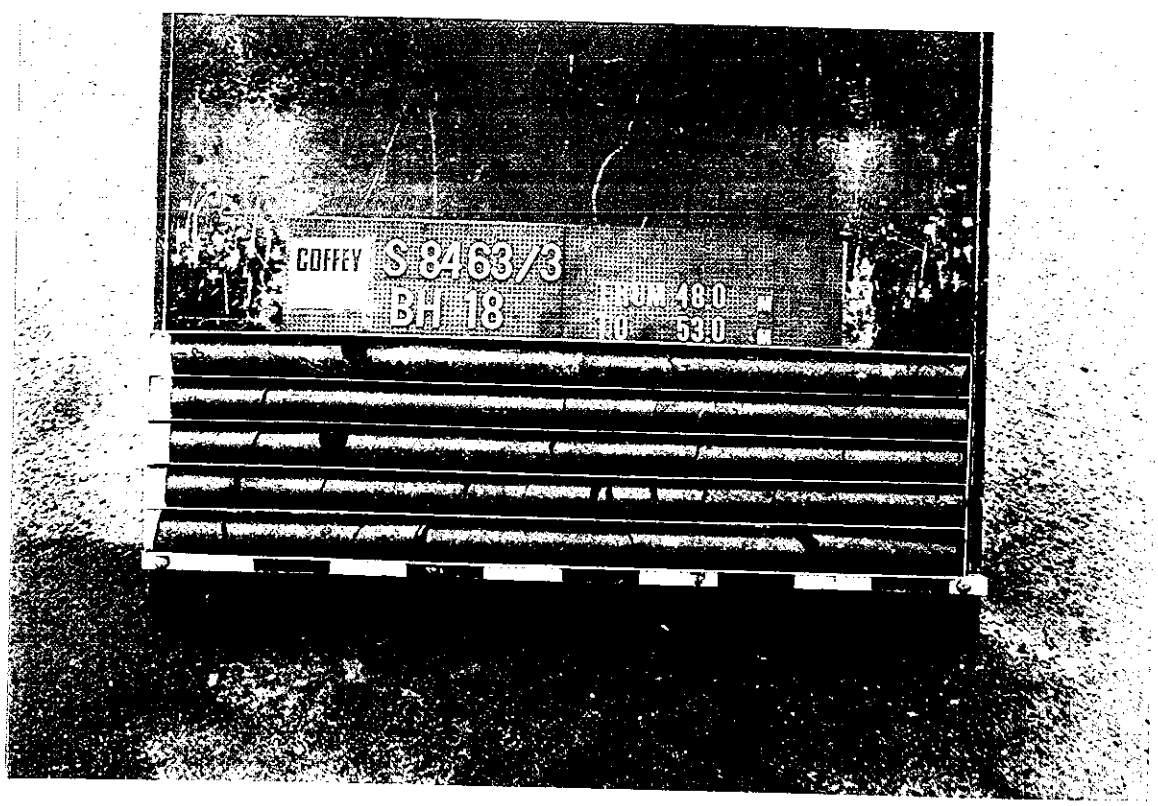
COFFEY
S 8463/3
BH 18

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 18
sheet 6 of 9

engineering log – cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC - 3.0m	fluid: WATER	bearing:
R.L.Surface:	129.8 m		
datum:	AHD		

drilling information

method	case-lift	water	R.L.	depth metres
NMLC			81	49
			80	50
			79	51
			78	52
			77	53
			76	54
			75	55
			74	56

rock substance

graphic log core loss	substance description (rock type: grain characteristics, colour, structure, minor components)	weathering	Est. Strength	point load test Is(50) MPa
	BRECCIA: fine to coarse grained, grey, & light grey, indistinct bedding.	FR	EL VL L M H VH EH	

rock mass defects

defect spacing mm	defect description (type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below)
30 100 300 1000 3000	crushed SM 25mm thick
	crushed SM 30mm thick
	jointed crushed SM 25mm thick
	crushed SM 20mm thick
	JT 50deg IR RO clean

General Defect Description:
Partings 0-20deg PL to IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 18
sheet 9 of 9

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	15.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308623.0 N 1269837.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC - 3.0m	fluid: WATER	bearing:
R.L.Surface:	129.6 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L	depth metres	graphic log core loss	substance description: rock type: grain characteristics, colour, structure, minor components	weathering	Est. Strength	point load test is(50) MPa	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness, unless otherwise noted defects follow general description below
NMLC			73	57		BRECCIA: fine to coarse grained, grey, & light grey, indistinct bedding.	FR				JT 45deg IR RO clean
											JT 60deg PL RO clean
			72	58							crushed SM (30deg) 5mm thick
											crushed SM (30deg) 5mm thick
											JT 45deg PL RO ironstained
											58.07 - 58.30m jointed zone, crushed & ironstained
			71	59							crushed SM 10mm thick
											JT 60deg IR RO clean
											crushed SM 35mm thick
											59.14 - 59.60m Vertical JT IR RO clean
			70	60							
			69	61							JT 60deg IR RO clean
			68	62							JT 45deg IR RO clean
											62.30 - 62.67m Vertical JT IR RO clean
			67	63							
			66	64		Borehole 18 Terminated at 63.00 m Piezometer slotted 3m from 60 to 63m. Sand to 58m, bentonite pellet plug and grout to surface.					

General Defect Description:
Partings 0-20deg PL to IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

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Coffey & Partners Pty. Ltd
incorporated in Queensland.

engineering log - borehole

borehole no: 19
sheet 1 of 2

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	20.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308625.2 N 1269836.9	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	129.8 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					129	1			FILL: Clay, gravel, sand and boulders	M	D		FILL
					128	2							
					127	3							
					126	4							
					125	5							
					124	6							
					123	7		CL	SILTY CLAY: low to medium plasticity, mottled grey brown				EW BRECCIA
					122	8			BRECCIA: highly weathered		VD		HW BRECCIA

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 19

sheet 2 of 2

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	20.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308625.2 N 1269836.9	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	129.8 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type;plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					121	9			BRECCIA: highly weathered	M	VD		HW BRECCIA
					120	10							
					119	11							
					118	12			Borehole 19 Terminated at 11.20m Piezometer slotted 2m from 9.20m - 11.20m, Sand to 7.80m, Bentonite plug to 7.60m				
					117	13							
					116	14							
					115	15							
					114	16							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 20
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	21.12.89
principal:		hole completed:	21.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308623.5 N 1269835.1	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	129.9 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C	5.1.90		129	1			FILL: Clay with boulders and cobbles of Breccia				
					128	2							
					127	3							
					126	4			very hard boulders of Breccia				
					125	5							
					124	6			BRECCIA: extremely weathered				RESIDUAL
					123	7			Borehole 20 terminated at 6.80m Piezometer at 6.6m, 2m slotted, Sand at 4.5m (2.1m of sand), bentonite at 4.35m (0.15m of bentonite pellets)				
					122	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube

*bit shown by suffix

B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

*	not measured
▽	water level
▽	water outflow
▽	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

borehole no: 21
sheet 1 of 6

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308565.65 N 1269849.89

hole commenced: 29.11.89
hole completed: 1.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK MOUNTED
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 113.6 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
ADV					113	0		CH	CLAY: medium to high plasticity, orange brown mottled, trace of gravel, subangular	D M	Fb F		RESIDUAL, root fibres
						1		CH	CLAY: medium to high plasticity, light brown - orange mottled, some gravel, angular		St		trace of root fibres
					112					D	H		V bit refusal at 1.60m
									Continued on Cored Borehole Sheet				
					111	2							
						3							
					110								
						4							
					109								
						5							
					108								
						6							
					107								
						7							
					106								
						8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

WATER
* not measured
water level
water outflow
water inflow

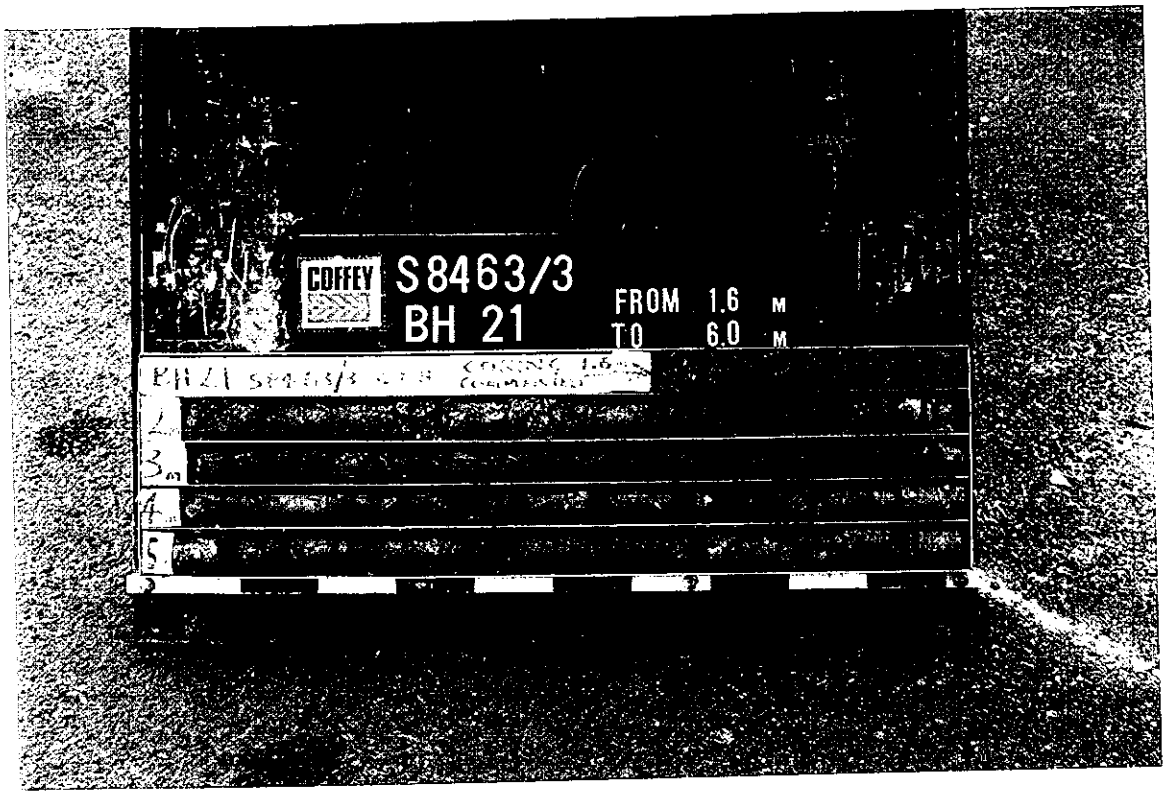
NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

187-230


COFFEY
S8463/3
BH 21
FROM 1.6 M
TO 6.0 M

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

engineering log – cored borehole

borehole no: 21
sheet 2 of 6

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	29.11.89
principal:		hole completed:	1.12.89
project:	OLD MANS VALLEY	logged by:	GJH/SRM
borehole location:	E 308565.65 N 1269849.89	checked by:	PLV
drill model and mounting:	EDSIN 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	113.6 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (0 100 200 600 1000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
			113	1		Continued from non-core borehole					
			112								
NMLC				2		BRECCIA: fine to coarse grained, brown,, indistinct bedding.	EW				Extremely weathered/Residual soil
			111	3		BRECCIA: medium to coarse grained, light brown, to brown,, trace of light grey grains, indistinct bedding.	EW HW				
			110	4							JT 20 PL RO ironstained infill
			109				HW				40mm crushed zone 20mm crushed zone
				5							JT 80deg PL RO crushed zone infill (EW) 10mm crushed zone 5mm crushed zone
			108								70mm crushed zone
				6							100mm fractured zone ironstained JT 60deg IR RO ironstained 25mm fractured zone
			107								50mm crushed zone
				7							30mm EW zone JT 50deg PL, RO, ironstained
			106			BRECCIA: fine to medium grained, light brown, massive, some dark grey, flecks					
				8		NO CORE: 80mm					30mm fractured zone
						BRECCIA: as below					

General Defect Description:
From 3.2m, Defects are joints 0-45deg planar, rough, ironstained

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

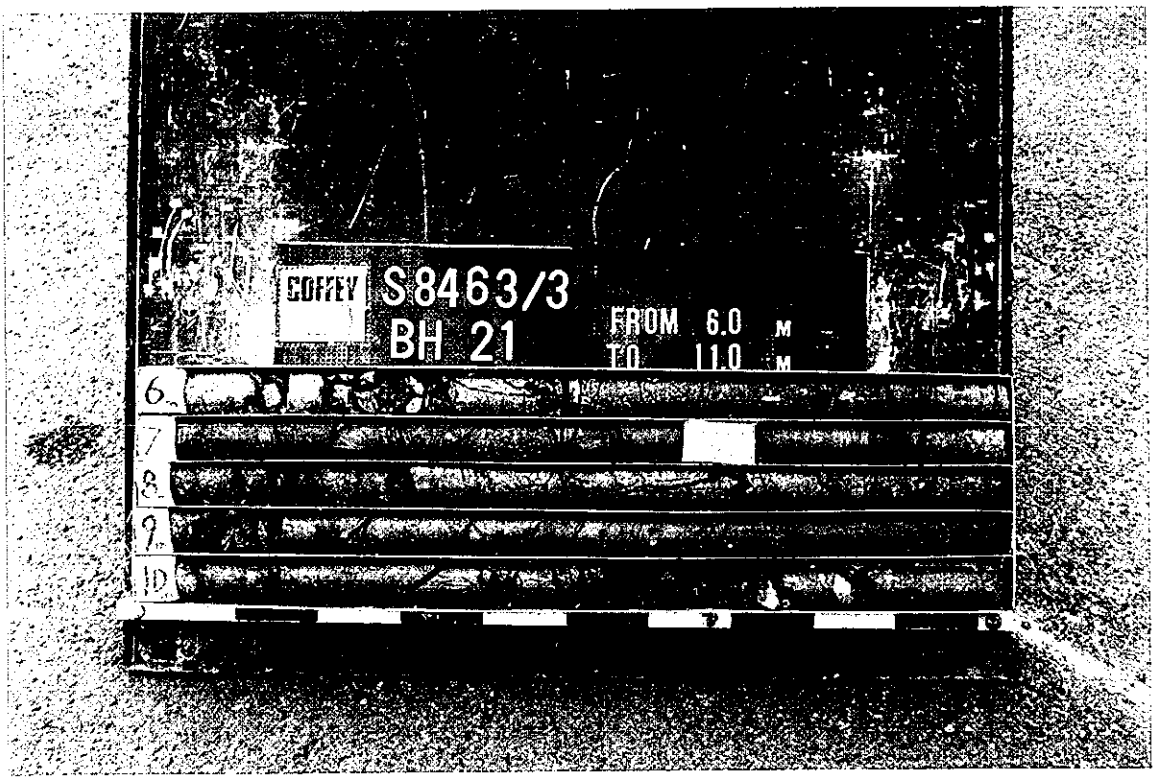
POINT LOAD TEST
D -diametral
A -axial

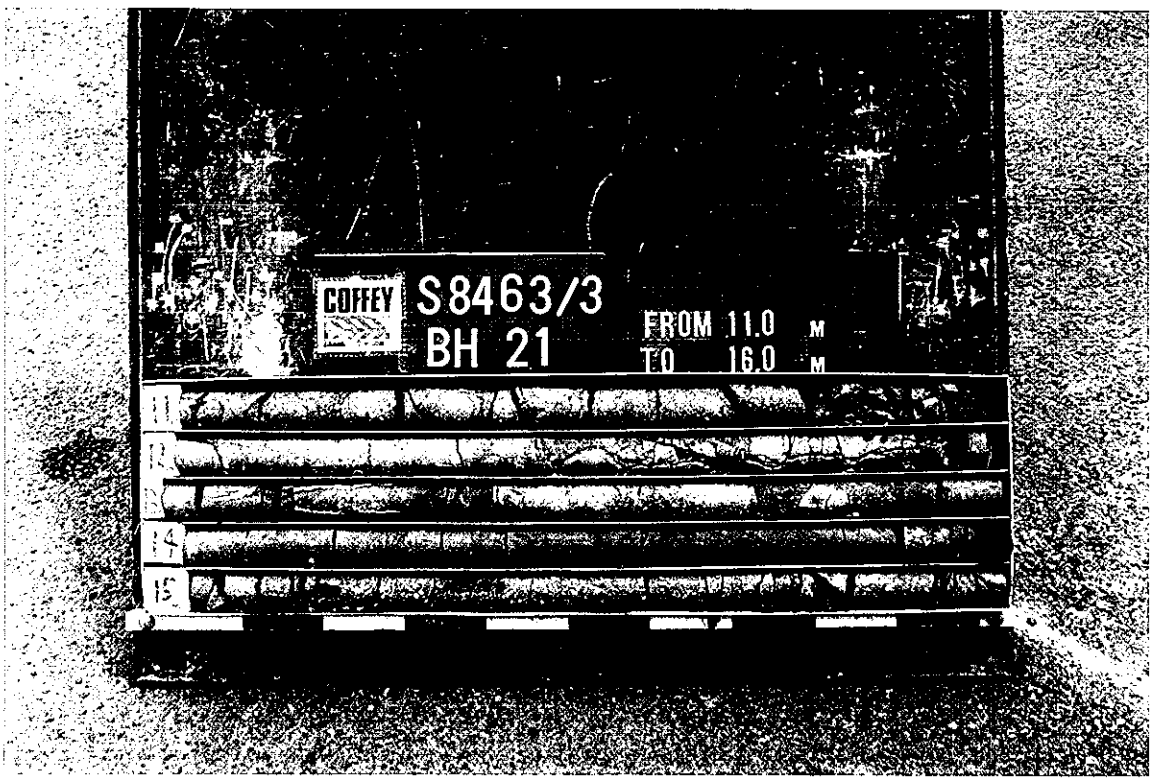
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recoverec

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 21
FROM 6.0 M
TO 11.0 M
6
7
8
9
10


COFFEY
S8463/3
BH 21
FROM 11.0 M
TO 16.0 M
11
12
13
14
15

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 21

sheet 3 of 6

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	29.11.89
principal:		hole completed:	1.12.89
project:	OLD MANS VALLEY	logged by:	GJH/SRM
borehole location:	E 308565.65 N 1269849.89	checked by:	PLV

drill model and mounting:	EDSIN 3000 TRUCK			slope:	-90 DEG	R.L.Surface:	113.6 m
barrel type and length:	NMLC 3.0m	fluid:	WATER	bearing:		datum:	AHD

drilling information | rock substance | rock mass defects

method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength	point load test Is(50) MPa	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			105	9		BRECCIA: fine to medium grained, light brown, massive, some dark grey, grains	HW				50mm jointed fractured zone 30mm EW zone 5mm EW zone JT 80deg IR RO ironstained 30mm EW zone 30mm fractured zone
			104	10							80mm fractured zone JT 30deg PL RO ironstained filled JT 60deg PL RO ironstained 2mm EW zone 100mm JT fractured zone 150mm JT fractured zone
			103	11							JT 30deg IR RO ironstained
			102	12							250mm crushed fractured zone (drilling induced)
			101	13		trace of calcite veining	MW				JT 90deg IR RO ironstained, 0.5m long 50mm crushed zone 15mm crushed zone
			100	14		becoming fine grained					PT 10deg IR RO clean PT 0deg PL RO clean PT 0deg PL RO clean
			99	15		BRECCIA: medium to coarse grained, light brown to light grey, indistinct bedding, some calcite veining					PT 0deg IR RO clean JT 0deg IR RO clean 50mm fractured zone 150 fractured jointed zone JT 90deg IR RO ironstained
			98	16							100mm jointed zone 100mm jointed zone

General Defect Description:
Partings/Joints, 0-45deg, planar, rough, ironstained

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

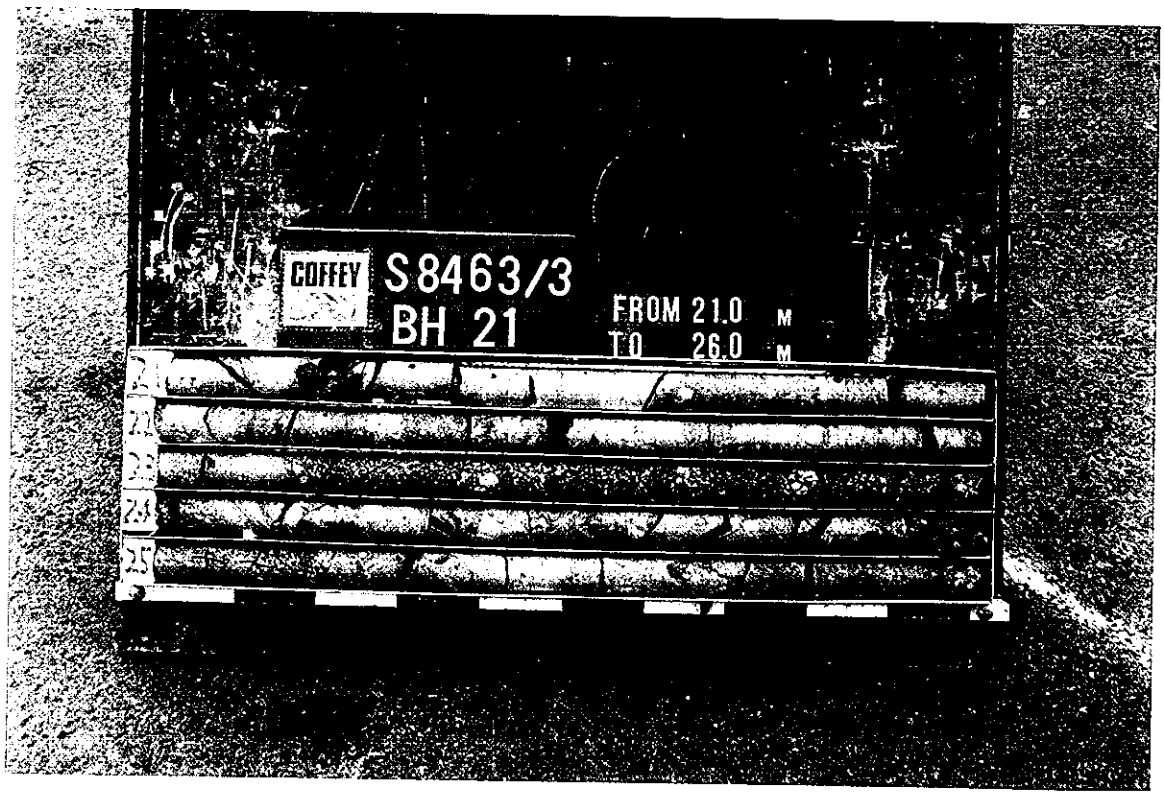
WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

187-229


COFFEY
S8463/3
BH 21
FROM 16.0 M
TO 21.0 M
16
17
18
19
20


COFFEY
S8463/3
BH 21
FROM 21.0 M
TO 26.0 M
21
22
23
24
25

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

engineering log - cored borehole

borehole no. 21
sheet 4 of 6

office job no: S6463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	29.11.89
principal:		hole completed:	1.12.89
project:	OLD MANS VALLEY	logged by:	GJH/SRM
borehole location:	E 308565.65 N 1269849.89	checked by:	PLV
drill model and mounting:	EDSIN 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:

R.L.Surface: 113.6 m
datum: AHD

drilling information					rock substance						rock mass defects	
method	core-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			97	17		BRECCIA: medium to coarse grained, light brown, to light grey, indistinct bedding, some calcite veining	MW to SW				150mm JT IR RO crushed infill
			96			some calcite veining					JT 90deg IR RO clean
				18			HW				150mm fractured, crushed zone 350mm HW zone jointed, fractured
						NO CORE					
			95			BRECCIA: as above	MW to SW				
				19							200mm jointed fractured zone
			94								150mm Jointed fractured zone
				20			SW to FR				5mm crushed seam
			93								Calcite vein at 70deg, 4mm wide
				21							50mm jointed zone
											jointed crushed zone, ironstained
			92			BRECCIA: fine grained, light grey, indistinct bedding.					JT 30deg PL, RO, ironstained
				22		BRECCIA: medium to coarse grained, light grey, to grey, some ironstained joints, indistinct bedding, minor quartz veining					
			91								2mm crushed zone
											PT 0deg PL RO clean
				23							PT 45deg PL RO clean
			90								
				24							

General Defect Description:
Partings/Joints, 0-45deg, planar, rough, ironstained

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

- water level
- water inflow
- * not measured

Drilling Water
- partial loss
- complete loss

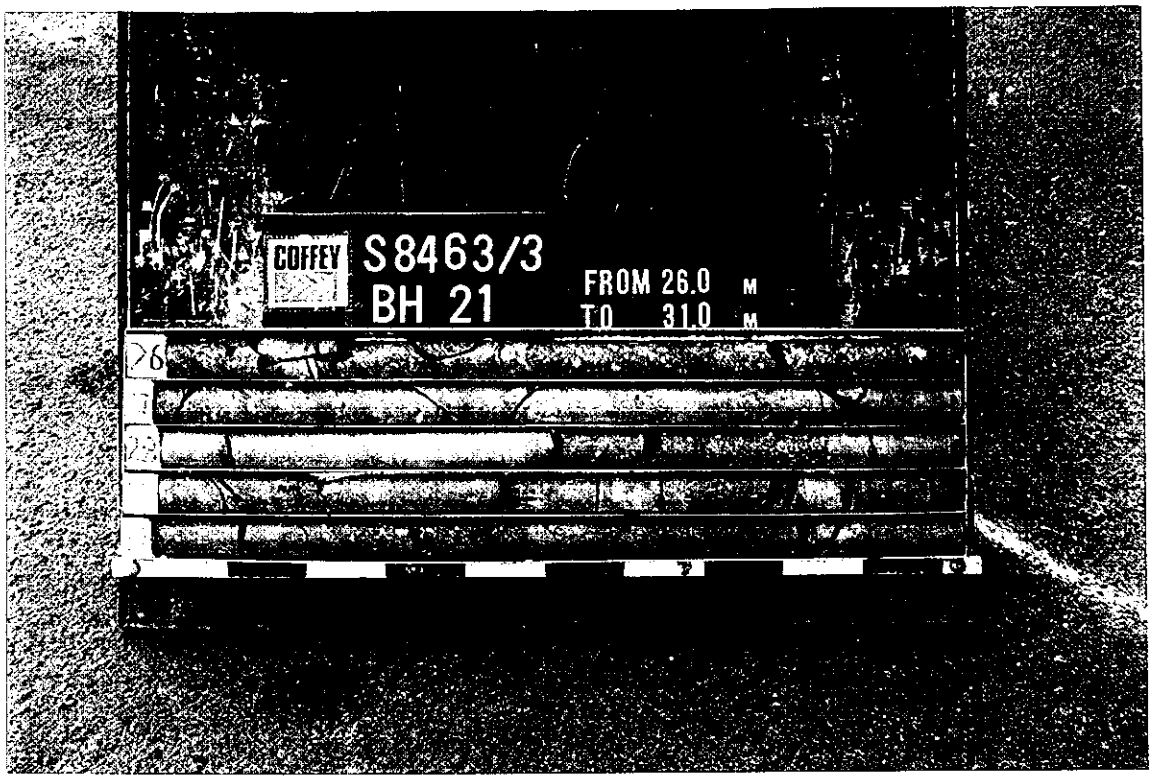
POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular


COFFEY
S8463/3
BH 21
FROM 26.0 M
TO 31.0 M
26

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 21
sheet 5 of 6

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	29.11.89
principal:		hole completed:	1.12.89
project:	OLD MANS VALLEY	logged by:	GJH/SRM
borehole location:	E 308565.65 N 1269849.89	checked by:	PLV
drill model and mounting:	EDSIN 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	113.6 m		
datum:	AHD		

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			89	25		BRECCIA: medium to coarse grained, light grey, to grey,, some ironstained joints, indistinct bedding.	SW				1m JT 15deg PL RO crushed infill
			88								JT IR RO ironstained 40mm jointed crushed zone
				26							JT 10deg PL RO clean
			87								JT 90deg IR RO ironstained
				27							150mm jointed zone ironstained
			86								100mm JT 10 - 60deg IR RO clean
				28							JT 30deg IR RO clean PT 0deg IR RO clean PT 0deg IR RO clean PT 0deg IR RO clean JT 30deg PL RO clean
			85								50mm jointed zone ironstained
				29							JT 20deg PL RO clean
			84			BRECCIA: fine to medium grained, grey, indistinct bedding.	FR				JT 0deg IR RO clean
				30		BRECCIA: fine to coarse grained, grey, - dark grey, thinly bedded, / indistinct bedding, dipping 25 - 30deg.					JT 0deg PL RO clean JT 25deg IR RO clean
			83			BRECCIA: fine to coarse grained, grey, dark grey, indistinct bedding.					broken core
				31							crushed seam 3mm thick
			82			BRECCIA: fine to medium grained, grey, indistinct bedding.					JTs at 5-30deg, ironstained
				32							JT 25deg PL RO Fe JT 45deg PL RO Fe JT IR RO JT 50deg PL RO JT 50deg PL RO calcite closed JT 45deg PL JT 60deg PL RO

General Defect Description:
Partings/ Joints,0-45deg,planar,rough, ironstained

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

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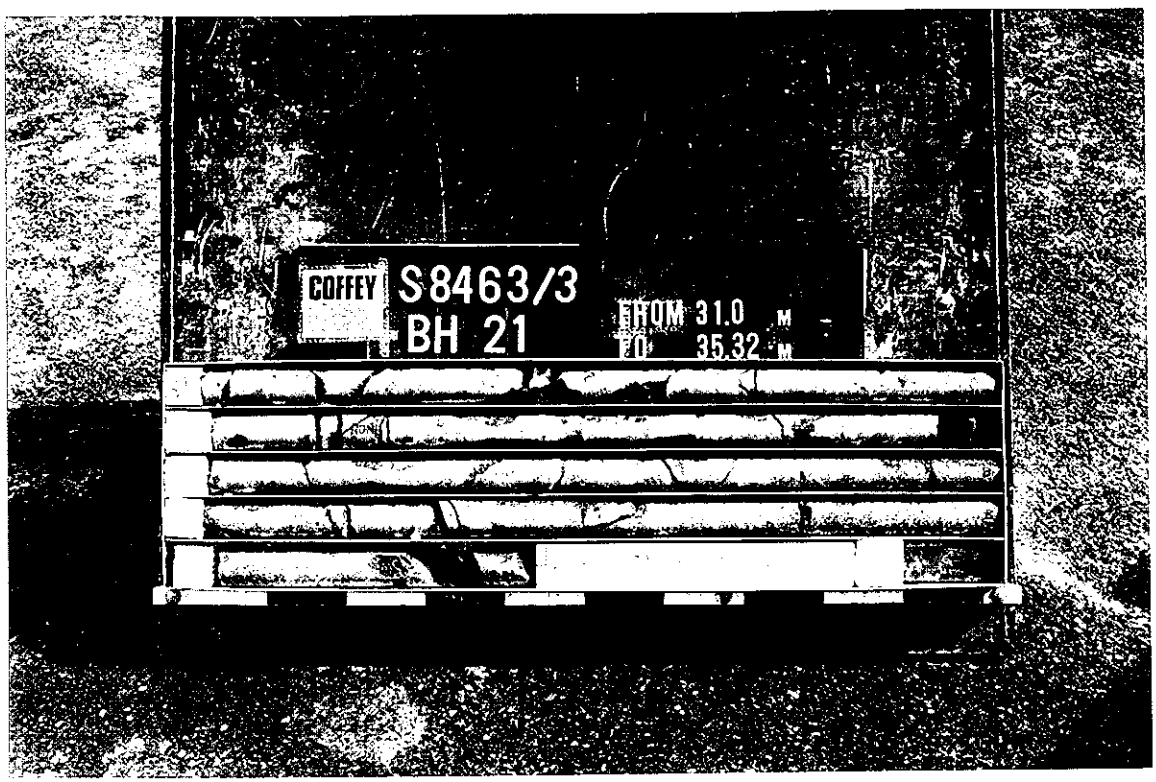
COFFEY
S8463/3
BH 21
FROM 31.0 M
TO 35.32 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 21

sheet 6 of 6

engineering log - cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308565.65 N 1269849.89

hole commenced: 29.11.89
hole completed: 1.12.89
logged by: GJH/SRM
checked by: PLV

drill model and mounting: EDSIN 3000 TRUCK
barrel type and length: NMLC 3.0m
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 113.6 m
datum: AHD

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength point load test Is(50) MPa	defect spacing mm	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			81	33		BRECCIA: fine to medium grained, grey, indistinct bedding.	FR	EL VL L M H VH EH	30 100 300 1000 3000	JT 20deg PL RO Fe JT 15 - 20deg PL RO Fe
			80			BRECCIA: fine to coarse grained, grey, to dark grey, bedding dipping about 45deg				JT 60deg PL RO JT 40deg PL RO
				34						calcite vein <1mm thick IR subvertical 34.0 - 34.3m calcite vein 20deg PL 1mm thick
			79							JT 60deg PL RO calcite
				35						JT 45deg PL RO calcite vein 60deg <1mm thick
										PT 23deg PL
			78	36		Borehole 21 Terminated at 35.30 m Piezometer placed at 35.2m, 3m slotted Sand to 31.8m (3.4m of sand), 50 litres of bentonite, 90 litres of cement/water grout.				
			77	37						
			76	38						
			75	39						
			74	40						

General Defect Description:

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

187-229

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 22
sheet 1 of 1

engineering log – borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308565.0 N 1269851.9

hole commenced: 20.12.89
hole completed: 20.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 113.5 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R				U50	113	1		CH	SANDY CLAY: brown				RESIDUAL trace of root fibres
					112	2							
					111	3			Borehole 22 Terminated at 2.0m Piezometer at 2.0m, 0.5m slotted, Sand at 1.2m (0.8m of sand), Bentonite at 1.05m (0.15m of bentonite), Grout to to surface (cement and water)				
					110	4							
					109	5							
					108	6							
					107	7							
					106	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT ÷ sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Incorporated in Queensland.

COFFEY

borehole no: 23
sheet 1 of 2

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308565.4 N 1269848.7

hole commenced: 1.12.89
hole completed: 1.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK MOUNTED
hole diameter: 88mm
slope: -90 DEG
bearing:
R.L.Surface: 113.6 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L. / depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa	structure and additional observations
R		NIL			113 / 0		CH	CLAY: medium to high plasticity, brown with orange mottled, trace of gravel, sub angular	M	St		RESIDUAL root fibres
					1		CH	CLAY: medium to high plasticity, light brown with orange mottled, some angular gravel				trace of root fibres
					112 / 2			BRECCIA: grading into EW breccia brown grey				
					111 / 3							
					110 / 4							
					109 / 5			HW Breccia grey, brown				
					108 / 6							
					107 / 7							
					106 / 8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 23

sheet 2 of 2

engineering log - borehole

office job no: S6463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	1.12.89
principal:		hole completed:	1.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308565.4 N 1269848.7	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK MOUNTED	slope: -90 DEG	R.L.Surface: 113.6 m
hole diameter:	88mm	bearing:	datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L. / depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
R					105 / 9			BRECCIA: HW, brown grey	M			
					104 / 10			Borehole 23 Terminated at 9.1m Piezometer placed at 9.1m. 1.5m screened, Sand at 7.25m (1.85m of sand), bentonite to surface.				
					103 / 11							
					102 / 12							
					101 / 13							
					100 / 14							
					99 / 15							
					98 / 16							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

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COFFEY

borehole no: 26
sheet 1 of 1

engineering log – borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308562.8 N 1269879.0

hole commenced: 20.12.89
hole completed: 20.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 111.0 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					111				FILL: Breccia boulders				FILL
								CH	SANDY CLAY: medium plasticity, coarse grained, brown				RESIDUAL
				U50									
					110	1			BRECCIA: extremely weathered				grading to EW Breccia
					109	2							
					108	3							
					107	4							MW BRECCIA
													HW BRECCIA
					106	5							
					105	6			Borehole 26 Terminated at 5.90m Piezometer at 5.9m, 1m slotted, Sand at 4.45m (1.45m of sand), Bentonite at 4.15m (0.30m of bentonite pellets) Grout to surface (cement & water)				
					104	7							
					103	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

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COFFEY

borehole no: 27
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308671.13 N 1269911.44

hole commenced: 28.11.89
hole completed: 28.11.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 76mm

slope: -90 DEG
bearing:

R.L.Surface: 114.3 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa	structure and additional observations
R		C			114	0			FILL: Gravelly clay, medium plasticity, angular, light brown, trace of fine sand				Fill, highly variable, large Breccia boulders
						1			becomes dark brown				breccia boulder?
					113				becomes light brown				
						2			grading grey				
					112				grey				breccia boulder?
						3							When reaming hole, water emerged from ground approx. 2m from hole with loss of drill-water.
					111								
						4							
					110								
						5							PVC slotted 2.5m to straddle the section of fill where circulation was lost.
					109								
						6							
					108								very hard
						7							
					107				Borehole 27 Terminated at 7.30m Piezometer placed at 6.9m, 2.5m screened length, sand to 3.95m (2.95m of sand) 0.85m bentonite plug, 6 litres of cement and water grout.				
						8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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engineering log – borehole

borehole no: 28
sheet 1 of 1

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308624.80 N 1269910.16

hole commenced: 29.11.89
hole completed: 29.11.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 75mm
slope: -90 DEG
bearing:
R.L.Surface: 113.3 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					113	0			FILL: Sandy Gravelly CLAY medium plasticity, angular, medium grained, brown	M			Fill, highly variable, clay to fresh breccia boulders
					112	1							
					111	2							
					110	3							
					109	4							wood particles
					108	5			FILL: Clayey SAND medium grained, medium plasticity, grading to sandy clay, yellow		S		complete drill water loss
					107	6							
					106	7			Borehole 28 Terminated at 7.25m Piezometer placed at 7.0m, 2.5m slotted length, sand to 3.55m (3.45m of sand), bentonite at 3.15m (0.4m plug) 6 litres of cement and water grout.				
						8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd.
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COFFEY

borehole no: 29
sheet 1 of 7

engineering log – borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308587.4 N 1269919.9

hole commenced: 4.12.89
hole completed: 7.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 112.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro-meter kPa 100 200 300 >600	structure and additional observations
ADV					112	1			FILL: Sandy gravelly CLAY, medium plasticity, coarse grained, angular, sub angular, brown	M D			Fill, ironstained gravel grey large cobbles and boulders of Breccia
				U50									During drilling water added to bind material
									FILL: Sandy clayey GRAVEL, angular, grey	M			
					111	2			FILL: Sandy gravelly CLAY, medium plasticity, coarse grained, angular gravel, light brown				ironstained gravel
R		C			110	3							V bit refusal (on a cobble or boulder of Breccia)
NLMC		C			109	4							Coring commenced at 4.65m with no core to 5.32m
					108	5			FILL: Breccia cobble, massive, medium to coarse grained, grey and light grey				moderately weathered
					107	6			FILL: Sandstone cobble, massive, fine to medium grained, light yellow FILL: Sandy Clayey GRAVEL, angular, ironstained, highly variable				Breccia, EW/HW grey-light grey
R					106	7							
		C			105	8							Coring recommenced at 7.90m with no core to 8.30m

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 29
sheet 2 of 7

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308587.4 N 1269919.9

hole commenced: 4.12.89
hole completed: 7.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 112.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
NLMC		C							FILL: Sandy Clayey GRAVEL, angular, ironstained, highly variable				Breccia, EW/HW grey-light grey
									FILL: Sandstone cobble, massive, fine to medium grained, light yellow				JT 85deg irregular, rough, clay veneer
					104	9			FILL: BRECCIA EW/HW massive medium to coarse grained.				HW/EW with EW and fractured zones
R													50mm EW zone 50mm fractured jointed zone
					103	10							Drilling water loss and recovery throughout the fill
		C		U50	102	11		CH	SANDY CLAY: medium to high plasticity, fine grained, sand, brown, grey breccia sand size particles				RESIDUAL
					101	12			BRECCIA: grading to EW Breccia				EW BRECCIA
									Continued on Cored Borehole Sheet				
					100	13							
					99	14							
					98	15							
					97	16							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

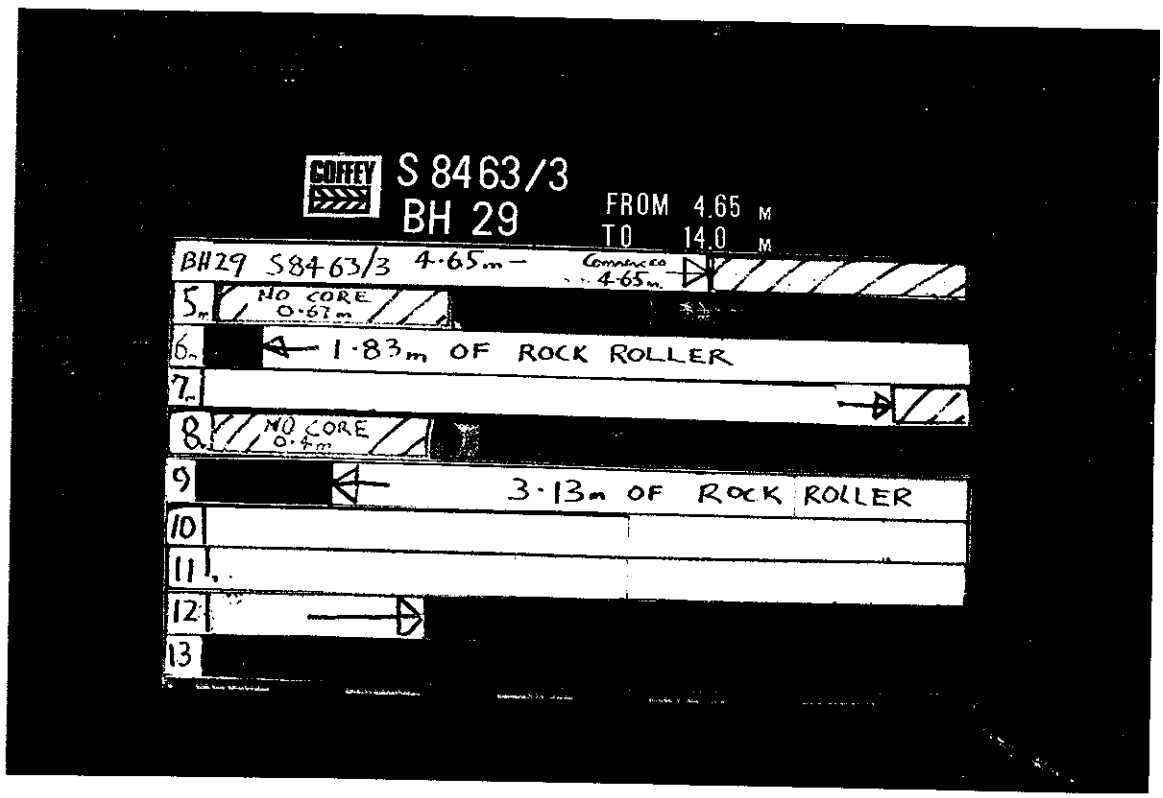
WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense


COFFEY
S 8463/3
BH 29
FROM 4.65 M
TO 14.0 M
BH29 S8463/3 4·65m –
Commenced 4·65m
5m
NO CORE 0·67m
6.
1·83m OF ROCK ROLLER
7.
8.
NO CORE 0·4m
9
3·13m OF ROCK ROLLER
10
11
12
13

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incorporated in Queensland

engineering log - cored borehole

borehole no: 29
sheet 3 of 7

office job no: S8463_3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	4.12.89
principal:		hole completed:	7.12.89
project:	OLD MANS VALLEY	logged by:	CJH
borehole location:	E 308587.43 N 1269919.86	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0	fluid: WATER	bearing:
		R.L.Surface:	112.8 m
		datum:	AHD

drilling information					rock substance				rock mass defects	
method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	defect spacing mm 30 100 300 1000 3000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
			104	9						
			103	10						
			102	11						
			101	12		Continued from non-core borehole				
NMLC			100	13		BRECCIA: medium to coarse grained, grey, with light brown, massive.	HW			50mm fractured, jointed zone
			99	14			EW			
			98	15			HW			J1 0deg IR RO ironstained J1 60deg IR RO ironstained 30mm EW zone 40mm EW zone PT IR RO ironstained
						BRECCIA: fine grained, red, ironstained	EW-HW			250mm EW-HW zone, jointed, fractured
						BRECCIA: medium to coarse grained, grey, with light brown, massive.				50mm clay seam surrounded by crushed zone
			97	16			MW			30mm crushed zone

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- not measured
- partial loss
- complete loss

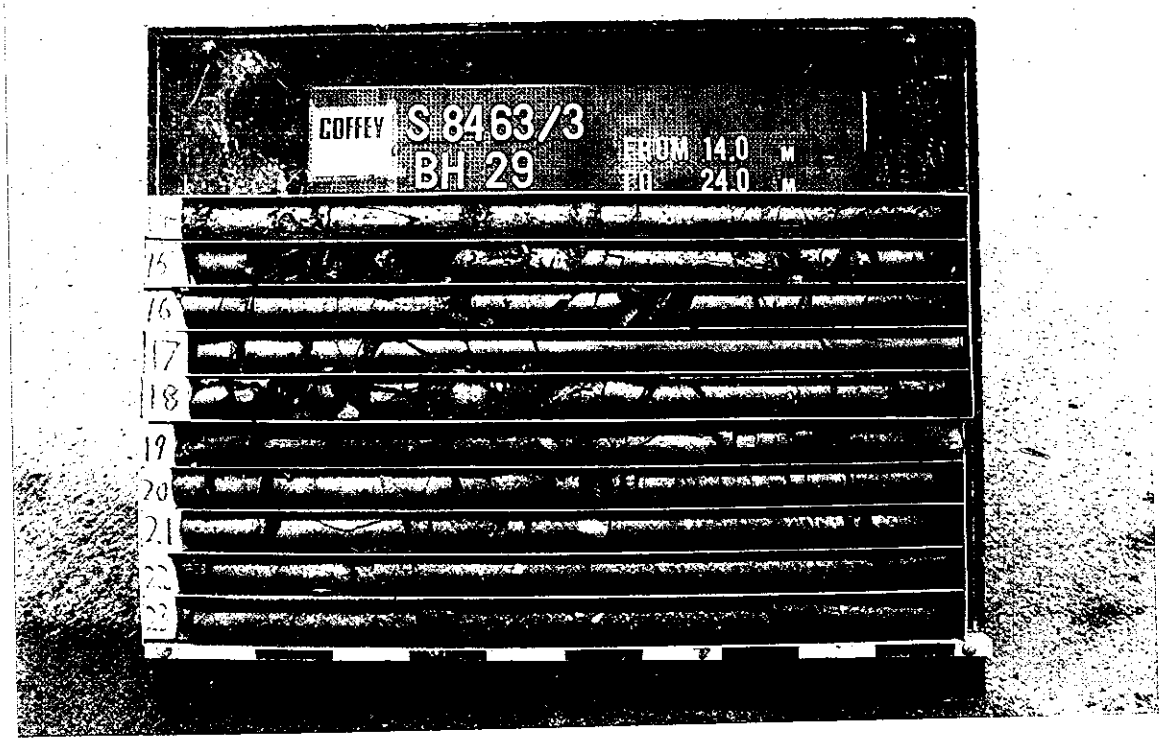
POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular


COFFEY
S 8463/3
BH 29
FROM 14.0 M
TO 24.0 M
15
16
17
18
19
20
21
22
23

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

Borehole no: 29

sheet 4 of 7

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	4.12.89
principal:		hole completed:	7.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308587.43 N 12699.19.86	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0	fluid: WATER	bearing:
R.L.Surface:	112.8 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics, colour, structure, minor components)	weathering	Est. Strength	point load test is(50) MPa	defect spacing mm	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
NMLC			96	17		BRECCIA: medium to coarse grained, grey, with light brown, massive.	MW				5mm crushed zone 20mm jointed zone 160mm jointed, fractured zone 10mm fractured zone 10mm clay seam 10mm crushed seam 20mm crushed seam
			95	18		BRECCIA: fine grained, grey, massive,	SW				JT 20deg PL RO 2mm clay infill 280mm fractured jointed zone
			94	19		BRECCIA: medium to coarse grained, brown, to grey, massive.	MW HW EW				30mm crushed zone 100mm EW zone 50mm HW zone JT 90deg IR RO ironstained JT 90deg IR RO ironstained JT 0deg IR RO ironstained 30mm crushed zone 10mm JT zone JT 95deg PL RO 2mm ironstone infill JT 60deg IR RO ironstained 100mm HW zone
			93	20		fine grained clasts to 100mm across	MW				
			92	21			SW				JT 10deg IR RO ironstained JT 90deg IR RO ironstained 10mm jointed zone 10deg 40mm jointed crushed zone JT 80deg IR RO ironstained 20mm HW zone
			91	22			FR				30mm jointed zone
			90	23							10mm jointed zone JT 80-90deg IR RO ironstained JT 10deg PL RO clean JT 0deg PL RO clean JT 0deg PL RO clean JT 0deg PL RO clean
			89	24							JT 0deg PL RO clean JT PL RO crushed infill, 2mm thick JT 45deg PL RO clean

General Defect Description:

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

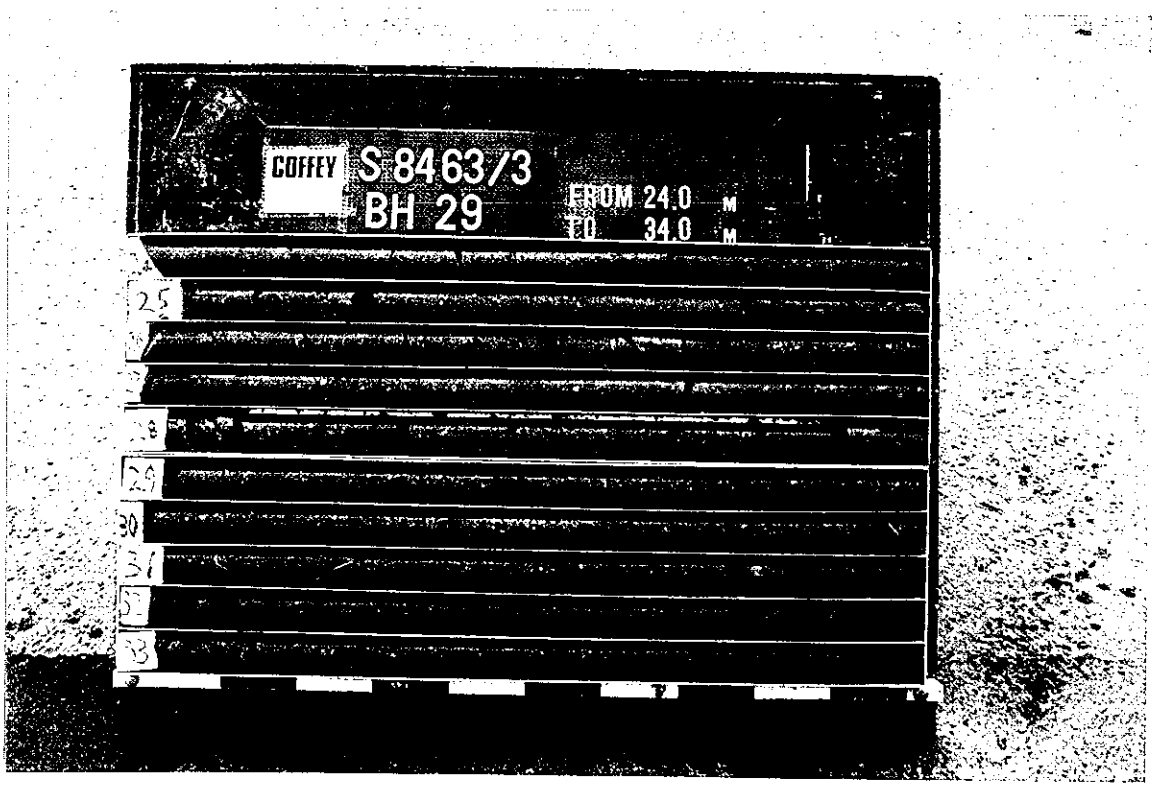
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

T67-229


COFFEY
S 8463/3
BH 29
FROM 24.0 M
TO 34.0 M
25
29
30
31
33

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 29
sheet 5 of 7

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	4.12.89
principal:		hole completed:	7.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308587.43 N 1269919.86	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 112.8 m
barrel type and length:	NMLC 3.0 fluid: WATER	bearing:	datum: AHD

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength; point load test Is(50) MPa	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			88	25		BRECCIA: medium to coarse grained, grey, with some brown, staining, massive.	FR to SW			JT 0deg PL RO clean JT 0deg PL RO clean 1m JT 30-60deg IR RO ironstained
										JT 0deg PL RO clean
			87	26						JT 75 - 90deg IR RO ironstained veneer
										JT 45deg PL RO ironstained crushed infill - 2mm
			86	27						JT zone 50mm 45deg IR RO clean JT 5deg IR RO clean JT zone 45-90deg IR RO ironstained. 150mm crushed zone JT 5deg PL RO clean
										JT 5deg PL RO clean
			85	28						JT 45-90deg IR RO clean
						BRECCIA: fine grained, grey, massive.	FR			50mm EW zone JT 5deg IR RO clean JT 0deg IR RO clean JT 0deg IR RO clean
			84	29		BRECCIA: medium to coarse grained, grey, massive.				JT 30deg PL RO clean
						BRECCIA: fine grained, grey, massive.				
			83	30		BRECCIA: medium to coarse grained, grey, massive.				JT 0deg IR RO clean JT 30deg PL RO clean JT 10deg IR RO clean
			82	31		trace of calcite veining				JT 60deg IR RO calcite infill
			81	32						PT 0deg IR RO clean JT 60deg PL RO ironstained

General Defect Description:

METHOD			POINT LOAD TEST	WEATHERING	STRENGTH	DEFECTS
AS	auger screwing	water level	D -diametral	FR -fresh	EL -extremely low	JT -joint
AD	auger drilling	water inflow	A -axial	SW -slightly	VL -very low	PT -parting
R	roller/tricone	not measured	GRAPHIC LOG/CORE LOSS	MW -moderately	L -low	SM -seam
W	washbore	Drilling Water	core recovered (hatching indicates material)	HW -highly	M -medium	CL -clay
NMLC	core drilling	partial loss	no core recovered	EW -extremely	H -high	RO -rough
NQ,HQ	core drilling	complete loss			VH -very high	DC -decomposed
	casing used				EH -extremely high	PL -planar
	barrel withdrawn					IR -irregular

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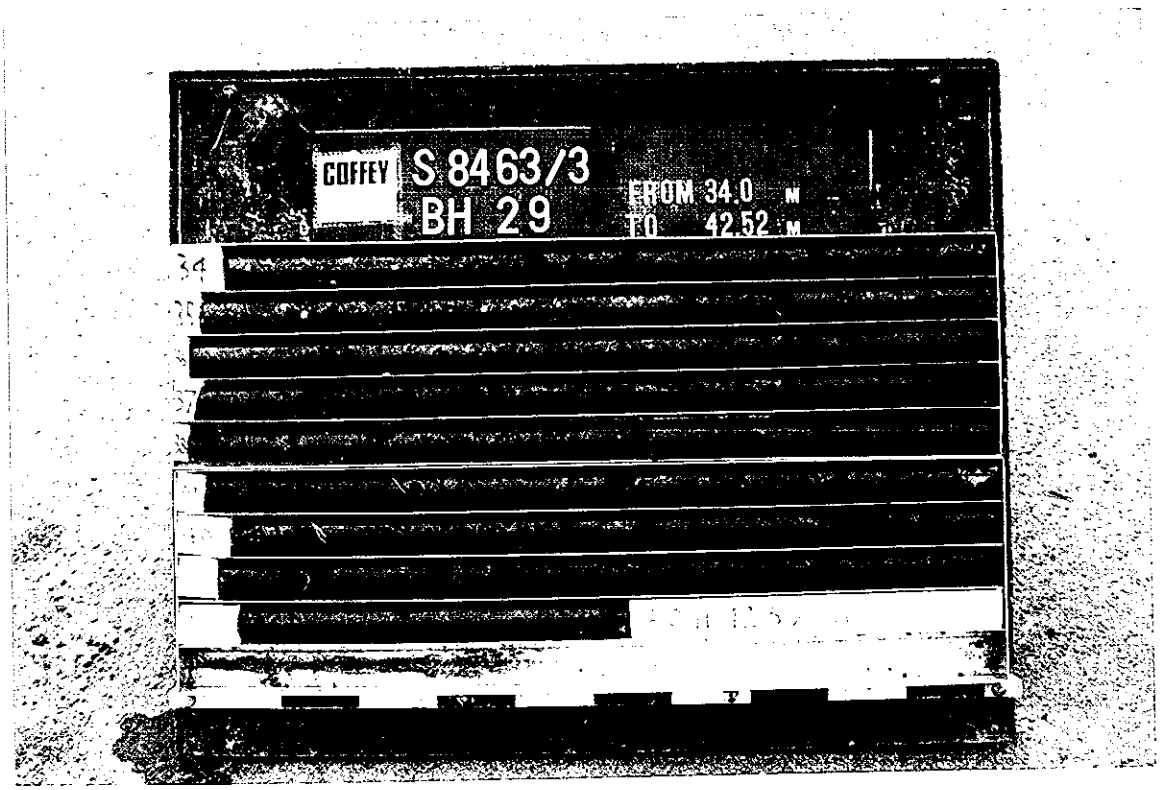
COFFEY
S 8463/3
BH 29
FROM 34.0 M
TO 42.52 M

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COFFEY

borehole no: 29
sheet 6 of 7

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	4.12.89
principal:		hole completed:	7.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308587.43 N 1269919.86	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0	fluid: WATER	bearing:
R.L.Surface:	112.8 m		
datum:	AHD		

drilling information					rock substance				rock mass defects	
method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	defect spacing mm 30 100 300 1000 3000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			80	33		BRECCIA: medium to coarse grained, grey, massive,	FR				JT 30deg PL RO ironstained
			79	34							JT zone, 0 - 60deg ironstained, 150mm wide JT 30deg PL RO clean JT 30deg PL RO clean
			78	35							JT 30deg PL RO calcite coated PT 0deg IR RO clean
			77	36							JT 10deg PL RO clean
			76	37							JT 10deg IR RO clean
			75	38							JT 10deg IR RO clean
			74	39							JT 10-30deg IR RO clean PT 20deg IR RO clean
			73	40		BRECCIA: coarse grained, coarse gravel to cobble sized grains					JT 30deg PL RO calcite infill, 1mm thick 50mm EW zone JT 10deg PL RO clean

General Defect Description:

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd
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COFFEY

borehole no: 29
sheet 1 of 1

engineering log - cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308587.43 N 1269919.86

hole commenced: 4.12.89
hole completed: 7.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 112.8 m
datum: AHD

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (50 100 200 600 2000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			72	41		BRECCIA: coarse grained, coarse gravel to cobble sized grains	FR				JT 0deg IR RO clean
											JT 10deg IR RO crushed infill, 10mm wide
			71	42		BRECCIA: medium to coarse grained, grey.					JT 0deg PL RO clean
											JT 10deg PL RO trace of ironstaining
			70	43		Borehole 29 Terminated at 42.52 m Piezometer at 42.5m, 5.0m slotted. Sand at 37.0m (5.5m of sand), 30 litres of Bentonite slurry, 70 litres of grout (cement and water)					
			69	44							
			68	45							
			67	46							
			66	47							
			65	48							

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- * not measured
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

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COFFEY

borehole no: 30

sheet 1 of 2

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308588.5 N 1269921.2

hole commenced: 8.12.89
hole completed: 8.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 83mm

slope: -90 DEG
bearing:

R.L.Surface: 112.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L. / depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa	structure and additional observations
R		C			112 / 0		CL	FILL: Sandy Gravelly Clay, medium plasticity, brown, gravel, coarse grained, angular, breccia				FILL, large cobbles of FR breccia and sandstone
					111 / 1							
					110 / 2			grey, becoming hard				Breccia cobble
					109 / 3							
					108 / 4							Breccia cobble
					107 / 5							
					106 / 6							intermittent water losses during drilling
					105 / 7							
					8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION 1 2 3 — no resistance ranging to refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 30

sheet 2 of 2

engineering log – borehole

office job no: S8403/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	8.12.89
principal:		hole completed:	8.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308588.5 N 1269921.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	83mm	bearing:	
R.L.Surface:	112.8 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
R		C	8.12.89		104	9		CL	FILL: Sandy Gravelly Clay, medium plasticity, brown, gravel, coarse grained, angular, breccia				FILL, large cobbles of FR breccia
					103	10							
				U50	102	11		CH	SANDY CLAY: high plasticity,				RESIDUAL, trace of root fibres Grading into EW to HW breccia
					101	12							
					100	13							
					99	14							
					98	15			Borehole 30 Terminated at 14.10m Piezometer placed at 13.80m, slotted 1m, sand to 12.35m (1.45m of sand), 20L of Bentonite, 40L of grout to 10.60m				
					97	16							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 31
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308589.5 N 1269922.5

hole commenced: 8.12.89
hole completed: 8.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 112.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L. / depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R			5.1.90		112 / 1 111 / 2 110 / 3 109 / 4 108 / 5 107 / 6 106 / 7 105 / 8			FILL: Sandy Gravelly CLAY, medium plasticity, coarse grained, angular gravel, brown				FILL, large Breccia cobbles Mainly Breccia boulders with clay fill between
								Borehole 31 Terminated at 7.25m Piezometer at 6.40m, 1m slotted, sand at 5.15m (1.25m of sand), 20 litres of Bentonite, Piezometer dry - 8.12.89				

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 32

sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	20.12.89
principal:		hole completed:	20.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308560.5 N 1269926.4	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	105.2 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type;plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa	structure and additional observations
R				U50	105	1		CH	SANDY CLAY: medium plasticity, coarse grained, brown				RESIDUAL
					104	2			BRECCIA: extremely weathered, brown				EW/HW BRECCIA
					103								
					102	3							grading to HW Breccia
					101	4							
					100	5							
					99	6							
					98	7			Borehole 32 Terminated at 7.10m Piezometer placed at 7.05m, 1m slotted, sand at 5.95m (1.6m of sand), Bentonite at 5.15m (300mm of bentonite pellets) Grout to surface (cement & water)				

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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COFFEY

borehole no: 33
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308560.8 N 1269927.9

hole commenced: 20.12.89
hole completed: 20.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 104.8 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C							FILL: Sandy clay, medium plasticity, fine grained, brown				FILL
								CH	SANDY CLAY: light brown				RESIDUAL
				U50	104	1			BRECCIA: light red brown				EW BRECCIA clay bands?
					103	2							
					102	3			Borehole 33 Terminated at 2.05m Piezometer at 2.05m, 0.5m slotted, Sand at 1.25m (0.80m of sand), Bentonite at 1.10m (0.15m of Bentonite pellets)				
					101	4							
					100	5							
					99	6							
					98	7							
					97	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance / ranging to / refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

T87-230

Coffey & Partners Pty. Ltd
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engineering log - borehole

borehole no: 34
sheet 1 of 1

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308543.0 N 1269924.6

hole commenced: 14.12.89
hole completed: 14.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 102.5 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
ADV									FILL: Sand, gravel and clay	M	MD		FILL
R				U50	102			CL	SANDY CLAY: low to medium plasticity, mottled light grey and light brown, sand is fine grained.	>Wp	VSt		RESIDUAL
						1		CL	SANDY CLAY: low plasticity, mottled brown and light brown, sand is fine grained.	<Wp	H		EW BRECCIA
					101				BRECCIA: highly weathered	M D			HW BRECCIA
						2			BRECCIA: moderately - slightly weathered				MW/SW BRECCIA
					100				Borehole 34 Terminated at 2.20m piezometer slotted 2.20 - 1.70m (0.5m) Sand to 1.40m, Benionite pellet plug to 1.10m, Backfill and grout				
						3							
					99								
						4							
					98								
						5							
					97								
						6							
					96								
						7							
					95								
						8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
tonging to
refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

T87-230

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COFFEY

borehole no: 35
sheet 1 of 1

engineering log – borehole

office job no: S6463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308668.0 N 1269934.36

hole commenced: 28.11.89
hole completed: 28.11.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 112.9 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro-meter kPa 100 200 300 400	structure and additional observations
ADT					112	1			FILL: Gravelly clay, medium plasticity, angular gravel, dark brown, trace of sand	D	VL		Fill, Breccia, no organic material. Highly variable coarse gravel
									FILL: Sandy gravelly clay, medium plasticity, angular large gravel, dark brown	M	F		Fill is highly variable
					111	2							
					110	3							
				5 , 8 , 10 N*=18									
					109	4							
					108	5							At 4.8m possibly grading into EW Breccia?
					107	6			Borehole 35 Terminated at 5.00m Piezometer installed at 4.2m, 1.0m slotted, backfilled, compacted, bentonite seal below piezo, sand to 2.8m (1.4m), bentonite to 2.3m (500mm) grout to surface				
					106	7							
					105	8							

METHOD
- AS auger screwing*
- AD auger drilling*
- R roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- *bit shown by suffix
- B blank bit
- V V bit
- T TC bit
- e.g. ADT

SUPPORT
- C casing
- M mud

PENETRATION 1 2 3
- no resistance
- ranging to
- refusal

WATER
- * not measured
- water level
- water outflow
- water inflow

NOTES samples and tests
- U50 undisturbed sample 50 mm diameter
- D disturbed sample
- N standard penetration test:
- N* SPT + sample recovered
- Nc SPT with solid cone
- V vane shear
- P pressuremeter
- Bs bulk sample
- R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
- D dry
- M moist
- W wet
- Wp plastic limit

CONSISTENCY/DENSITY INDEX
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

T87-230

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engineering log - borehole

COFFEY

borehole no: 36

sheet 1 of 1

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	28.11.89
principal:		hole completed:	28.11.89
project:	OLD MANS VALLY	logged by:	GJH
borehole location:	E 308637.98 N 1269935.81	checked by:	PLV
drill model and mounting:	EDSON 300 TRUCK	slope:	-90 DEG
hole diameter:	75mm	bearing:	
R.L.Surface:	113.3 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R	U	C			113	0		SW	SAND: medium grained, light yellow, some gravel, angular	D	VL		
									FILL: highly variable, consisting of clay to fresh breccia boulders				complete drill water loss
					112	1							
						2			FILL: Gravelly clay, medium plasticity, angular gravel, light brown				Fill, highly variable
					111	3							
					110	4							Complete loss of drilling fluid
					109	5							
					108	6			Borehole 36 Terminated at 5.00m Piezometer placed at 5.05m, 1m screened length, sand to 3.55m (1.5m of sand), top of bentonite at 3.30m (0.25m plug) 10 litres of cement and water grout.				
					107	7							
					106	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 37
sheet 1 of 3

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	11.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308606.9 N 1269938.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 112.8 m
hole diameter:	76mm	bearing:	datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro-meter kPa 100 200 300 400	structure and additional observations
R		C			112	1			FILL: SANDY GRAVELLY CLAY, medium plasticity, coarse-grained, angular gravel, brown				FILL, large cobbles and boulders of breccia, variable fill
					111	2							
					110	3							
					109	4			FILL: CLAYEY SAND, light brown				
					108	5			FILL: Sandy Gravelly CLAY, as above				Attempted U50, EW sandstone
					107	6							
					106	7							
					105	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 37

sheet 2 of 3

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	11.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308606.9 N 1269938.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	76mm	bearing:	
R.L.Surface:	112.8 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type;plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C	5.1.90	U50	104	9			FILL: Sandy Gravelly CLAY, medium plasticity, coarse grained, angular gravel, brown				
					103	10			Breccia boulders from 10.2 to 10.65m				
				U50	102	11							
					101	12							
					100	13			Intermittent sand layers				
					99	14							
					98	15			BRECCIA: EW - HW Breccia				RESIDUAL
				U50	97	16							trace of root fibres
													trace of root fibres

METHOD
- AS auger screwing*
- AD auger drilling*
- R roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- *bit shown by suffix
- B blank bit
- V V bit
- T TC bit
- e.g. AD/T

SUPPORT
- C casing
- M mud

PENETRATION
1 2 3 — no resistance / ranging to / refusal

WATER
- * not measured
- water level
- water outflow
- water inflow

NOTES samples and tests
- U50 undisturbed sample 50 mm diameter
- D disturbed sample
- N standard penetration test:
- N* SPT + sample recovered
- Nc SPT with solid cone
- V vane shear
- P pressuremeter
- Bs bulk sample
- R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
- D dry
- M moist
- W wet
- Wp plastic limit

CONSISTENCY/DENSITY INDEX
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

T87-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

borehole no: 37
sheet 3 of 3

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	11.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308606.9 N 1269938.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	76mm	bearing:	
R.L.Surface:	112.8 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					96	17			BRECCIA: EW - HW Breccia				RESIDUAL
					95	18			Borehole 37 Terminated 17.10m Piezometer at 17.1m, 1.5m slotted, sand at 15.6m (1.5m at Sand), 35 litres of Bentonite (tremmied), 45 litres of Grout (cement and water). Bentonite at 13.3, bentonite into washed out sand				
					94	19							
					93	20							
					92	21							
					91	22							
					90	23							
					89	24							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 38
sheet 1 of 2

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308605.2 N 1269938.1	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	76mm	bearing:	
R.L.Surface:	112.9 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
R		C			112	1		CL	FILL: Sandy Gravelly Clay, medium plasticity, brown, gravel, coarse grained, angular, sand fine to coarse				FILL, cobbles and boulders of breccia
					111	2			becoming more clayey with depth				
					110	3							
					109	4							
					108	5							
					107	6							
					106	7							
					105	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C	casing
M	mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

*	not measured
	water level
	water outflow
	water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - borehole

borehole no: 38

sheet 2 of 2

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308605.2 N 1269938.1	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	76mm	bearing:	
		R.L.Surface:	112.9 m
		datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100, 200, 300, 400)	structure and additional observations
R		C			104	9		CL	FILL: Sandy Gravelly Clay, medium plasticity, brown, gravel, coarse grained, angular, sand fine to coarse				FILL, cobbles and boulders of breccia
					103	10							
					102	11			Borehole 38 Terminated at 10.0m Piezometer at 9.90m, slotted 1m. Sand at 8.45m (1.45m of sand), 35L of Bentonite. Bentonite at surface with casing, at 8.1m when casing removed. 45L of grout (cement/water)				
					101	12							
					100	13							
					99	14							
					98	15							
					97	16							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 39
sheet 1 of 1

engineering log – borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	14.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308553.2 N 1269954.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	97.5 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R		C							FILL: Silty sand	M	L MD		FILL
					97			CL	SANDY CLAY: low plasticity, mottled light brown and light grey, some silt, sand is fine to medium grained,	>Wp	VSt		RESIDUAL
				U50	96	1						X	
					95	2		CL	SANDY CLAY: low to medium plasticity, mottled red brown light brown and light grey some cementation	<Wp	H		EW BRECCIA
					94	3			BRECCIA: highly weathered	M D			
						4			BRECCIA: moderately/slightly weathered				
									Borehole 39 Terminated 4.10m				
					93	5			Piezometer slotted 0.5m from 4.10 to 3.60m, Sand to 3.0m, Bentonite plug to 2.75m, backfill and grout.				
					92	6							
					91	7							
					90	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 40
sheet: 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308554.6 N 1269953.7

hole commenced: 14.12.89
hole completed: 14.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 97.5 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
ADV									FILL: Silty sand	M	L MD		FILL
					97			CL	SANDY CLAY: low plasticity, mottled light brown and light grey, some silt	>Wp	VSt		RESIDUAL
				U50		1							
					96								
						2							
				U50	95								
								CL	SANDY CLAY: low to medium plasticity, mottled light brown light grey and red brown some cementation	<Wp	H		EW BRECCIA
													V bit refusal at 2.8m
ADT						3			BRECCIA: highly weathered	M D			HW BRECCIA
					94				Borehole 40 Terminated at 2.85m				
						4			Piezometer slotted 1m, 2.80 to 1.80m. Sand to 1.60m, Bentonite pellets to 1.40m backfill and grout.				
					93								
						5							
					92								
						6							
					91								
						7							
					90								
						8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

187-230

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 41
sheet 1 of 6

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308534.7 N 1269971.8

hole commenced: 12.12.89
hole completed: 14.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 94.9 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa	structure and additional observations
W / R		C			94	1		CL	FILL: Sand, Clay, gravel and wood	M	D		FILL
								CL	SANDY CLAY: low to medium plasticity, light brown, trace of roots and silt	>Wp	VSt		ALLUVIUM attempted U50 at 1.45m - no recovery
				U50	93	2		CL	SANDY CLAY: low plasticity, mottled grey and light brown, sand is fine to medium		St VSt	100 200 300 400	RESIDUAL/EW BRECCIA
					92	3			BRECCIA: highly weathered	M D	H		HW BRECCIA
									Continued on Cored Borehole Log				
					91	4							
					90	5							
					89	6							
					88	7							
					87	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense


COFFEY
S8463/3
BH 41
FROM 3.3 M
TO 8.0 M

Coffey & Partners Pty Ltd
Incorporated in Queensland.

engineering log - cored borehole

borehole no: 41
sheet 2 of 6

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308534.74 N 1269971.78	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
		R.L.Surface:	94.9 m
		datum:	AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (60 200 600 2000 6000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
			94	1							
			93	2							
			92	3		Continued from non-core borehole					
NMLC						BRECCIA: fine to coarse grained, brown, indistinct bedding,	HW				100mm jointed zone 100mm jointed/crushed SM with clay clay/crushed SM 30mm thick
			91	4		BRECCIA: fine to coarse grained, mottled grey, light grey, and brown, indistinct bedding,	SW				JT 85deg IR RO Fe JT 45deg PL RO Fe JT 45deg PL RO Fe JT 85deg IR RO Fe
			90	5							Jointed SM 70mm thick
			89	6							JT 60deg PL smooth clean crushed SM 5deg 10mm thick JT 50deg IR RO Fe JT 45deg PL RO Fe 6.54- 8.13 JT 90deg IR RO & smooth partly Fe with some intersecting JTs at 45 - 60deg and occasional crushed infills
			88	7							
			87	8							

General Defect Description:
From 3.3m to 10.6m Joints/partings generally at 0 to 30deg and ironstained

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY S8463/3
BH 41
FROM 8.0 M
TO 13.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - cored borehole

borehole no: 41
sheet 3 of 6

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308534.74 N 1269971.78	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	94.9 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics, colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
NMLC			86	9		BRECCIA: fine to coarse grained, mottled grey, light grey, and brown, indistinct bedding.	SW				crushed SM 25mm thick 8.60 - 8.80 jointed zone with some crushed zones JT 35deg IR RO clean JT 60deg PL RO
			85	10							Jointed zone 70mm thick Jointed zone 90mm thick Jointed crushed SM 40mm thick JT 50deg IR RO clean JT 60 - 90deg IR RO Fe and some crushed infill JT 50deg IR RO trace of crushed infill
			84	11		BRECCIA: fine grained, light grey, indistinct bedding.	FR				
			83	12							
			82	13		BRECCIA: fine to coarse grained, mottled grey, and light grey, indistinct bedding.					Clay/crushed SM, 35deg, 15mm thick JT 50deg IR RO with crushed infill JT 45deg IR RO clean
			81	14							
			80	15			MW FR				14.88 - 15.0m jointed crushed SM wih clay
			79	16							

General Defect Description:
From 3.3m to 10.6m Joints/partings are generally at 0 to 30deg and ironstained

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

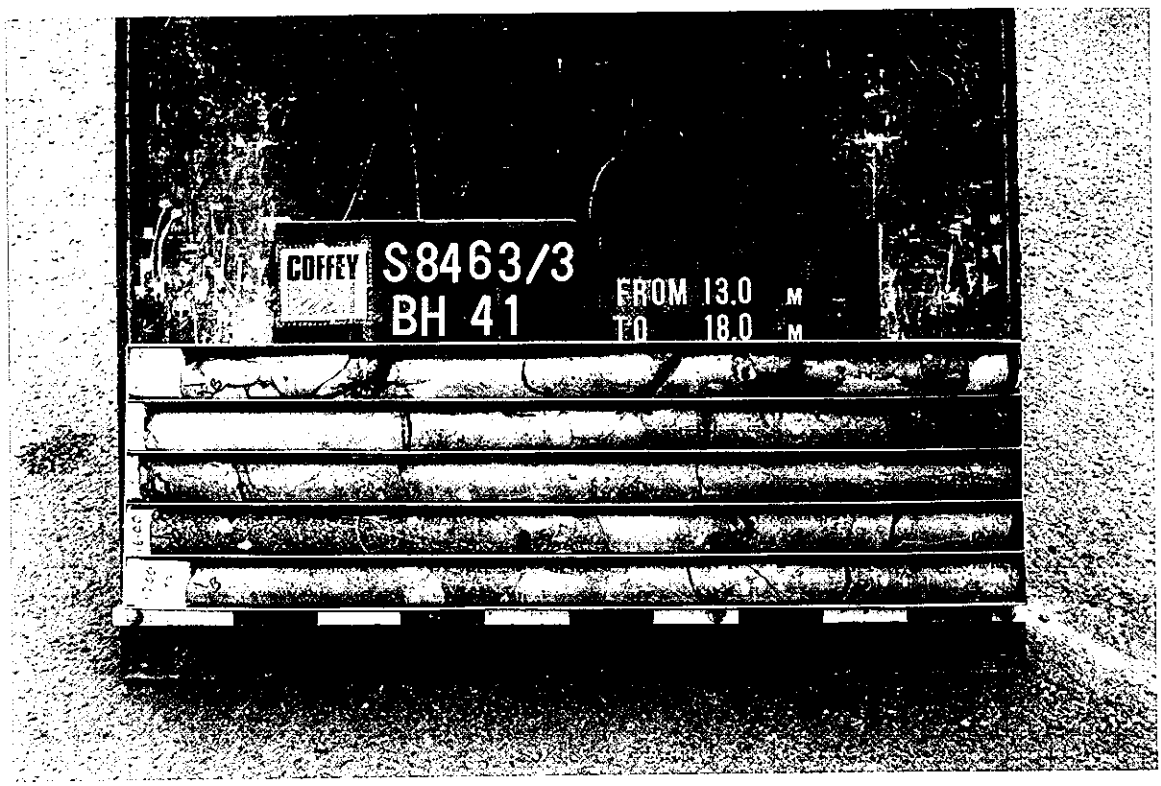
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
Pt -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

187-229


COFFEY
S8463/3
BH 41
FROM 13.0 M
TO 18.0 M


COFFEY
S8463/3
BH 41
FROM 18.0 M
TO 23.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 41
sheet 4 of 6

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308534.74 N 1269971.78	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	94.9 m		
datum:	AHD		

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength	point load test Is(50) MPa	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			78	17		BRECCIA: fine to coarse grained, mottled grey, and light grey; indistinct bedding.	FR				JT 50deg IR RO Clean
			77	18							JT 45deg PL smooth clean
			76	19							JT 60deg IR RO clean JT 45deg IR RO clay coated
			75	20							
											JT 45deg IR RO clean
			74	21							JT 55deg IR smooth clay coated
			73	22							
			72	23							JT 50deg PL RO clean
			71	24							JT 45deg PL RO Clean

General Defect Description:
Joints/partings 0 to 30deg

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

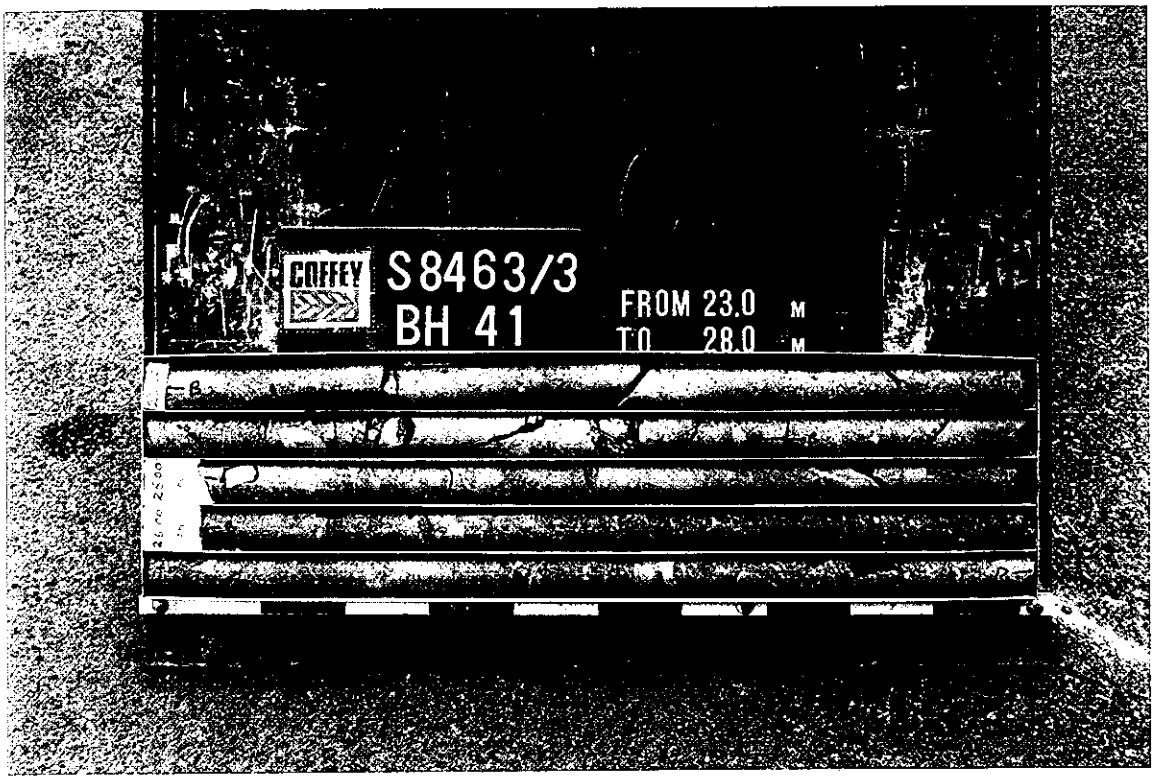
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

187-229


COFFEY
S8463/3
BH 41
FROM 23.0 M
TO 28.0 M


COFFEY
S8463/3
BH 41
FROM 28.0 M
TO 33.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 41
sheet 5 of 6

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308534.74 N 1269971.78	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	94.9 m		
datum:	AHD		

drilling information					rock substance				rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength	defect spacing mm	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			70	25		BRECCIA: fine to coarse grained, mottled grey, and light grey, indistinct bedding.	SW / FR			JT 30deg IR RO Fe JT 30deg IR RO Fe JT 60deg IR RO Fe JT 45deg IR RO trace of crush
			69	26						JT 50deg IR RO some crushed infill
			68	27						
			67	28						JT 60deg IR RO clean
			66	29						JT 50deg PL RO clean
			65	30						
			64	31						JT 50deg IR RO clean
			63	32						JT 40deg IR RO clean

General Defect Description:
Joints/partings 0 to 30deg

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 41

sheet 6 of 6

engineering log – cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308534.74 N 1269971.78

hole commenced: 12.12.89
hole completed: 14.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0m
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 94.9 m
datum: AHD

drilling information					rock substance				rock mass defects	
method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH) / point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			62	33		BRECCIA: fine to coarse grained, mottled grey, and light grey, indistinct bedding,	FR			crushed SM 30mm thick JT 90deg IR RO clean
			61	34		Borehole 41 Terminated at 33.00 m Piezometer from 33.0 to 30.0m, 3m slotted, Sand to 29.40m, Bentonite Pellet plug to 29.20m. Cement grout to surface.				
			60	35						
			59	36						
			58	37						
			57	38						
			56	39						
			55	40						

General Defect Description:
Joints / Partings at 0 to 30deg

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 42
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308534.5 N 1269972.9

hole commenced: 14.12.89
hole completed: 14.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L.Surface: 94.9 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
A		C	5.1.90 ▽		94	1			FILL: sand, clay and gravel.	M	D		FILL
								CL	SANDY CLAY: low to medium plasticity, light brown some silt	>Wp	VSt		ALLUVIUM
					93	2		CL	SANDY CLAY: low plasticity, mottled grey and light brown, sand is fine to medium.				RESIDUAL / EW BRECCIA
					92	3			BRECCIA: highly weathered	M D	H		HW BRECCIA
					91	4			Borehole 42 Terminated at 3.35m Piezometer slotted 0.5m from 3.20 to 2.70m, Sand to 2.30m, Bentonite pellet plug to 2.0m, Grout to surface.				
					90	5							
					89	6							
					88	7							
					87	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance ranging to refusal

WATER
* not measured
▽ water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

engineering log – borehole

borehole no: 43
sheet 1 of 1

office job no: S6403-3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	18.12.89
principal:		hole completed:	18.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308635.8 N 1270001.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L. Surface:	118.2 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test, etc	R.L.	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / density index	hand penetrometer kPa	structure and additional observations
ADT			5.1.90	U50	118	0		CH	SANDY CLAY: medium to high plasticity, fine grained, brown mottled orange, trace of angular gravel	D M	Fb St		RESIDUAL root fibres
				U50	117	1							EW BRECCIA
									BRECCIA: Extremely to highly weathered				EW BRECCIA becoming dryer with depth
				U50	116	2							
					115	3							
					114	4							
					113	5							grading to MW breccia
					112	6			Borehole 43 Terminated at 5.65m Piezometer at 4.9m, 1m slotted, Sand at 3.6m (1.3m of sand). Bentonite at 3.15m (450mm of bentonite pellets) Grout (cement & water) to surface.				
					111	7							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3
no resistance
ranging to
refusal

WATER
* not measured
water level
water outflow
water inflow

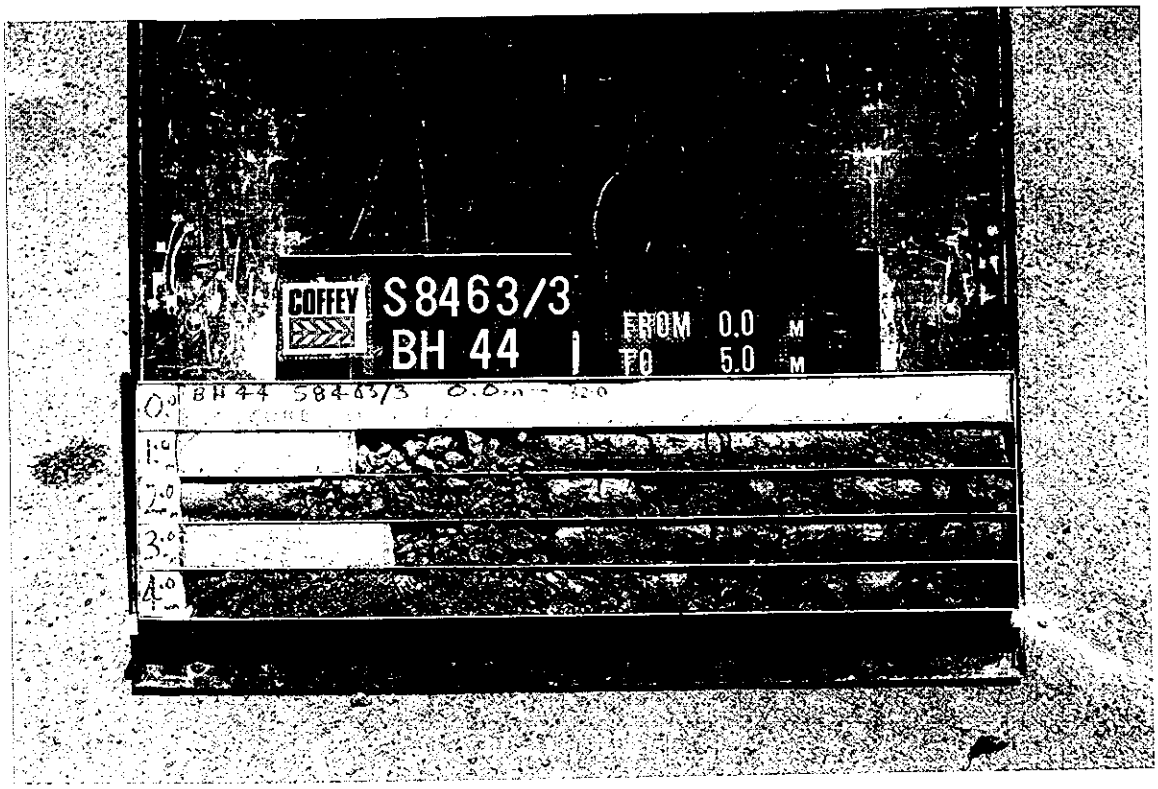
NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

187-230


COFFEY
S8463/3
BH 44
FROM 0.0 M
TO 5.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 44
sheet 1 of 5

engineering log - cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308578.8 N 1270007.8

hole commenced: 12.12.89
hole completed: 14.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 104.7 m
datum: AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (60 200 600 2000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
NMLC			104	1		NO CORE: 1.2m (Residual/extremely weathered breccia)					
			103	2		BRECCIA: medium to coarse grained, brown, with light brown, grains massive,	HW EW				250mm fractured zone 400mm jointed zone IR RO ironstained
							EW				50mm EW zone
							HW				20mm crushed zone
							EW				400mm jointed fractured zone
			102	3			HW EW				250mm jointed fractured zone 20mm crushed zone
						NO CORE: 0.25m					
						BRECCIA: as above	HW EW				200mm jointed fractured zone 20mm crushed zone
			101	4			EW				
			100	5		grading dark grey with light brown grains	HW EW				150mm jointed fractured zone JT 0deg IR RO clay veneer 150mm jointed crushed zone 150mm jointed, crushed zone 200mm JT zone 0-90deg IR RO ironstained
							HW				JT 0deg IR RO ironstained 150mm jointed fractured zone
			99	6		BRECCIA: fine grained, brown, massive,	MW				150mm JT zone 0-60deg IR RO ironstained 70mm crushed zone
						BRECCIA: as above	SW				200mm JT zone 0-60deg IR RO ironstained
			98								JT 0deg IR RO, 2mm clay infill
				7							JT 0deg IR RO sandy, 2mm clay infill 70mm jointed zone 0-60deg IR RO clay infill 90mm jointed zone
						BRECCIA: fine grained, brown, massive,	MW				20mm JT zone 40-60deg IR RO ironstained 30mm crushed zone
			97			BRECCIA: as above	SW				JT 5deg IR RO clean
				8		BRECCIA: fine grained, brown, massive,					

General Defect Description:
Partings at 0-20deg, PL-IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

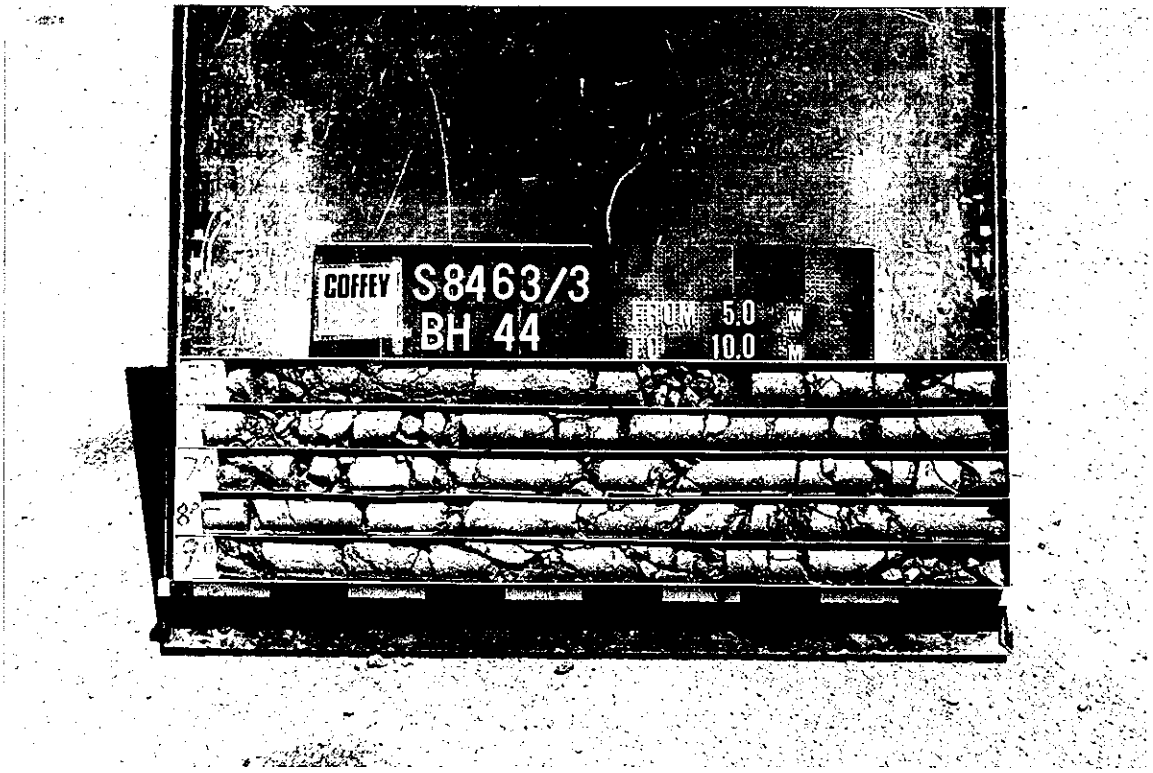
POINT LOAD TEST
D -diametral
A -axial

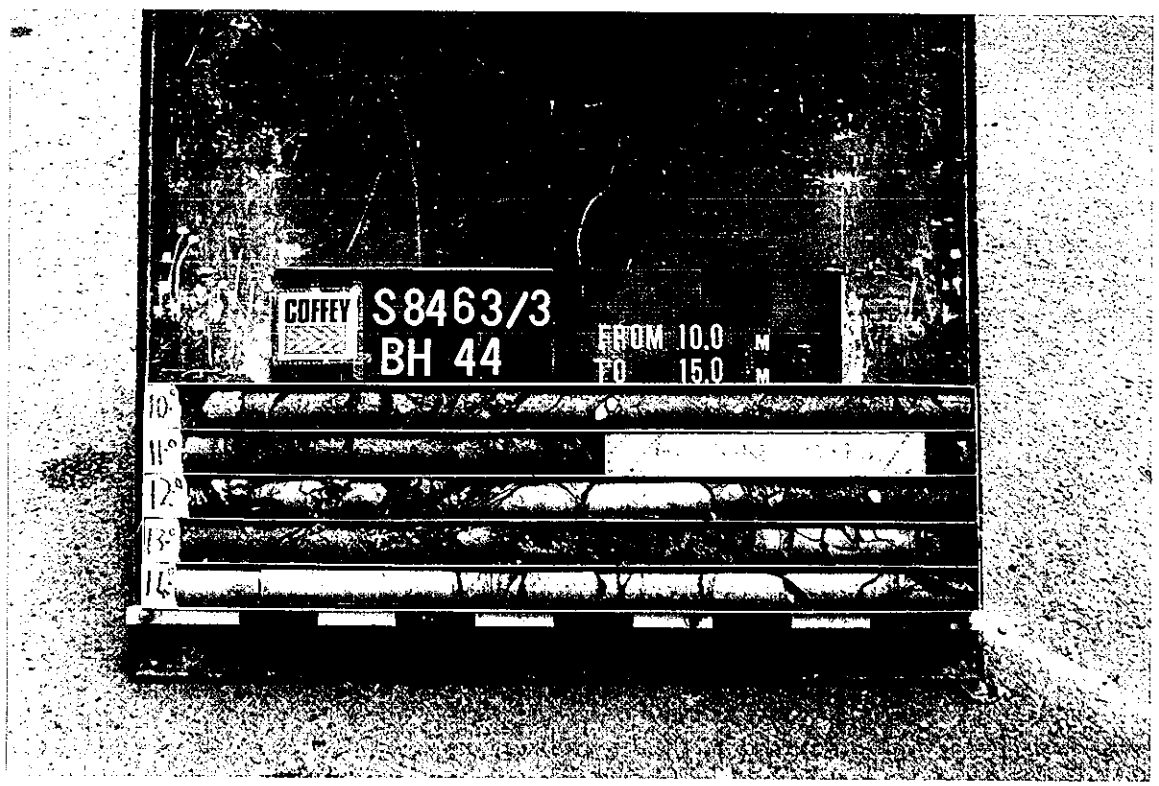
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 44
FROM 5.0 M
TO 10.0 M


COFFEY
S8463/3
BH 44
FROM 10.0 M
TO 15.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 44

sheet 2 of 5

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308578.8 N 1270007.8	checked by:	PLV

drill model and mounting:	EDSON 3000 TRUCK			slope:	-90 DEG	R.L.Surface:	104.7 m
barrel type and length:	NMLC 3.0	fluid:	WATER	bearing:		datum:	AHD

drilling information					rock substance					rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 60 200 600 2000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			96	9		BRECCIA: medium to coarse grained, brown, with light brown, grains massive,	SW				JT 0deg IR RO clean 10mm JT zone 0 - 45deg IR RO ironstained
							MW				300mm jointed zone with crushed seam 0 - 60deg, ironstained
			95								30mm JT 45deg PL RO clay infill JT 45deg PL RO clay infilled 550mm JT zone 30 - 45deg IR RO some crushed infill
				10			SW				180mm Jointed fractured zone
							MW				JT 20deg IR RO, 5mm crushed infill JT zone 45deg, 100mm crushed infill
			94				SW				
				11							100mm EW zone
							MW				5mm JT 0deg PL RO clay infilled
			93			NO CORE: 0.4m					
				12		BRECCIA: as above	MW				450mm JT 45 - 90deg zone ironstained
						BRECCIA: fine grained, light grey, with dark grey, grains, massive,	SW				
			92			BRECCIA: as above					
				13							JT 0deg IR RO clean JT 45deg IR RO clean
							MW				
							HW				JT 10deg IR RO, 10mm sandy clay infill 300mm fractured zone 0 - 80deg IR RO ironstained
			91			BRECCIA: fine grained, light grey, with dark grey, grains, massive,	MW				
				14			FR				
							SW				150mm JT zone 0 - 30deg IR RO Fe
			90			trace of calcite veins					140mm JT crushed zone IR RO Fe
				15							JT 0 - 30deg IR RO Fe, 50mm crushed zone
			89								JT 0 - 30deg IR RO Fe, 90mm crushed zone
				16							

General Defect Description:
Partings at 0-20deg, PL-IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

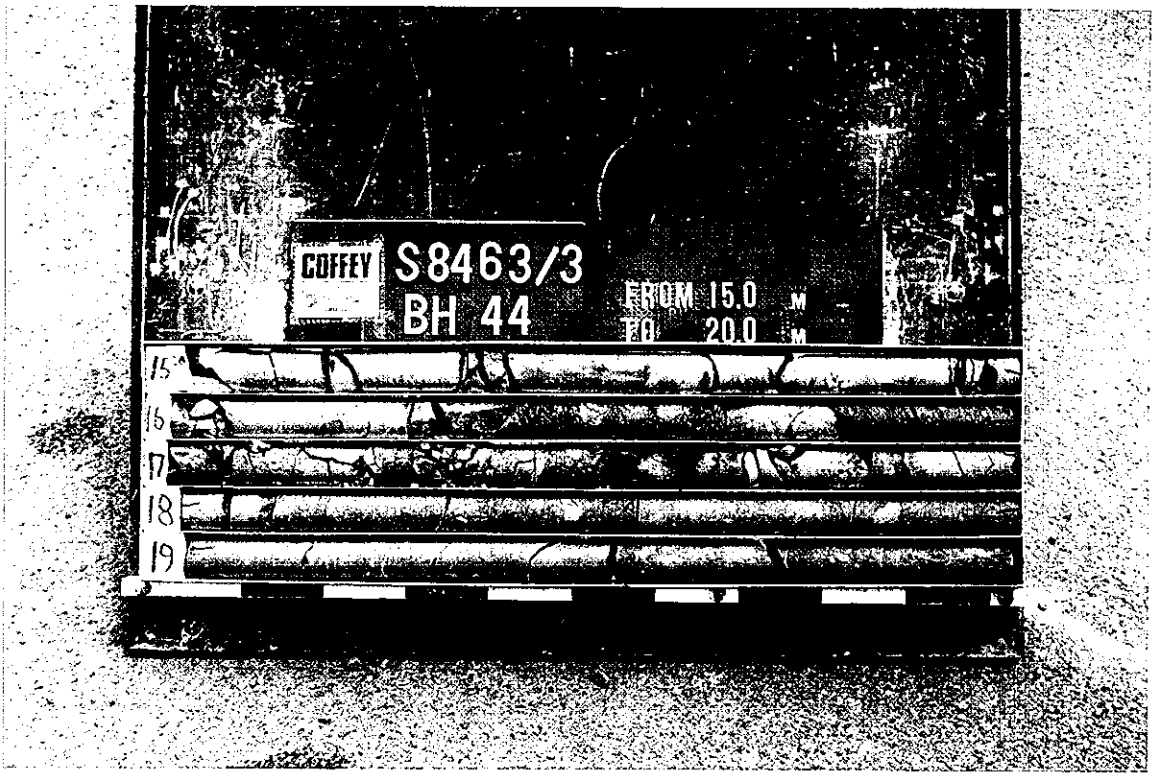
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 44
FROM 15.0 M
TO 20.0 M
15
16
17
18
19


COFFEY
S8463/3
BH 44
FROM 20.0 M
TO 25.0 M
20
21
22
23
24

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 44
sheet 3 of 5

engineering log – cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308578.8 N 1270007.8

hole commenced: 12.12.89
hole completed: 14.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 104.7 m
datum: AHD

drilling information

method	case-liff	water	R.L.	depth metres
NMLC			88	17
			87	18
			86	19
			85	20
			84	21
			83	22
			82	23
			81	24

rock substance

graphic log core loss	substance description (rock type: grain characteristics colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa
	BRECCIA: fine grained, light grey, with dark grey, grains, massive,	SW		
	BRECCIA: medium to coarse grained, dark grey, with light grey, grains massive,			
	BRECCIA: fine grained, light grey, massive,			
	BRECCIA: medium to coarse grained, light grey, to light brown, massive,	MW		
	BRECCIA: fine grained, light grey, massive,	SW		
	BRECCIA: medium to coarse grained,	MW		
	BRECCIA: fine grained, light grey, massive,	SW		
	BRECCIA: medium to coarse grained, light grey, to grey, massive.	FR		
	becoming light grey & fine grained			
	BRECCIA: fine grained, light grey, massive,			
	BRECCIA: medium to coarse grained, light grey, to grey, massive.			

rock mass defects

defect spacing mm (60 200 600 2000)	defect description (type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below)
	50mm JT 0 - 45deg IR RO Fe
	200mm jointed zone 0 - 45deg IR RO Fe
	20mm crushed zone
	350mm jointed zone 0 - 90deg IR RO Fe
	120mm jointed fractured zone Fe
	50mm jointed zone IR RO Fe
	JT 10deg IR RO clay infill
	JT 0deg IR RO clean
	JT 0deg IR RO trace of Fe
	JT 5deg IR RO clay veneer
	JT 10deg IR RO calcite vein
	JT 45deg IR RO calcite vein
	JT 45deg IR RO calcite vein
	JT 10deg PL RO clean
	JT 20deg PL RO clean
	JT 0deg IR RO clean
	JT 10deg IR RO clean
	JT 45deg PL RO calcite veneer
	JT 10deg PL RO clean
	JT 30deg IR RO clean
	JT 0deg PL RO clean
	JT 0deg PL RO clean
	JT 10deg PL RO clean
	JT 45deg PL RO clean
	JT 45deg PL RO, 5mm calcite infill

General Defect Description:
Partings at 0-20deg, PL-IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

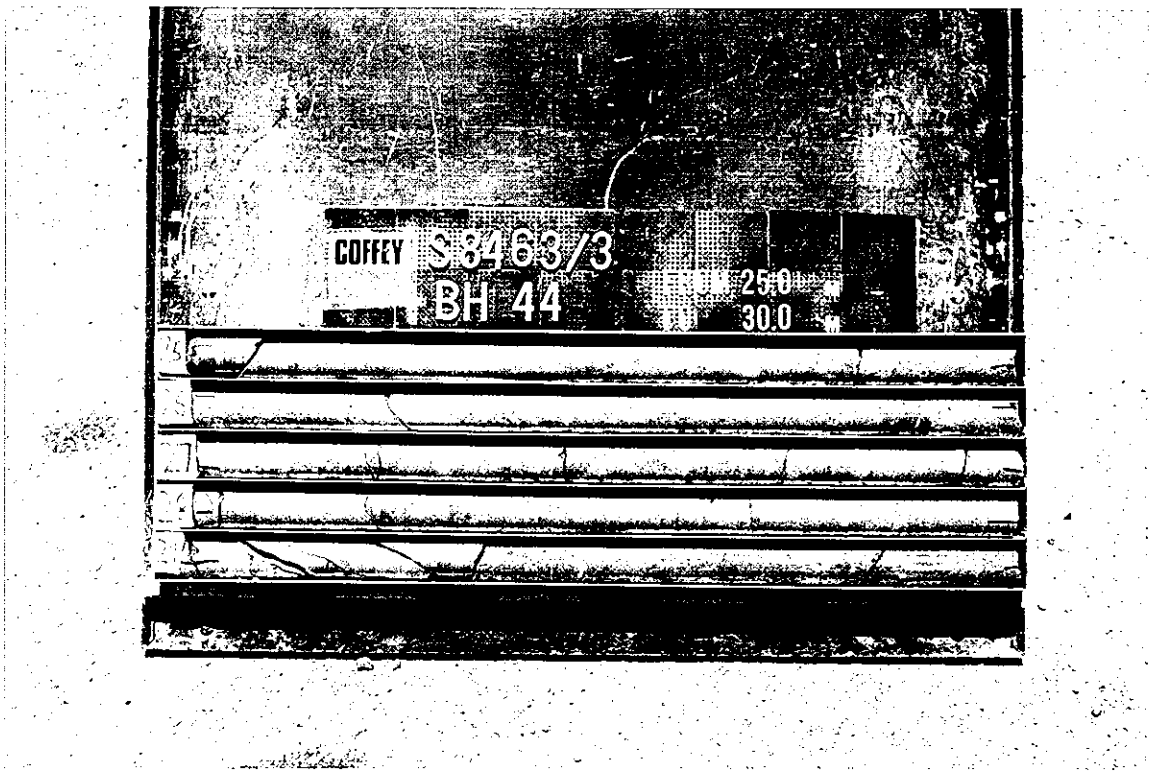
GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

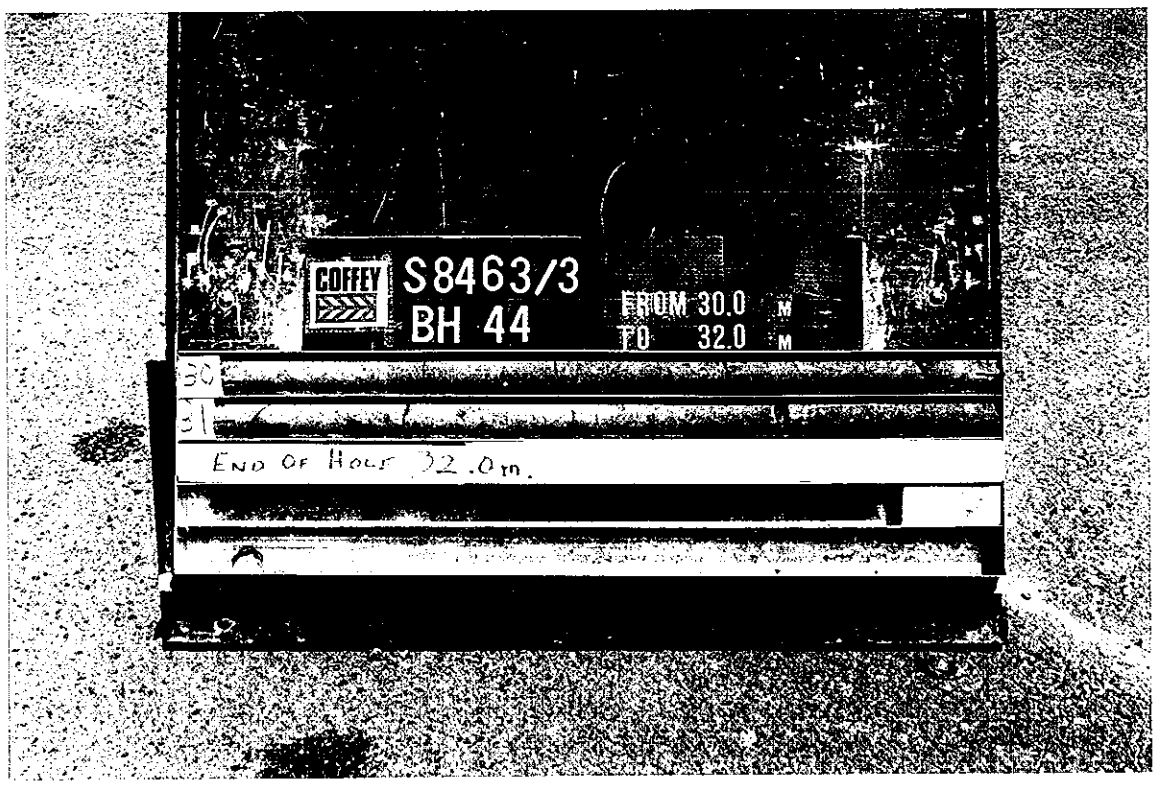
WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

187-229


COFFEY S8463/3
BH 44
FROM 25.0 M
TO 30.0 M


COFFEY S8463/3
BH 44
FROM 30.0 M
TO 32.0 M
END OF HOLE 32.0m.

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 44

sheet 4 of 5

engineering log - cored borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308578.6 N 1270007.6

hole commenced: 12.12.89
hole completed: 14.12.89
logged by: GJH
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0 fluid: WATER

slope: -90 DEG
bearing:

R.L.Surface: 104.7 m
datum: AHD

drilling information					rock substance					rock mass defects	
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	defect spacing mm 30 100 300 1000 3000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			80	25		BRECCIA: medium to coarse grained, light grey, to grey, massive,	FR				JT 10deg PL RO calcite infill JT 0deg PL RO clean
						BRECCIA: fine grained,					JT 45deg PL RO clean
			79	26		BRECCIA: medium to coarse grained, light grey, to grey, massive,					JT 10deg PL RO clean
			78								JT 0- 20deg IR RO clean
				27							JT 10deg IR RO clean JT 0deg IR RO clean
			77								JT 0deg IR RO clean
				28		BRECCIA: fine grained, grey,					JT 30deg PL RO clean
						BRECCIA: medium to coarse grained, light grey, to grey, massive,					JT 30deg PL RO calcite coated
			76								JT 0deg PL RO clean
				29							JT 75deg IR RO, 5mm calcite infill JT 75deg PL RO calcite coated
			75								JT 45deg IR RO clean
				30							JT 10deg IR RO clean JT 0deg IR RO clean
			74								JT 0deg IR RO clean
				31							JT 0deg IR RO clean JT 45deg PL RO calcite
											JT 0deg IR RO clean
			73								JT 0-10deg IR RO clean
				32							

General Defect Description:
Partings at 0-20deg, PL-IR

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - cored borehole

COFFEY

borehole no: 44

sheet 5 of 5

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	12.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308578.8 N 1270007.8	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0	fluid: WATER	bearing:
		R.L.Surface:	104.7 m
		datum:	AHD

drilling information					rock substance				rock mass defects	
method	case-iift	water	R.L.	depth metres	graphic log / core loss	substance description: rock type; grain characteristics; colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH) / point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below
NMLC			72	33		BRECCIA: medium to coarse grained, light grey, to grey, massive,	FR			
			71	34		**Borehole 44 Terminated at 32.35 m** Piezometer at 31.95m, 5m slotted. Sand at 26.4m (5.55m of sand). Bentonite at 25.85 (0.55m of bentonite (tablets). (Water flowing from piezometer when grout (cement & water) placed in hole) 135 litres of grout added to hole.				
			70	35						
			69	36						
			68	37						
			67	38						
			66	39						
			65	40						

General Defect Description:
Partings at 0-20deg, PL-IR

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

- water level
- water inflow
- * not measured Drilling Water
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 45
sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	14.12.89
principal:		hole completed:	14.12.89
project:	OLD MANS VALLEY	logged by:	GJH
borehole location:	E 308579.7 N 1270006.2	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	105.0 m	datum:	AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R			▽ 5.190	U50	105			CH	SANDY CLAY: medium plasticity, brown				RESIDUAL
					104	1							rading into Breccia
									BRECCIA: extremely - highly weathered, light brown				
					103	2							
					102	3							
					101	4							
					100	5							
					99	6							
					98	7							
					97	8			Borehole 45 Terminated at 7.50m				Piezometer placed at 7.4m, 1m slotted, Sand at 5.5m (1.85m of sand) Bentonite at 4.90m (0.65m of Bentonite)

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance ranging to refusal

WATER

* not measured
▽ water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

COFFEY

borehole no: 46
sheet 1 of 5

engineering log - borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308551.8 N 1270020.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
hole diameter:	100mm	bearing:	
R.L.Surface:	93.5 m		
datum:	AHD		

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
W		C							FILL: CLAY and GRAVEL	M	MD		FILL
								CL	SILTY CLAY: low to medium plasticity, red brown, some fine sand	M	H		RESIDUAL
R				U50	93	1							
										D	Fb		
					92			CL	SANDY CLAY: low to medium plasticity, mottled light brown & dark brown, some silt	>Wp	VSt		EW BRECCIA
				U50	91	2							
						3			BRECCIA: highly weathered	M D	H		
					90								
						4			Continued on Cored Borehole Sheet				
					89	5							
					88	6							
					87	7							
					86	8							

METHOD
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
C casing
M mud

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

T87-230


COFFEY
S 8463/3
BH 46
FROM 3.9 M
TO 13.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 46
sheet 2 of 5

engineering log – cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308551.7 N 1270020.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope: -90 DEG	R.L.Surface: 93.5 m
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing: datum: AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics, colour, structure, minor components)	weathering	Est. Strength (VL, L, M, H, VH, EH)	point load test Is(50) MPa	defect spacing mm (30, 100, 300, 1000, 3000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
			93	1							
			92	2							
			91	3							
			90			Continued from non-core borehole					
NMLC				4		BRECCIA: fine to coarse grained, mottled grey, and brown, indistinct bedding.	HW / MW				JT 30deg IR RO infill crushed Jointed crushed SM, 25mm thick crushed SM, 15mm thick
			89	5							4.78–5.07m jointed zone with Fe & crushed infill 5.33–5.75m jointed zone with Fe & crushed infill
			88	6			SW				Jointed crushed SM, 35mm thick crushed SM, 20mm thick
			87			BRECCIA: fine to coarse grained, mottled grey, and light grey, with trace to some brown, indistinct bedding.					crushed SM, 10mm thick crushed SM, 10mm thick
			86	7							crushed SM, 5mm thick
				8							

General Defect Description:
From 3.9 to 9.6m Joints / partings are generally ironstained to 30deg, with a trace of crushed infill

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

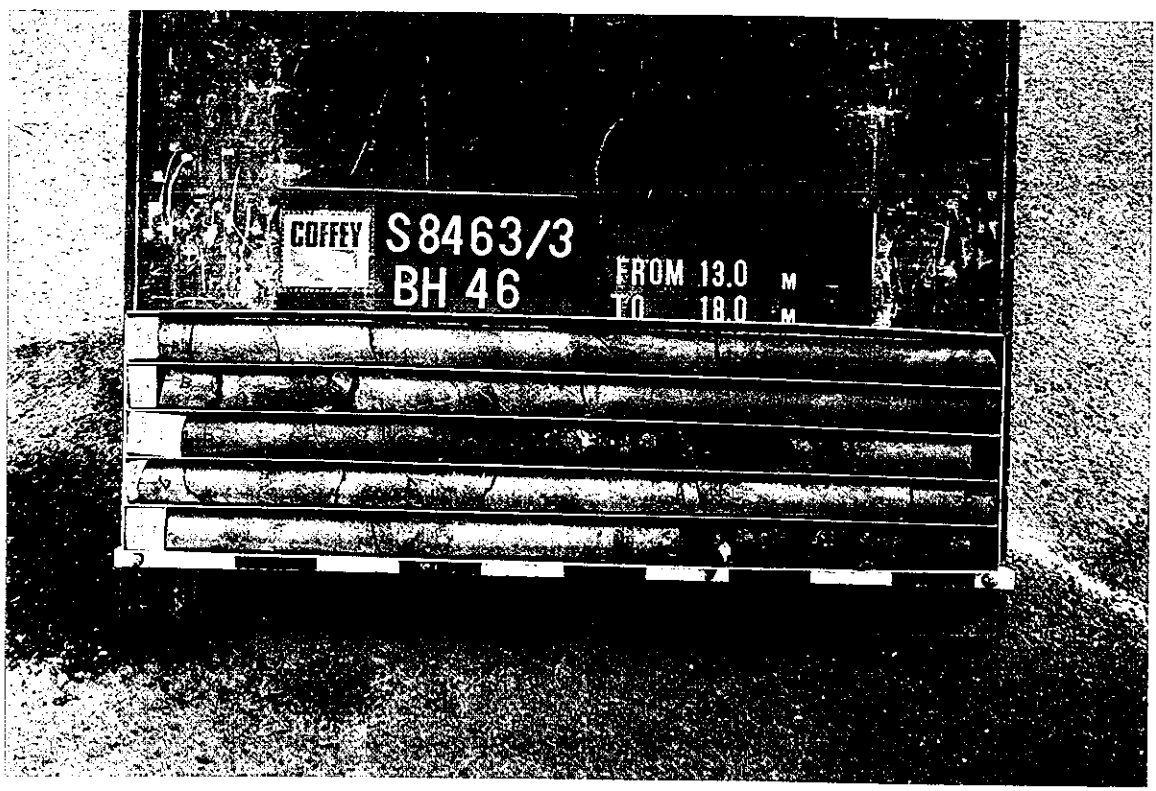
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 46
FROM 13.0 M
TO 18.0 M

Coffey & Partners Pty. Ltd.
Incorporated in Queensland.

engineering log - cored borehole

borehole no: 46
sheet 3 of 5

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308551.7 N 1270020.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
		R.L.Surface:	93.5 m
		datum:	AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description: rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (50 200 600 2000 6000)	defect description: type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			85	9		BRECCIA: fine to coarse grained, mottled grey, and light grey, with some ironstaining, indistinct bedding.	SW				JT 45deg PL RO crushed infill JT 30deg IR RO crushed infill JT 60deg PL smooth clean 8.82-9.6m MultiJTed with Fe & crushed infill
			84								
				10		BRECCIA: fine to coarse grained, mottled grey, and light grey, indistinct bedding.	FR				
			83								
				11							
			82								
				12							JT 50deg PL RO clean JT 50deg PL RO clean
			81								
				13							JT 60deg PL RO clean
			80								
				14							JT 45deg IR RO clean
			79								
				15							
			78								15.27 - 15.43m Jointed, crushed SM 15.53 - 15.80m Jointed and crushed
				16							

General Defect Description:
From 3.9 to 9.6m, Joints / partings are generally ironstained to 30deg. with a trace of crushed infill

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured Drilling Water
partial loss
complete loss

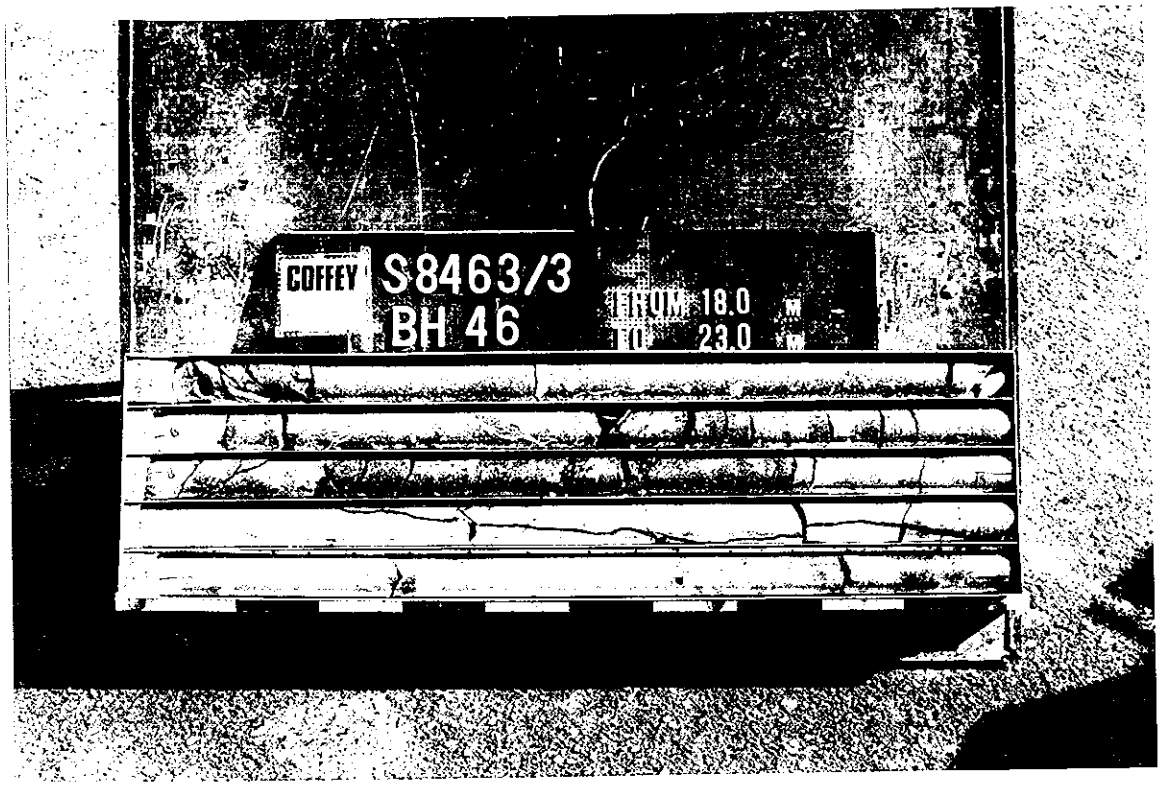
POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 46
FROM 18.0 M
TO 23.0 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 46
sheet 4 of 5

engineering log - cored borehole

office job no: S6463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308551.7 N 1270020.6

hole commenced: 11.12.89
hole completed: 12.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
barrel type and length: NMLC 3.0m
fluid: WATER
slope: -90 DEG
bearing:
R.L.Surface: 93.5 m
datum: AHD

drilling information | rock substance | rock mass defects

method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description (rock type: grain characteristics, colour, structure, minor components)	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	defect spacing mm (30 100 300 1000 3000)	defect description (type, inclination planarity, roughness, coating, thickness; unless otherwise noted defects follow general description below)
NMLC			77	17		BRECCIA: fine to coarse grained, mottled grey, and light grey, indistinct bedding.	FR				
			76	18							17.63 - 18.15m jointed zone with numerous crushed SMs
			75	19							
			74	20							JT 30deg IR RO crushed infill JT 40deg IR RO clean JT 60deg IR RO clean jointed crushed SM 60mm thick
			73	21							jointed crushed SM 30mm thick
			72	22		BRECCIA: fine grained, light grey, - green, indistinct bedding.					21.22 - 22.29m Vertical JT IR smooth,
			71	23		BRECCIA: fine to coarse grained, mottled light grey, and light grey - green, indistinct bedding.					JT 50deg IR RO crushed infill JT 60deg IR RO trace of crushed infill Jointed crushed SM, 90mm thick
			70	24							JT 60deg IR smooth clean

General Defect Description:

METHOD
AS auger screwing
AD auger drilling
R roller/tricone
W washbore
NMLC core drilling
NQ,HQ core drilling
casing used
barrel withdrawn

water level
water inflow
* not measured
Drilling Water
partial loss
complete loss

POINT LOAD TEST
D -diametral
A -axial

GRAPHIC LOG/CORE LOSS
core recovered (hatching indicates material)
no core recovered

WEATHERING
FR -fresh
SW -slightly
MW -moderately
HW -highly
EW -extremely

STRENGTH
EL -extremely low
VL -very low
L -low
M -medium
H -high
VH -very high
EH -extremely high

DEFECTS
JT -joint
PT -parting
SM -seam
CL -clay
RO -rough
DC -decomposed
PL -planar
IR -irregular


COFFEY
S8463/3
BH 46
FROM 23.0 M
TO 27.9 M

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

COFFEY

borehole no: 46
sheet 5 of 5

engineering log - cored borehole

office job no: S8463/3

client:	HORNSBY SHIRE COUNCIL	hole commenced:	11.12.89
principal:		hole completed:	12.12.89
project:	OLD MANS VALLEY	logged by:	JAF
borehole location:	E 308551.7 N 1270020.6	checked by:	PLV
drill model and mounting:	EDSON 3000 TRUCK	slope:	-90 DEG
barrel type and length:	NMLC 3.0m	fluid: WATER	bearing:
R.L.Surface:	93.5 m		
datum:	AHD		

drilling information					rock substance					rock mass defects	
method	case-liff	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	defect spacing mm 60 200 600 2000 6000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			69	25		BRECCIA: fine to coarse grained, mottled light grey and light grey - green, indistinct bedding.	FR				JT 90deg IR smooth clean JT 45deg IR RO clean JT 90deg IR smooth clean
			68								
				26							
			67								JT 70deg PL smooth clean JT 70deg PL smooth clean
				27							26.78 - 27.12m JT 90deg PL smooth coated with 1mm calcite
			66								JT 90deg IR smooth, coated 1mm calcite JT 75deg PL smooth, trace of calcite
				28		Borehole 46 Terminated at 27.90 m Piezometer slotted 27.90 - 24.90m Sand to 24.50m, Bentonite plug to 24.10m, Cement grout to surface					
			65								
				29							
			64								
				30							
			63								
				31							
			62								
				32							

General Defect Description:

METHOD
- AS auger screwing
- AD auger drilling
- R roller/tricone
- W washbore
- NMLC core drilling
- NQ,HQ core drilling
- casing used
- barrel withdrawn

Drilling Water
- water level
- water inflow
- * not measured
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- CL -clay
- RO -rough
- DC -decomposed
- PL -planar
- IR -irregular

787-229

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Incorporated in Queensland.

COFFEY

borehole no: 47

sheet 1 of 1

engineering log - borehole

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
borehole location: E 308551.7 N 1270018.1

hole commenced: 12.12.89
hole completed: 12.12.89
logged by: JAF
checked by: PLV

drill model and mounting: EDSON 3000 TRUCK
hole diameter: 100mm

slope: -90 DEG
bearing:

R.L.Surface: 93.4 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
R					93	1		CL	FILL: Clay and gravel	M	MD		FILL
									SILTY CLAY: low to medium plasticity, red brown, some fine sand	M D	H Fb		RESIDUAL
					92	2		CL	SANDY CLAY: low to medium plasticity, mottled light brown and dark brown, some silt	>Wp	VS		EW BRECCIA
					91	3							
					90				BRECCIA: highly weathered	M D	H		
						4			Borehole 47 Terminoted at 3.50m Piezometer, slotted 1.5m from 3.50 - 2.00m. Sand to 1.75m, Bentonite plug and grout.				
					89	5							
					88	6							
					87	7							
					86	8							

METHOD

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
*bit shown by suffix	
B	blank bit
V	V bit
T	TC bit
e.g.	ADT

SUPPORT

C casing
M mud

PENETRATION

1 2 3 — no resistance / ranging to / refusal

WATER

* not measured
water level
water outflow
water inflow

NOTES samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test:
N*	SPT + sample recovered
Nc	SPT with solid cone
V	vane shear
P	pressuremeter
Bs	bulk sample
R	refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE

D	dry
M	moist
W	wet
Wp	plastic limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

S8463/3-AG
18th July, 1990

LIST OF EXCAVATIONS

TEST PIT NO.	CO-ORDINATES EAST	NORTH	SURFACE RL(m)	DEPTH (m)
TP9	308560	1269874	111.0	3.1
TP10	308544.5	1269921	102.5	2.26
TP11	308541.5	1269919.5	102.0	1.90

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Incorporated in Queensland

COFFEY

pit no TP9
sheet 1 of 1

engineering log - excavation

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MAN'S VALLEY
pit location: E 308560 N 1269874

pit commenced: 19.1.90
pit completed: 19.1.90
logged by: PLV
checked by: PLV

equipment type and model: BACKHOE
excavation dimensions: 4.0m m long 1.0m m wide

R.L.Surface: 111.0 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa (100 200 300 400)	structure and additional observations
BH					111			GC	FILL: CLAYEY GRAVEL, medium to coarse grained, medium to high plasticity, grey	M	MD		FILL FROM QUARRY
								CH	CLAY: high plasticity, reddish brown, a trace of clay reddish brown	M	VSt H		RESIDUAL
					110	1		CH	SANDY CLAY: medium to high plasticity brown becoming mottled grey brown with depth, grading to gravelly sandy clay	M	H		EW BRECCIA
					109	2							
					108	3							tending to HW breccia at base of pit.
					107	4			Pit TP9 Terminated at 3.10 m				
					106	5							
					105	6							
					104	7							
					103	8							

METHOD
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HA hand auger
DT diatube

SUPPORT
T timbering
N nil

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
D none encountered
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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COFFEY

pit no
TP 10
sheet 1 of 1

engineering log - excavation

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MAN'S VALLEY
pit location: E308544.5 N 1269921

pit commenced: 19.1.90
pit completed: 19.1.90
logged by: PLV
checked by: PLV

equipment type and model: BACKHOE
excavation dimensions: 4.0 m long 1.0 m wide

R.L.Surface: 102.5 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L.	depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
BH					102	0		CH	SANDY CLAY: high plasticity mottled light brown grey	M	VSt H		EW BRECCIA; RESIDUAL
				Bs		1			Clay decreasing with depth				
					101				Subrounded to angular fragments to 150mm				
						2			BRECCIA: Highly weathered				
					100	3			Pit TP10 Terminated at 2.26 m				
					99	4							
					98	5							
					97	6							
					96	7							
					95	8							

METHOD
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HA hand auger
DT diatube

SUPPORT
T timbering
N nil

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
D none encountered
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

188-239

Coffey & Partners Pty. Ltd
Incorporated in Queensland.

engineering log - excavation

COFFEY

pit no TP11
sheet 1 of 1

office job no: S8463/3

client: HORNSBY SHIRE COUNCIL
principal:
project: OLD MANS VALLEY
pit location: E 308541.5 N 1269919.5

pit commenced: 4.5.90
pit completed: 9.5.90
logged by: SRM
checked by: PLV

equipment type and model: CASE 580 Backhoe
excavation dimensions: 4.0 m long 5.0 m wide

R.L.Surface: 102.0 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, test,etc	R.L. / depth metres	graphic log	classification symbol	material: soil type:plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
BH		NIL			102		SM	TOPSOIL: SILTY SAND: fine to medium grained, brown, becoming clayey	M	L		TOPSOIL with tree roots
					101 1		CL	SANDY CLAY: yellow brown, sand & gravel fine to coarse grained	>Wp	VSt		RESIDUAL clay
								BRECCIA: fine to coarse grained, brown, with corestones up to 300mm	M	VSt		EW BRECCIA 300x300mm Undisturbed block samples taken from 1.2 to 1.5m
								BRECCIA: fine to coarse grained, brown	M	H		HW BRECCIA
					100 2			Pit TP11 Terminated at 1.90 m				
					99 3							
					98 4							

METHOD
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HA hand auger
DT diatube

SUPPORT
T timbering
N nil

PENETRATION
1 2 3 — no resistance ranging to refusal

WATER
D none encountered
* not measured
water level
water outflow
water inflow

NOTES samples and tests
U50 undisturbed sample 50 mm diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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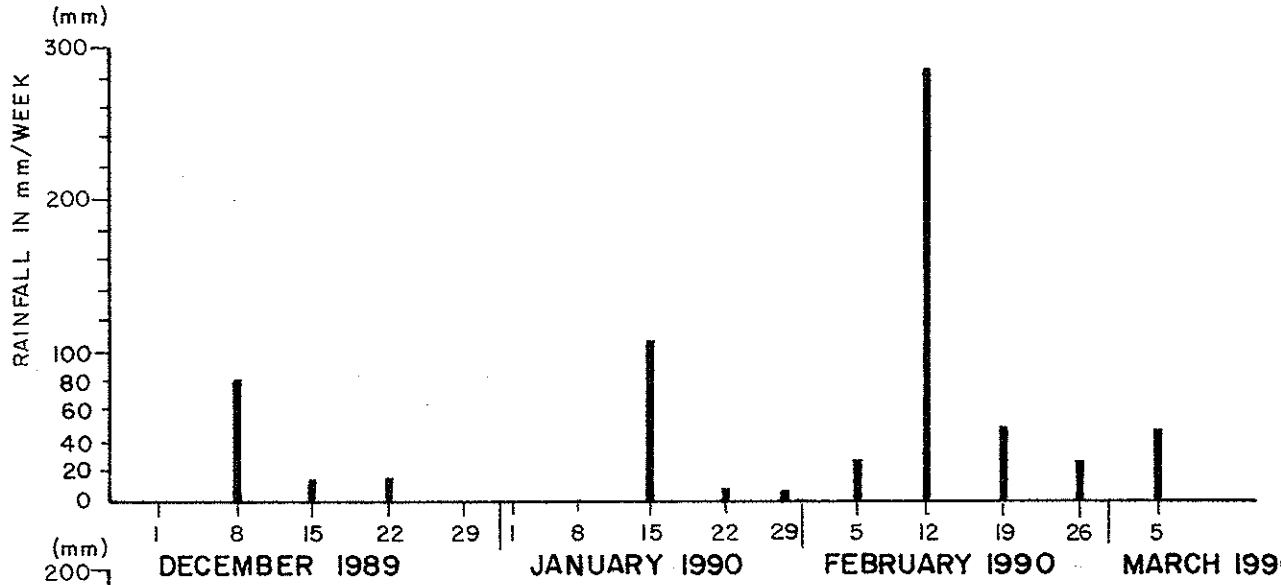
APPENDIX B

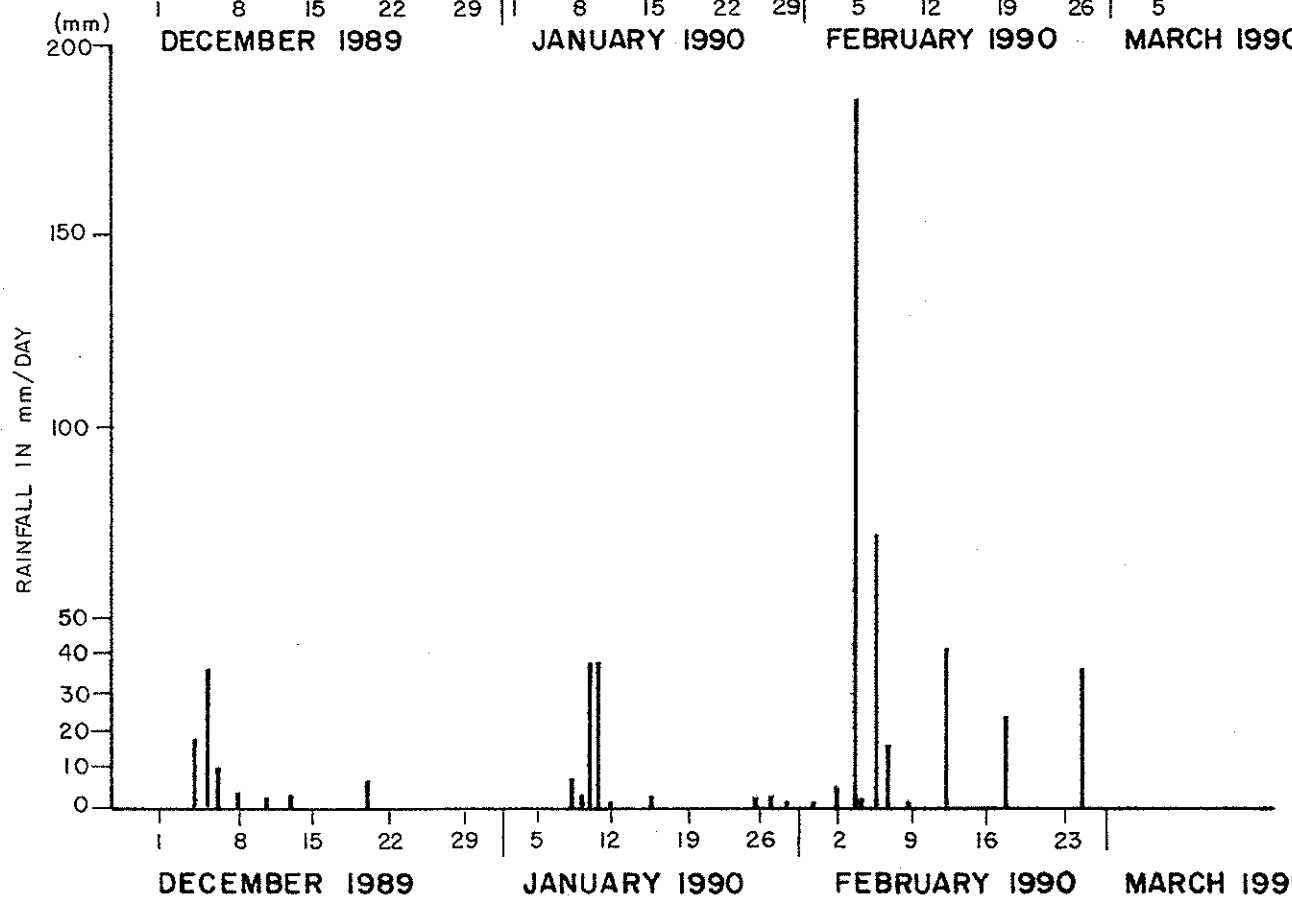
APPENDIX B

BOREHOLE PIEZOMETRIC LEVELS

S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

RAINFALL REGISTRATIONS

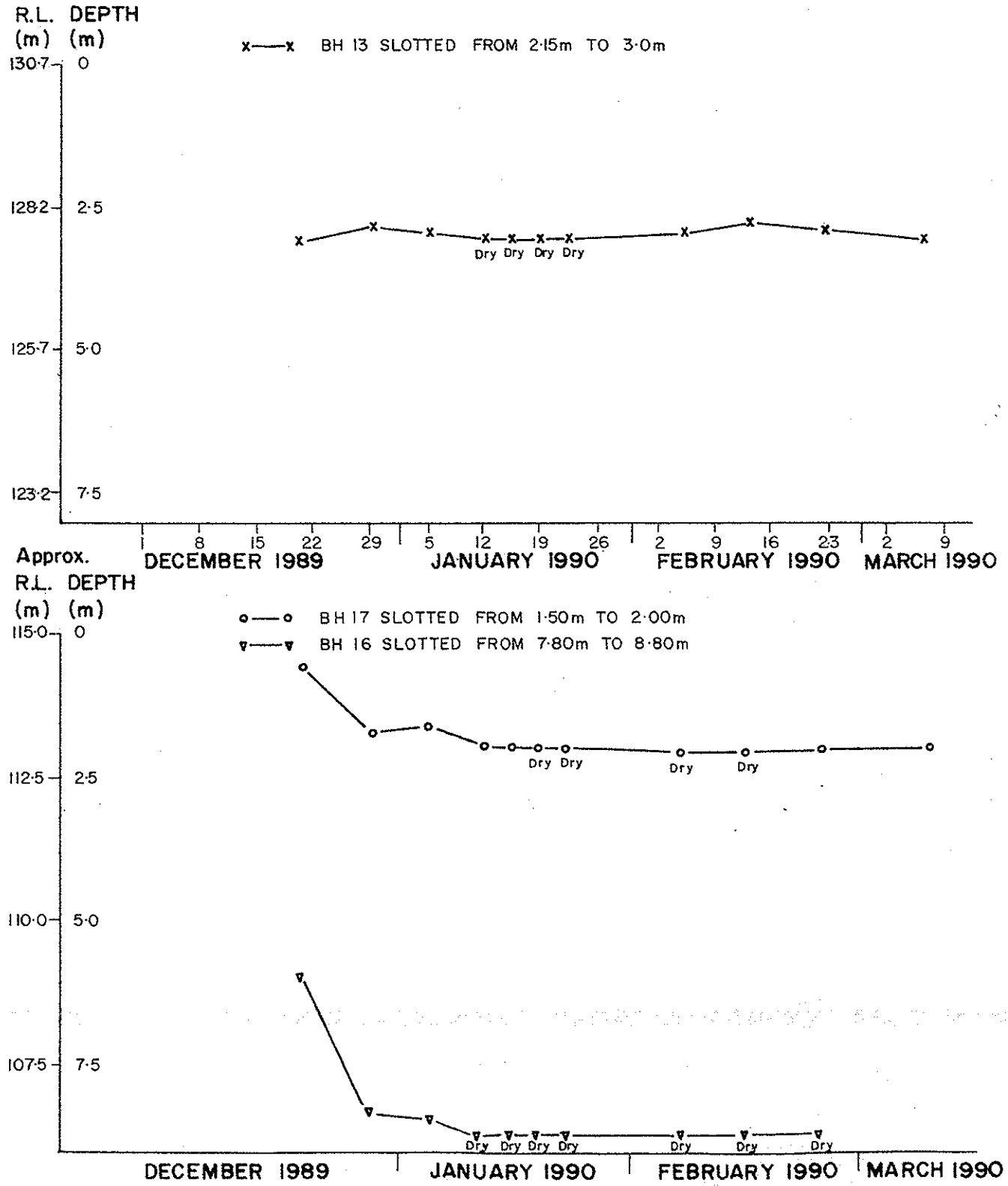




NOTE 1) RAINFALL READINGS ARE FOR WAHROONGA, FROM THE BULLETIN OF DAILY METROPOLITAN RAINFALL PREPARED BY THE BUREAU OF METEOROLOGY.
2) ALL RAINFALL ARE BASED ON TELEGRAPHIC REPORTS
3) RAINFALLS ARE FOR THE 24 HOURS ENDED 9 A.M. ON THE DATE SHOWN.

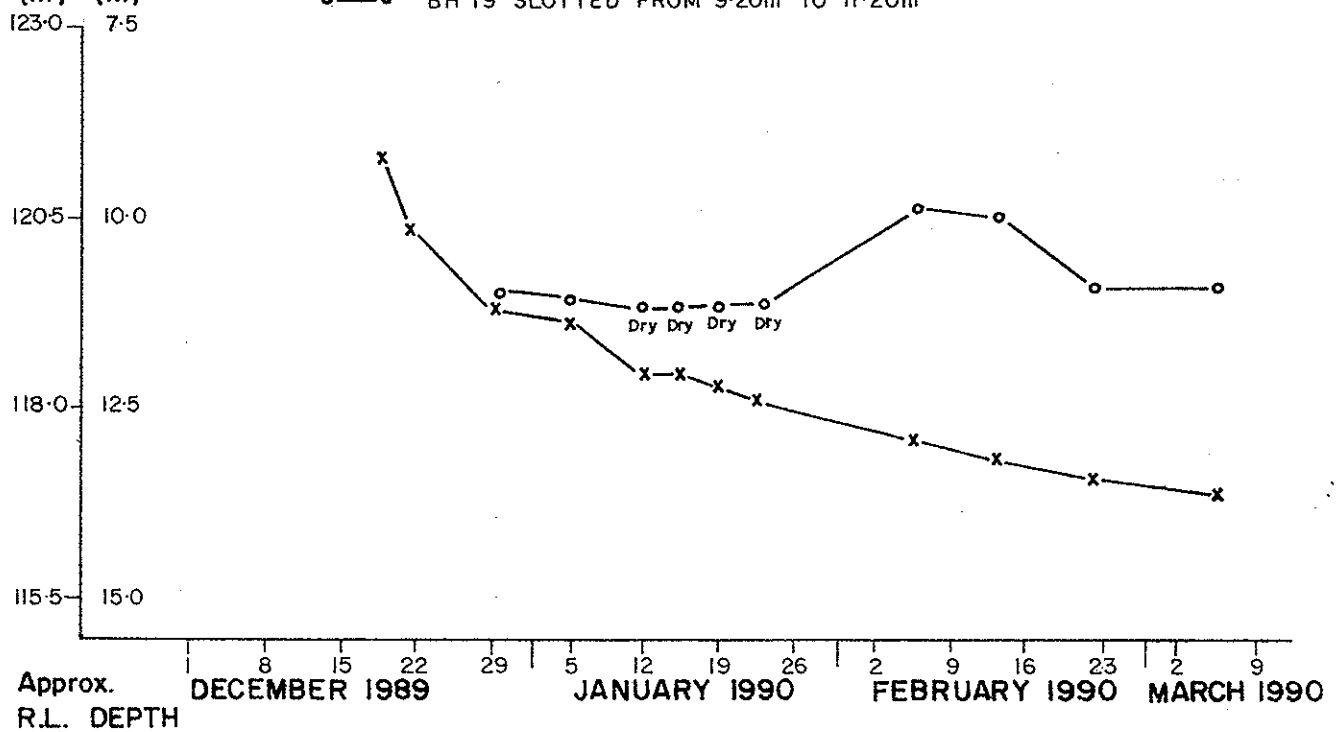
S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

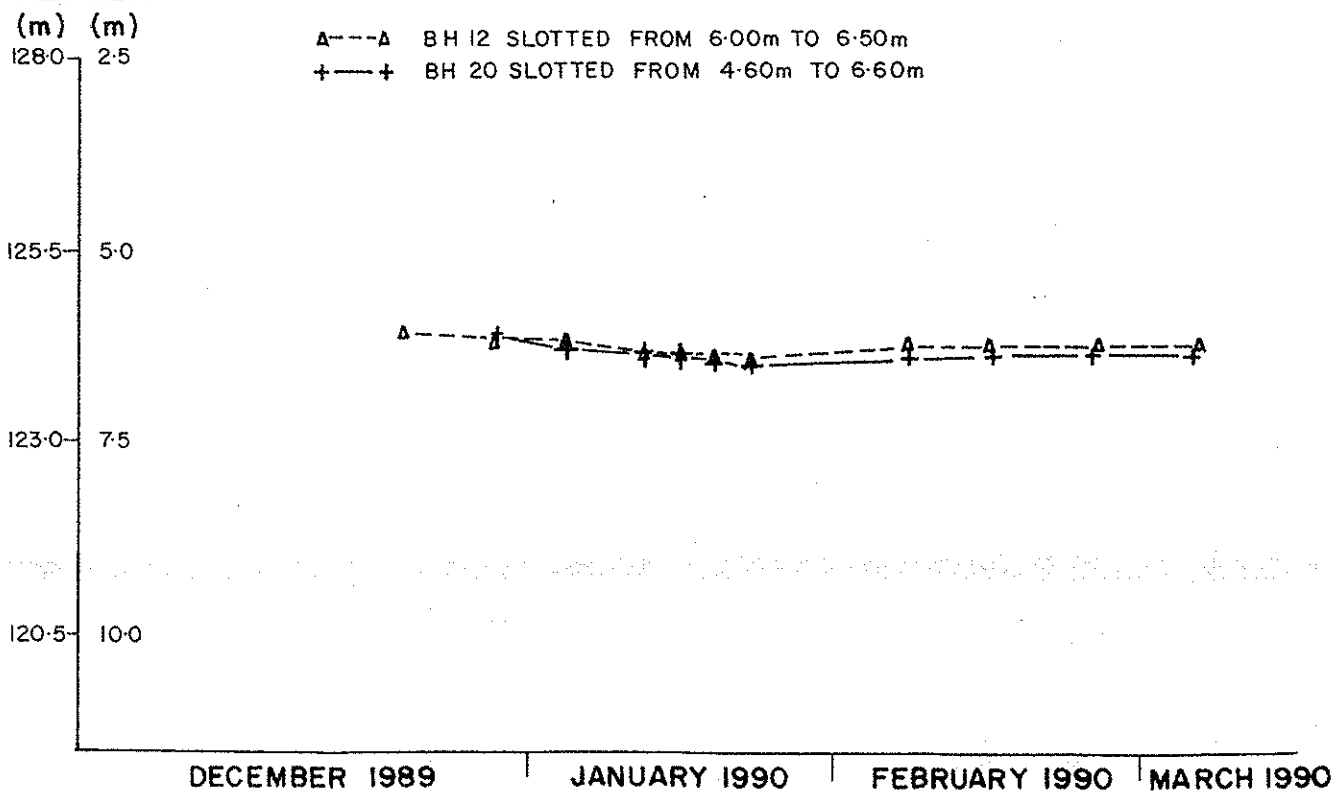
PIEZOMETRIC LEVELS VERSUS TIME



S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

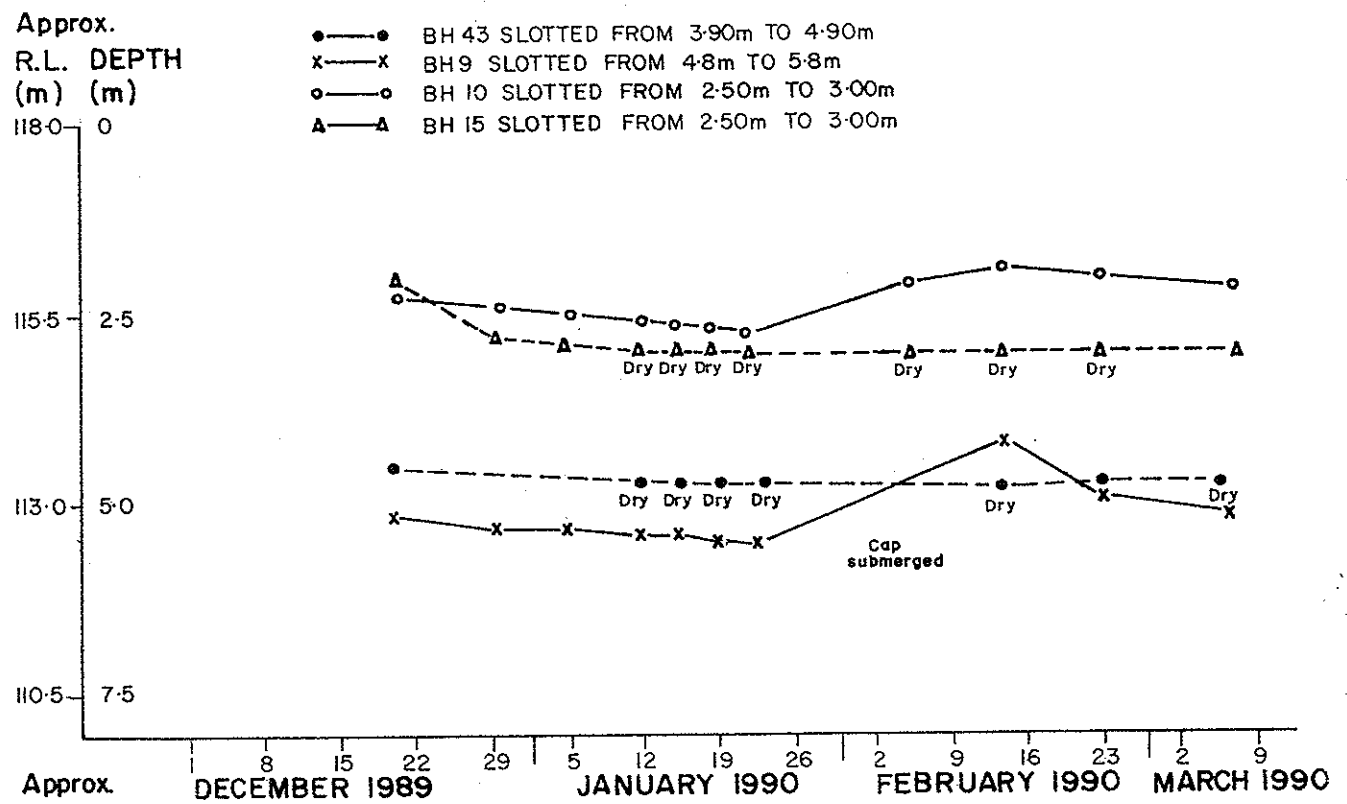
PIEZOMETRIC LEVELS VERSUS TIME

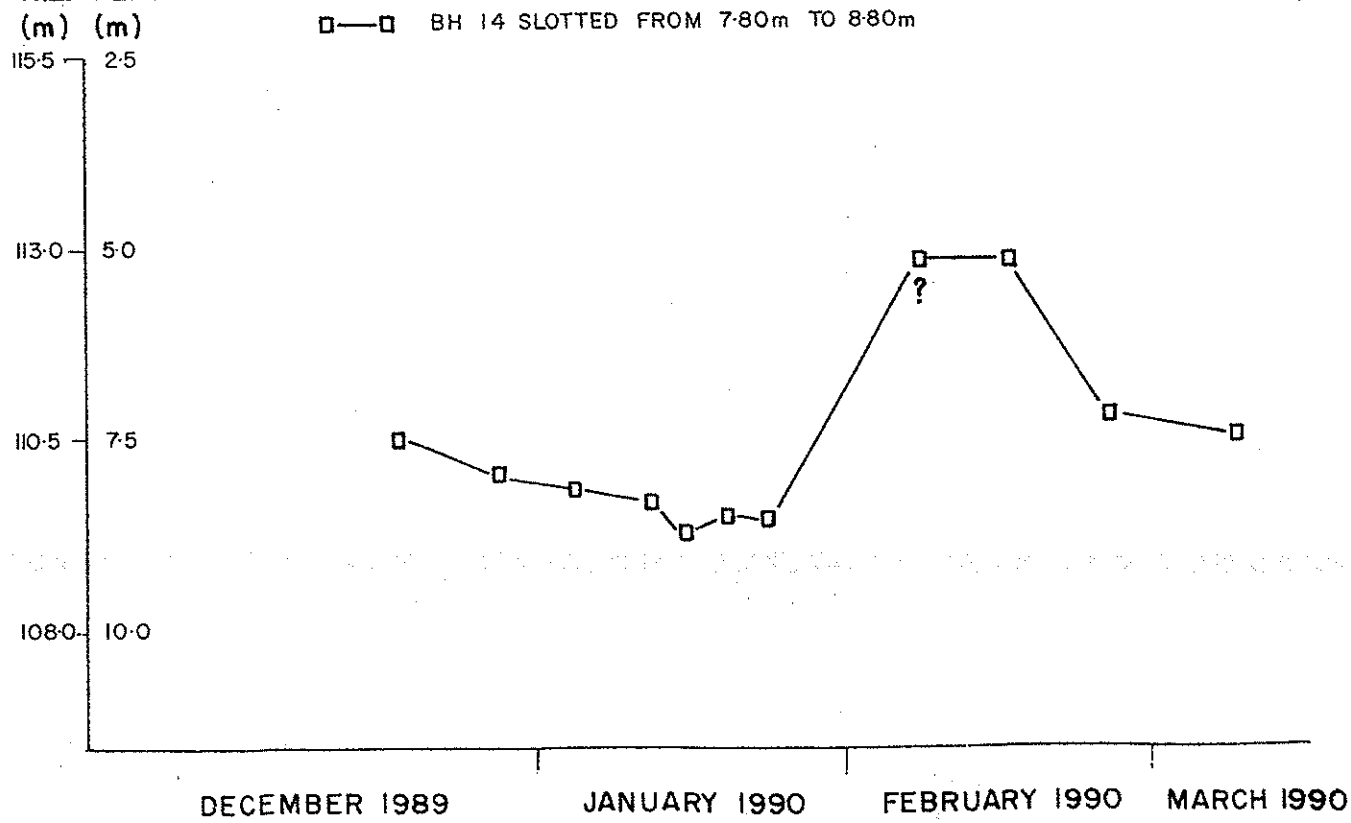




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

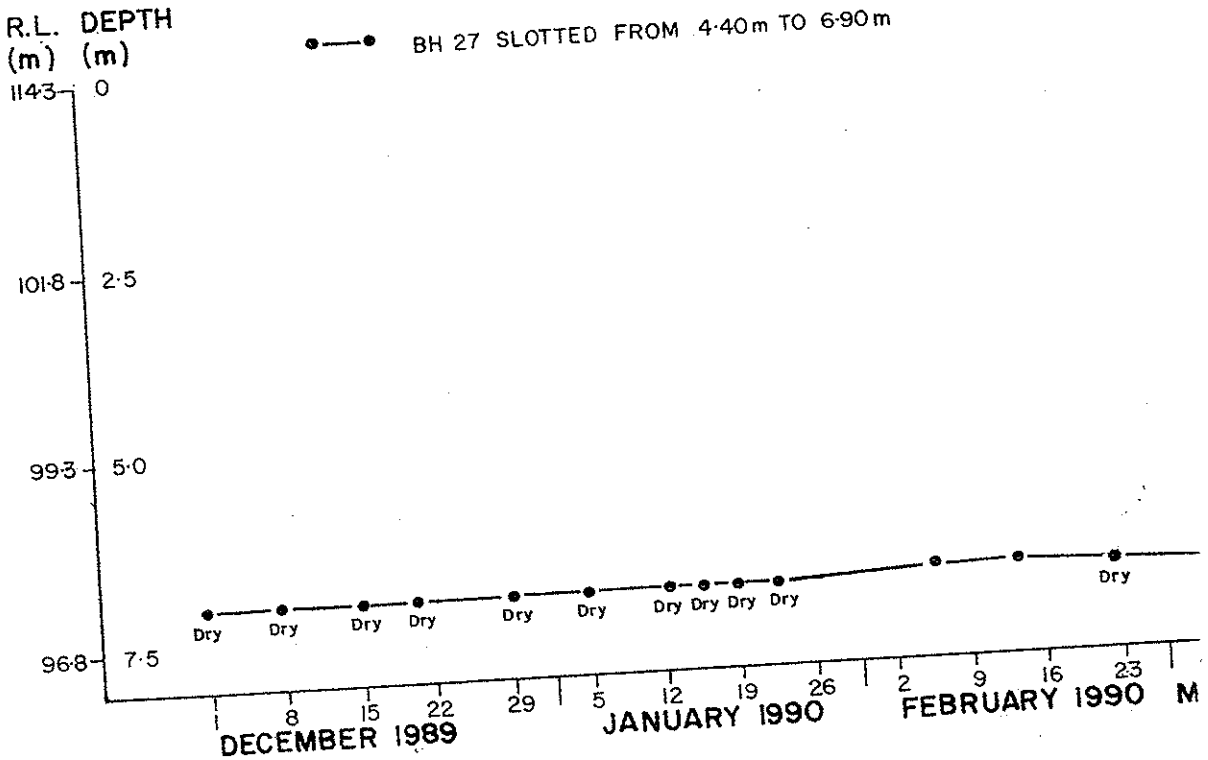
PIEZOMETRIC LEVELS VERSUS TIME

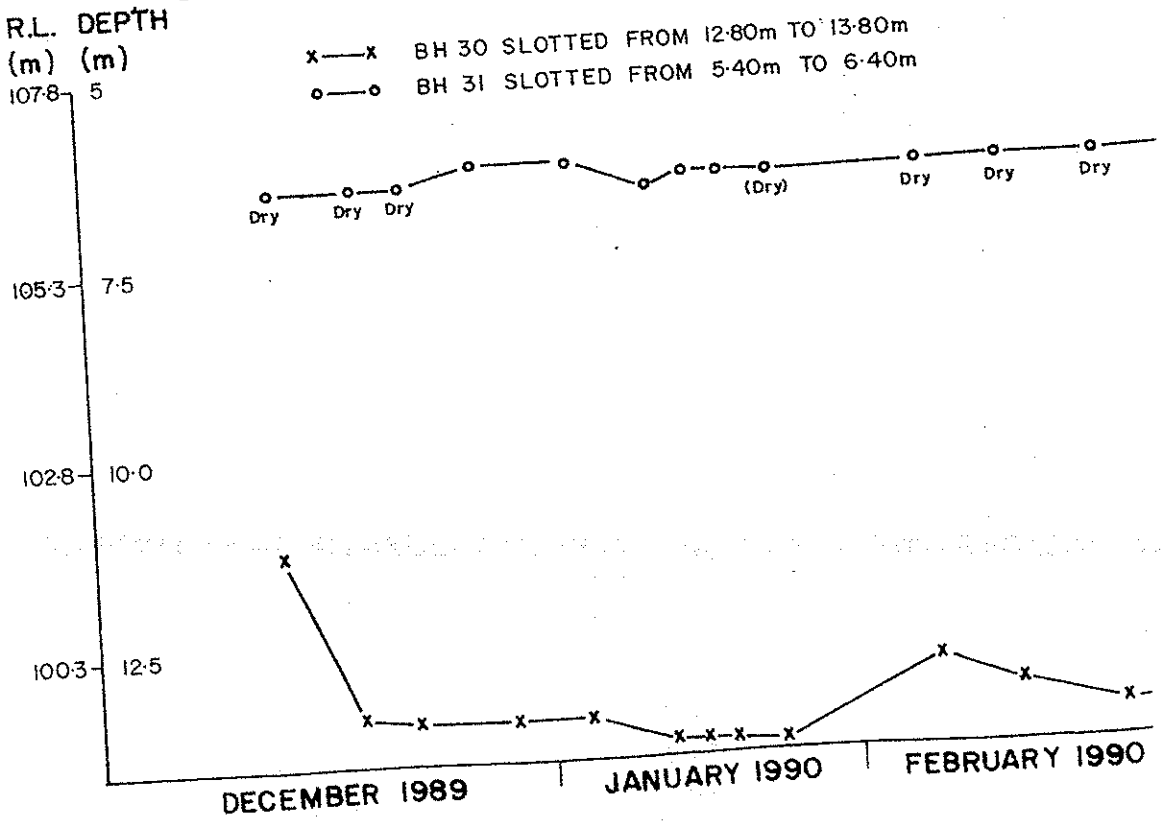




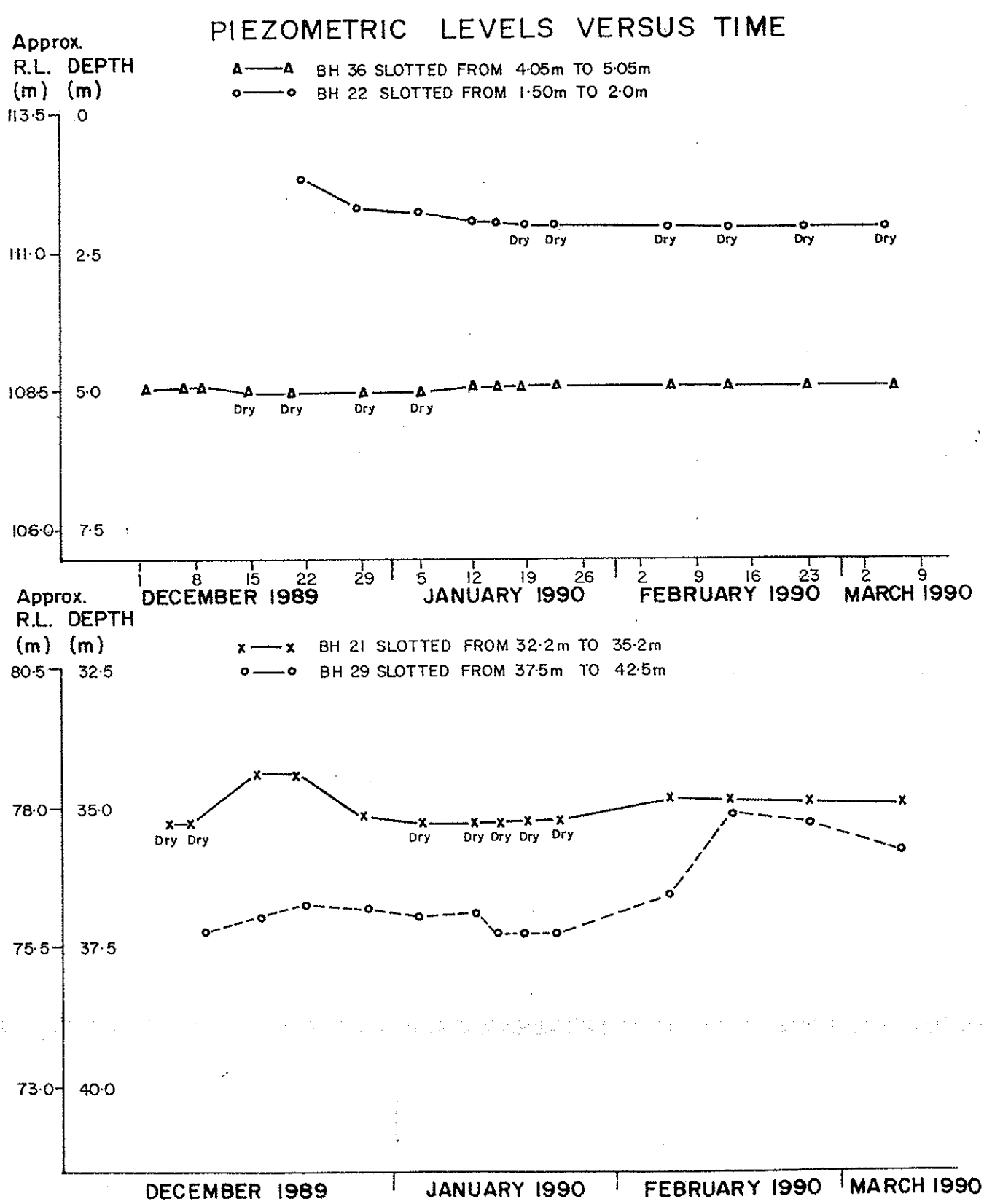
S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

PIEZOMETRIC LEVELS VERSUS TIME



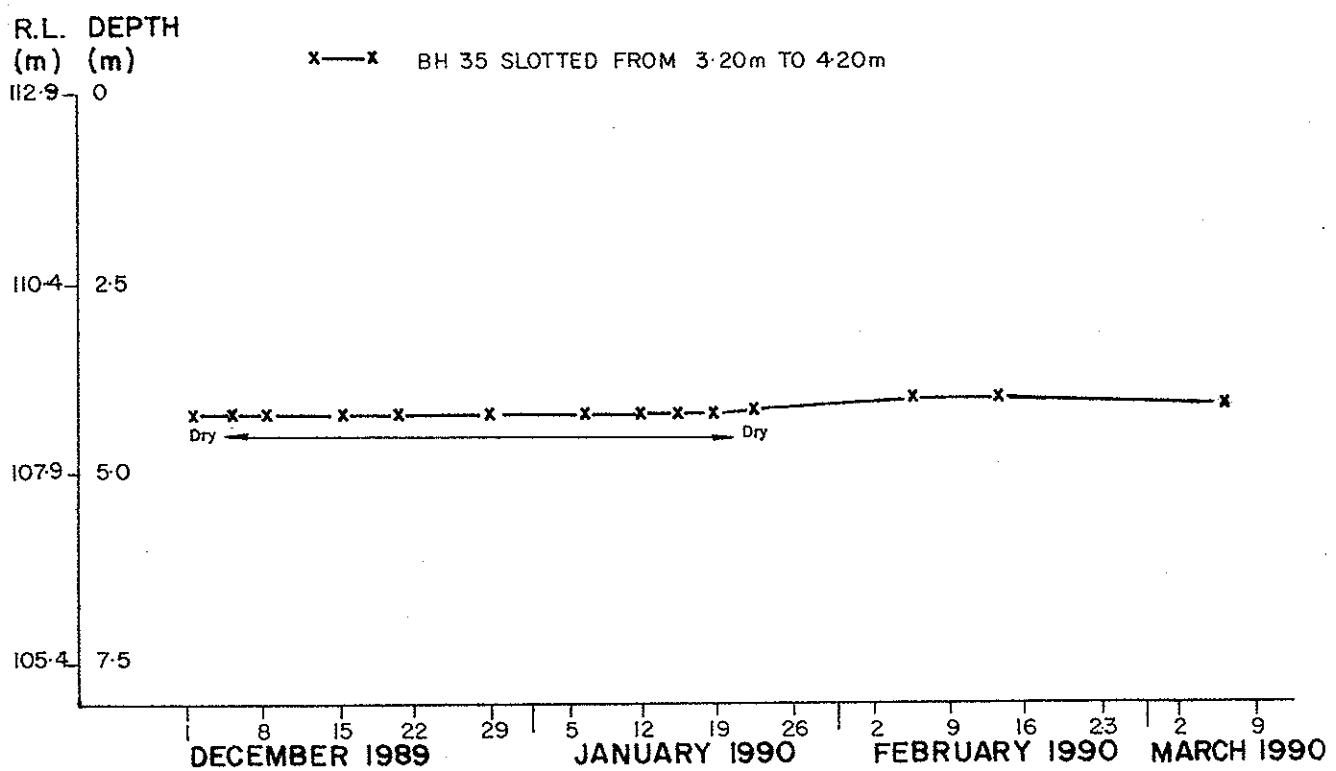


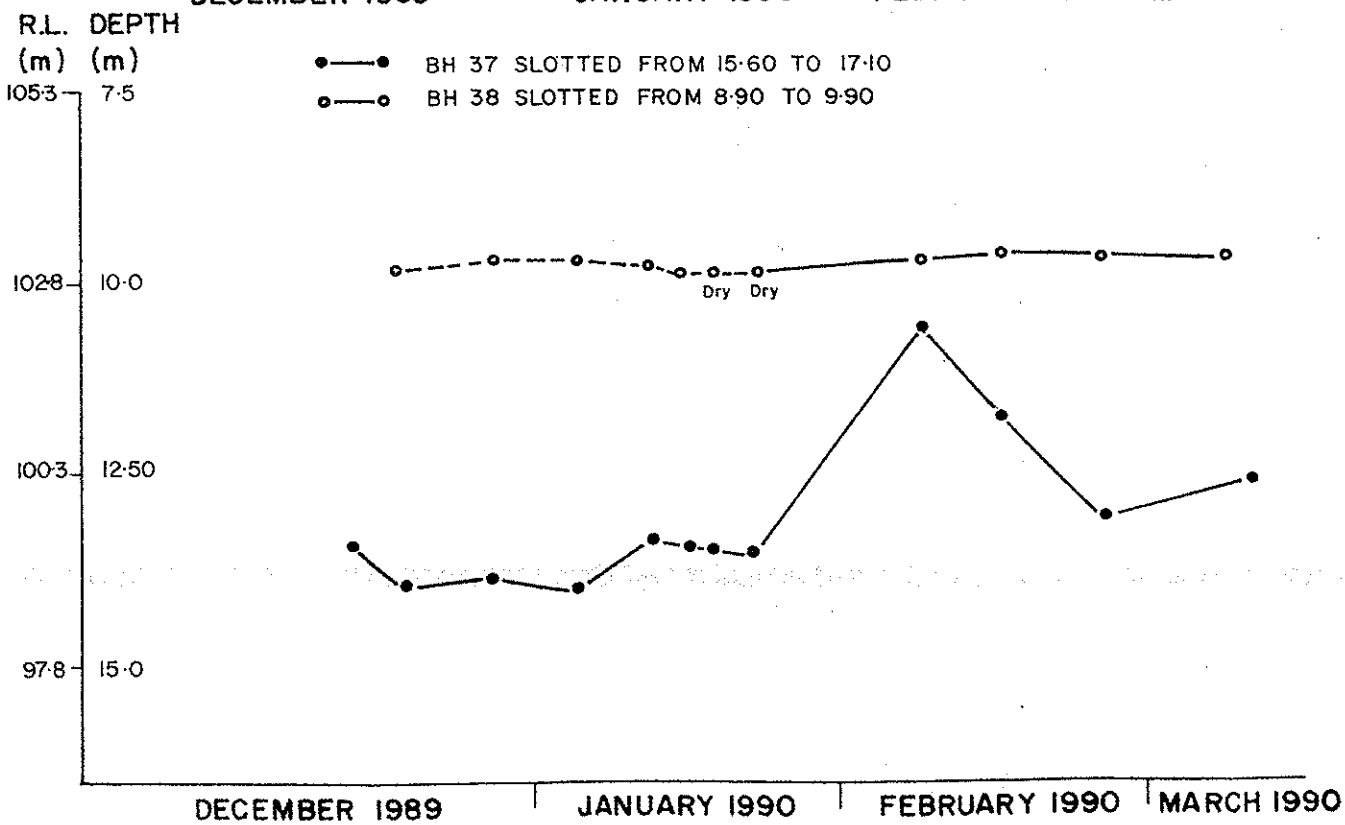
S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY



S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

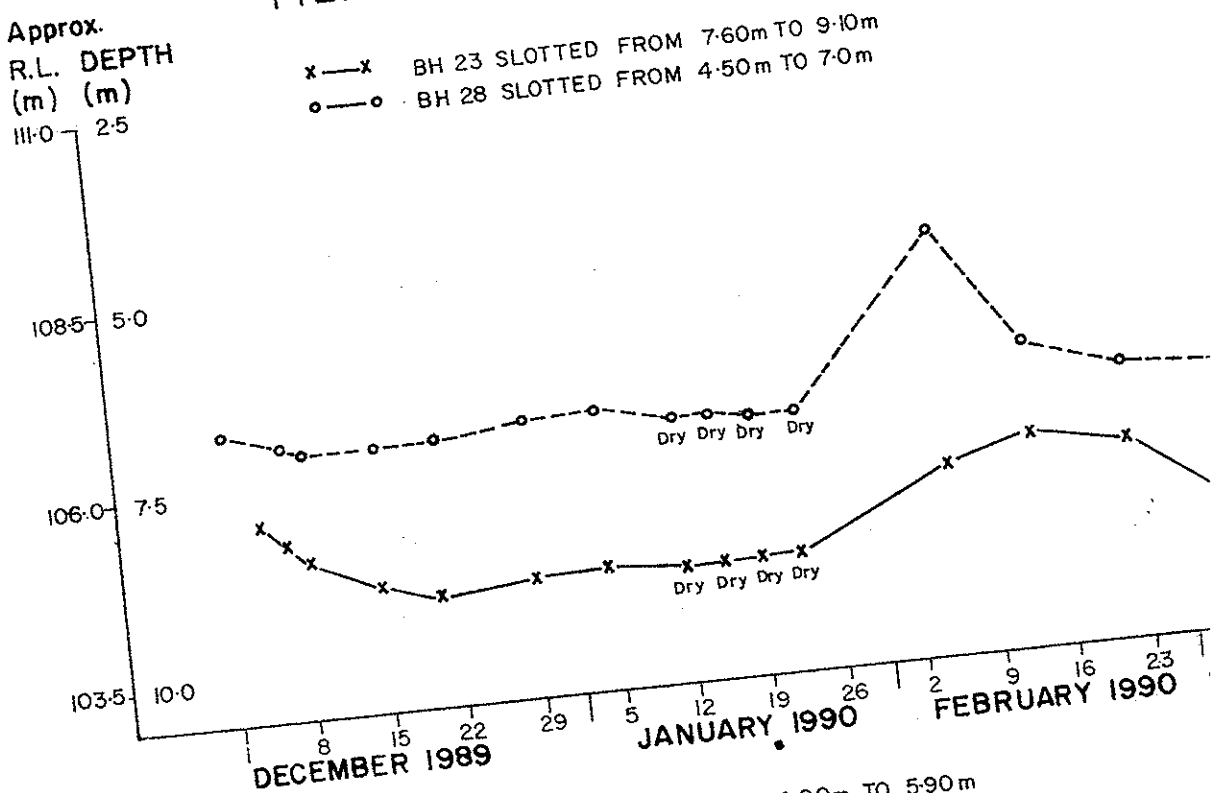
PIEZOMETRIC LEVELS VERSUS TIME

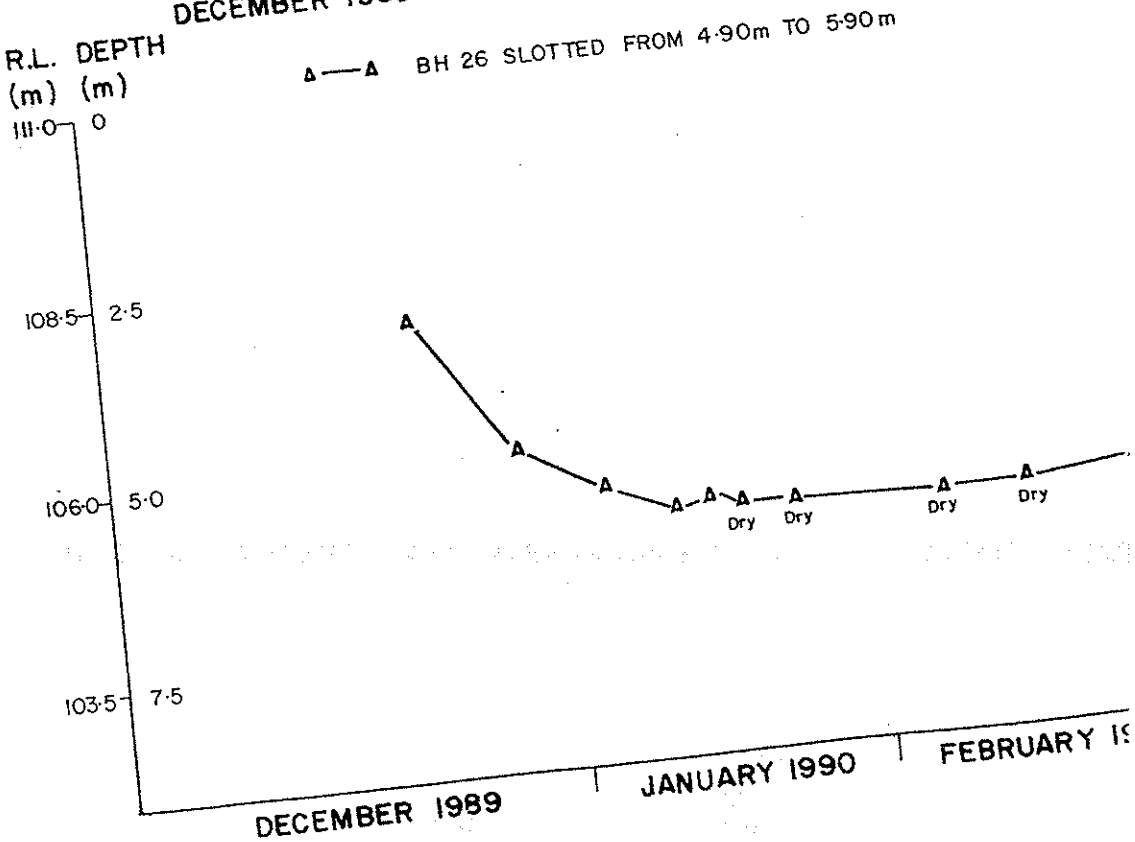




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

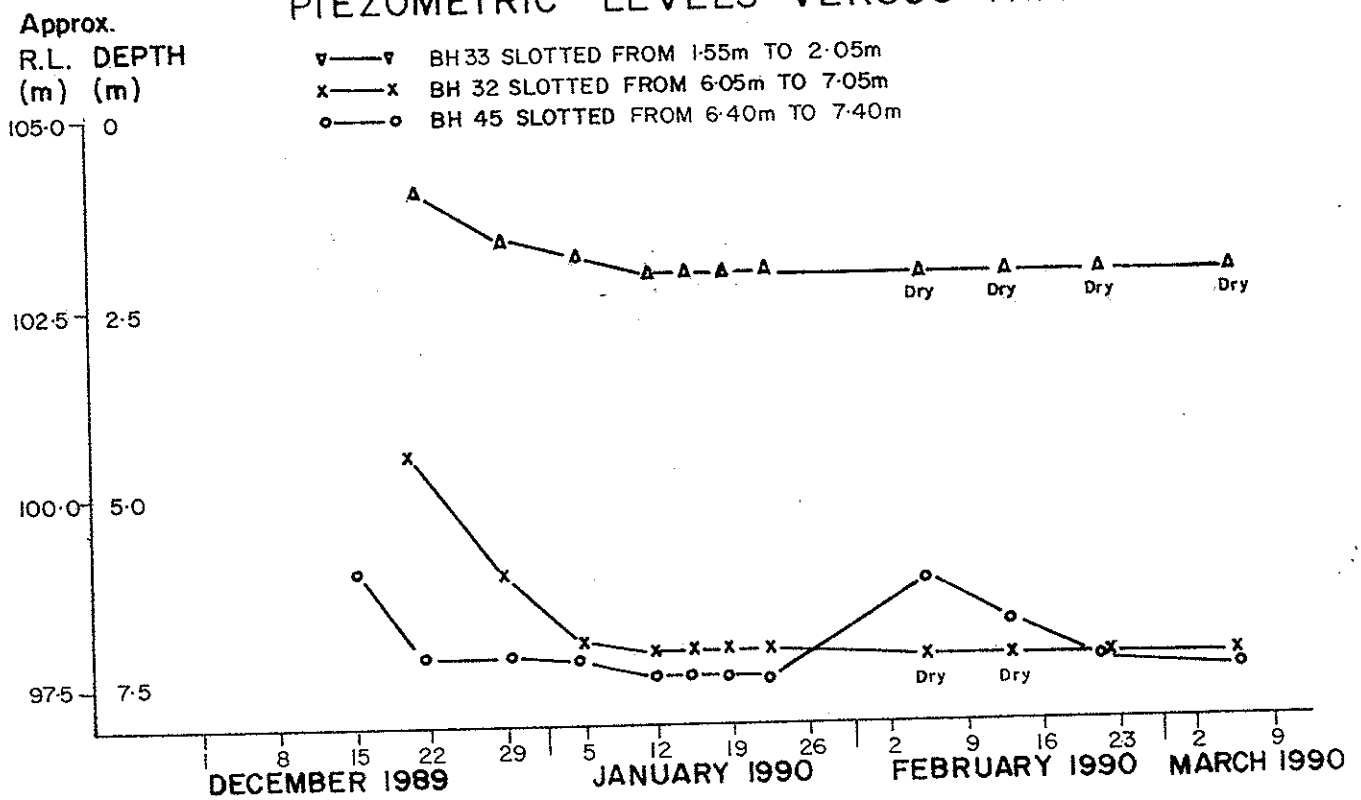
PIEZOMETRIC LEVELS VERSUS TIME

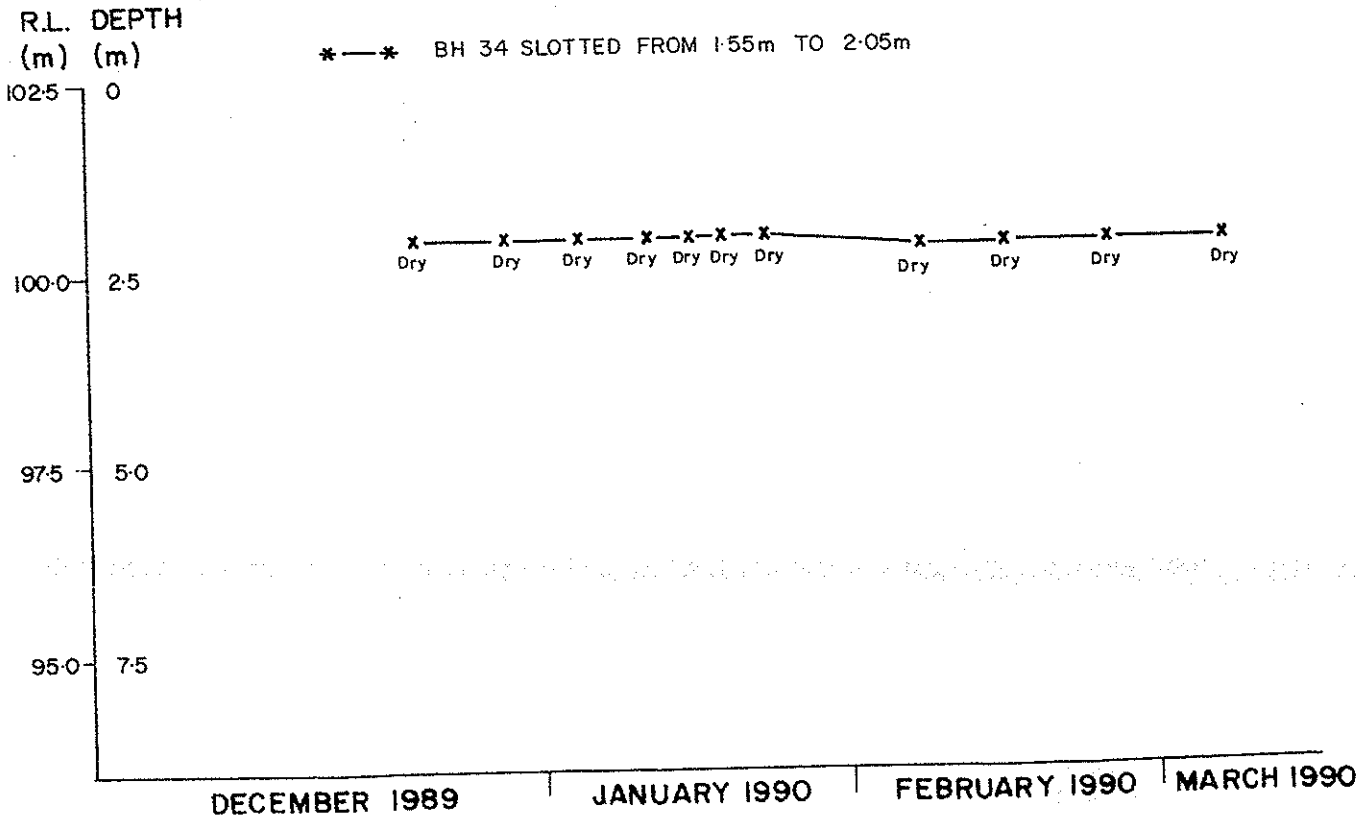




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

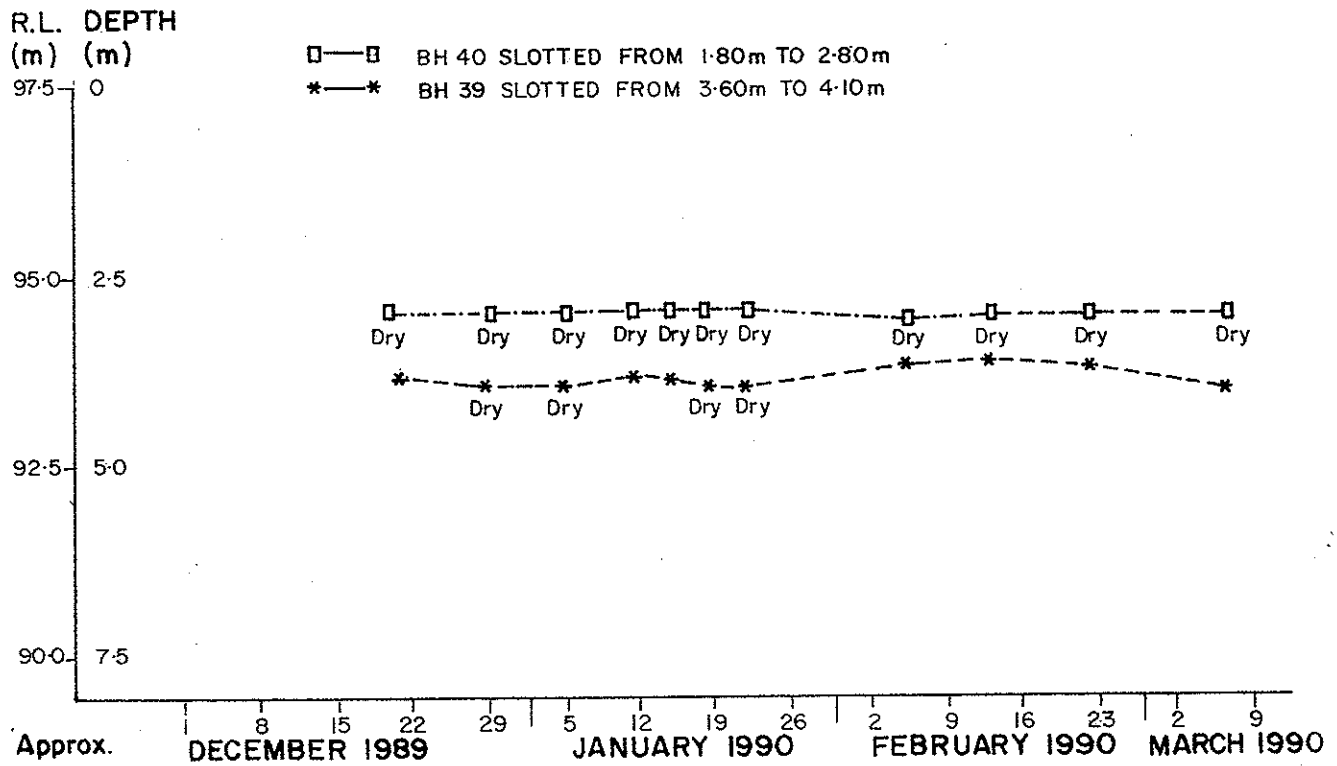
PIEZOMETRIC LEVELS VERSUS TIME

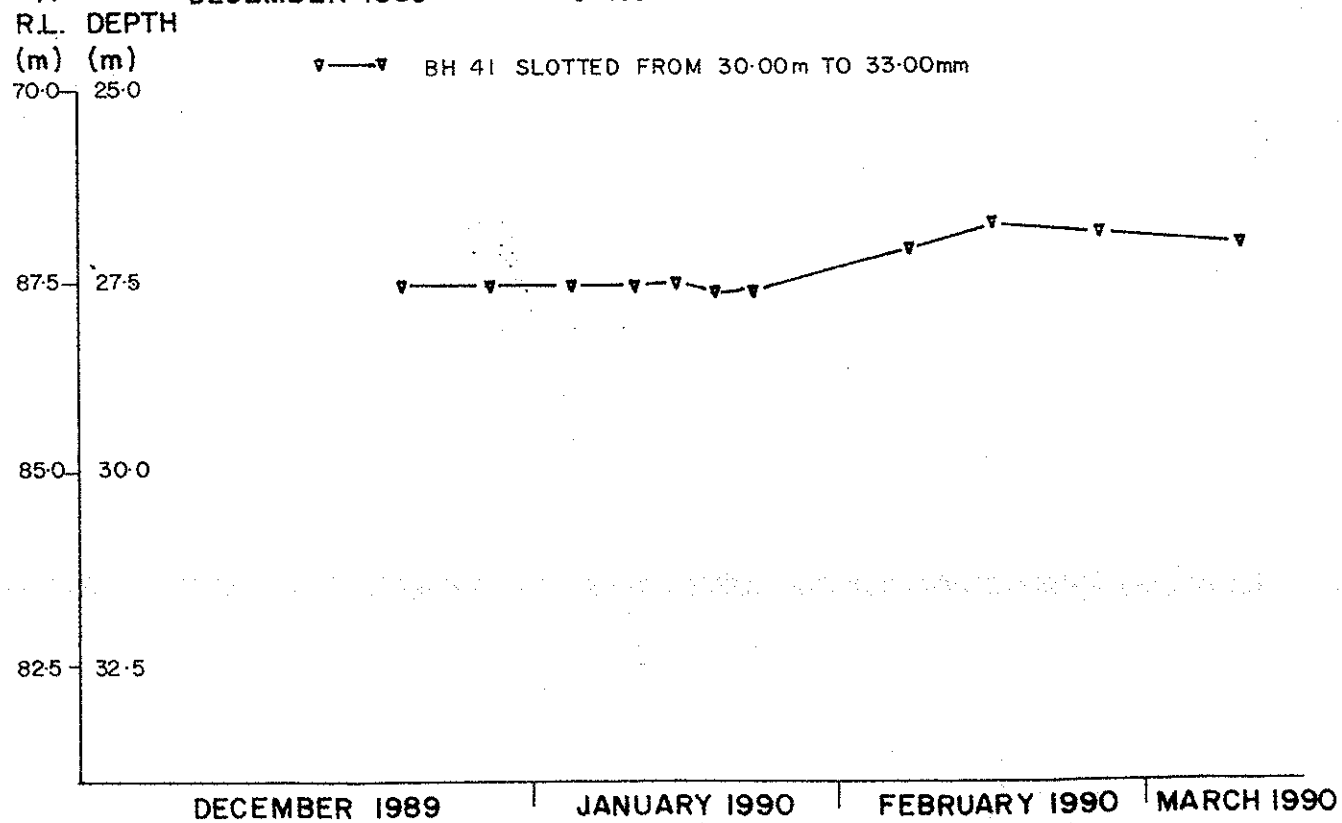




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

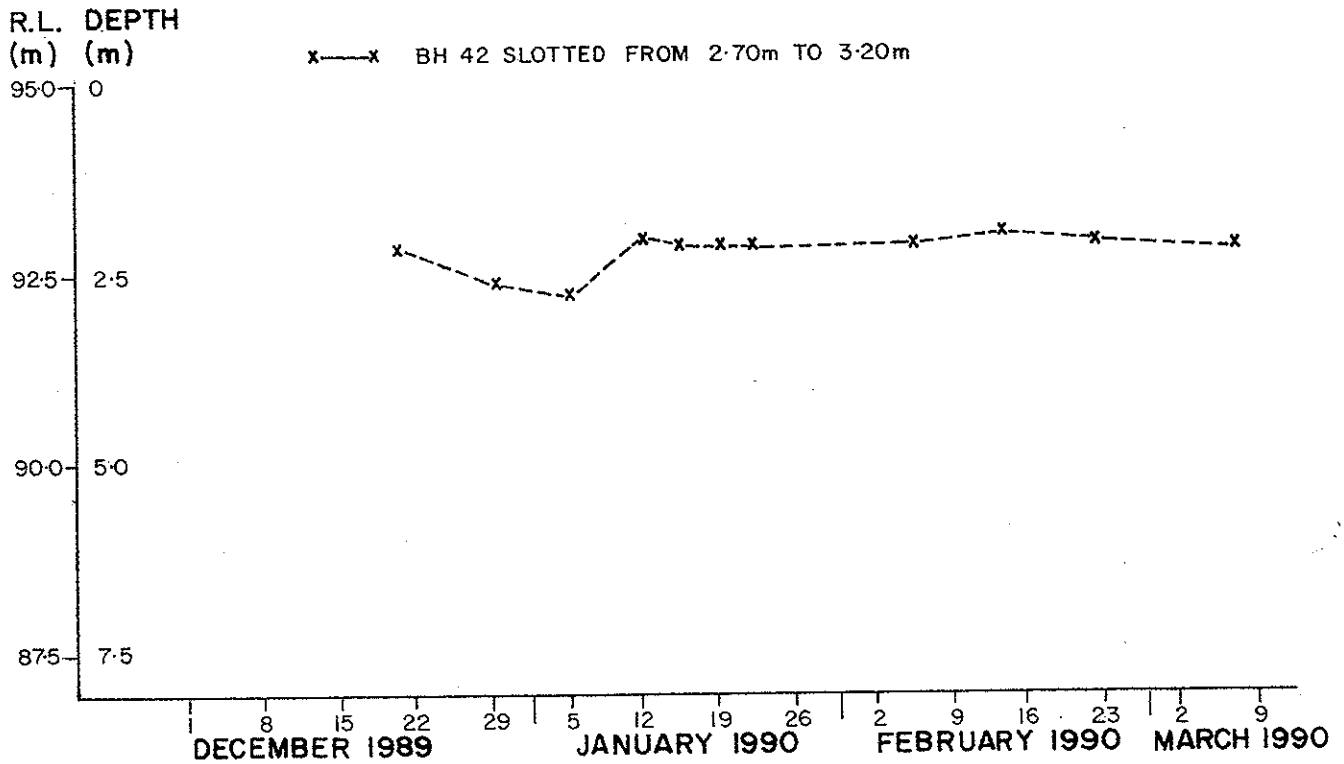
PIEZOMETRIC LEVELS VERSUS TIME

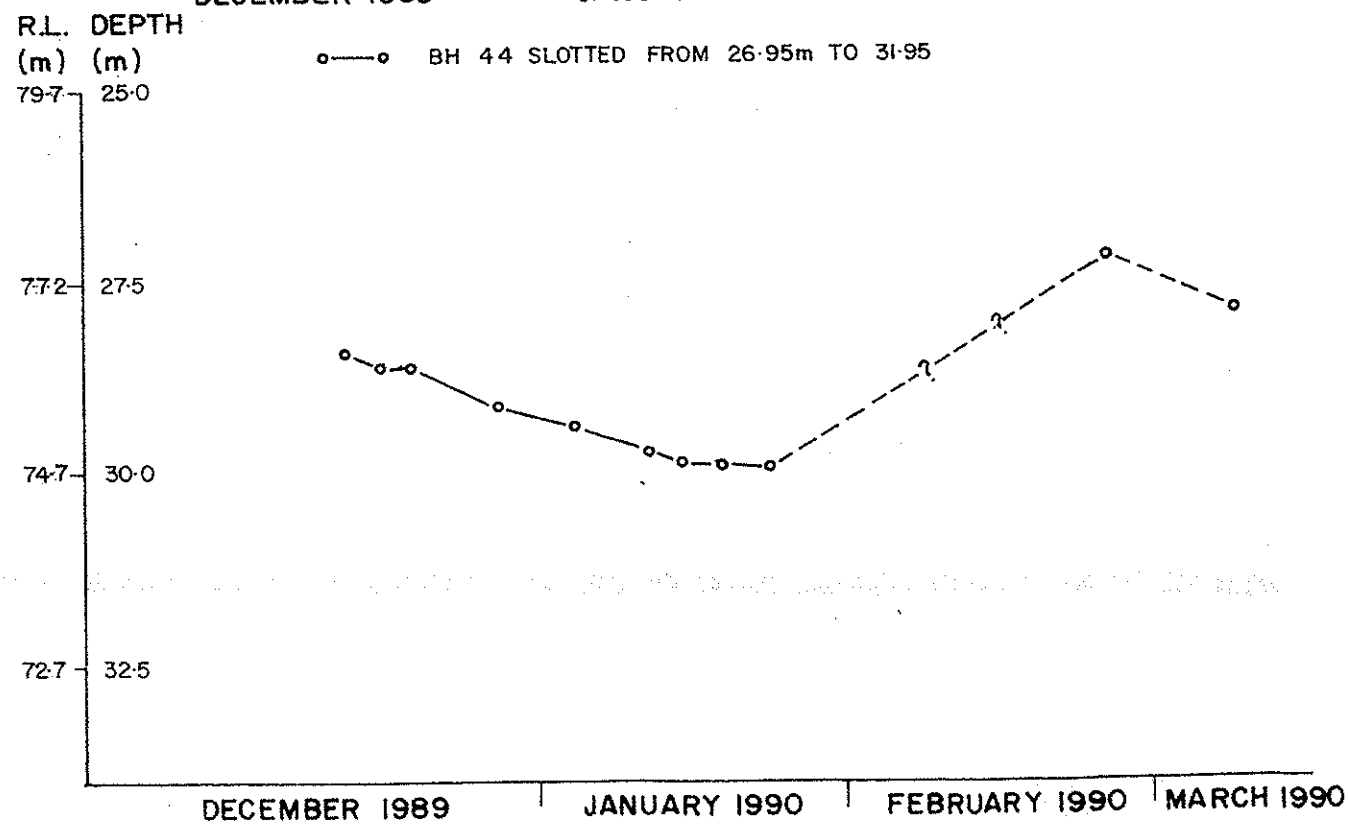




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

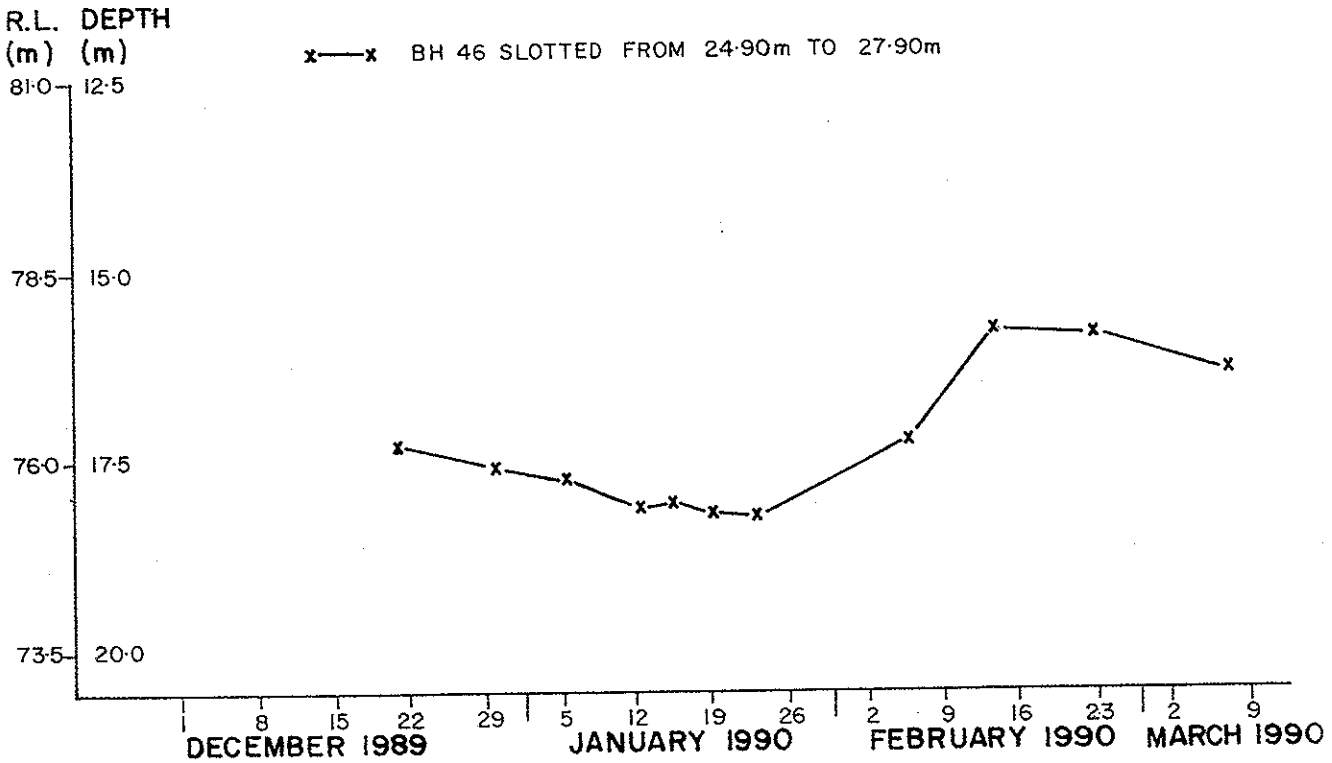
PIEZOMETRIC LEVELS VERSUS TIME

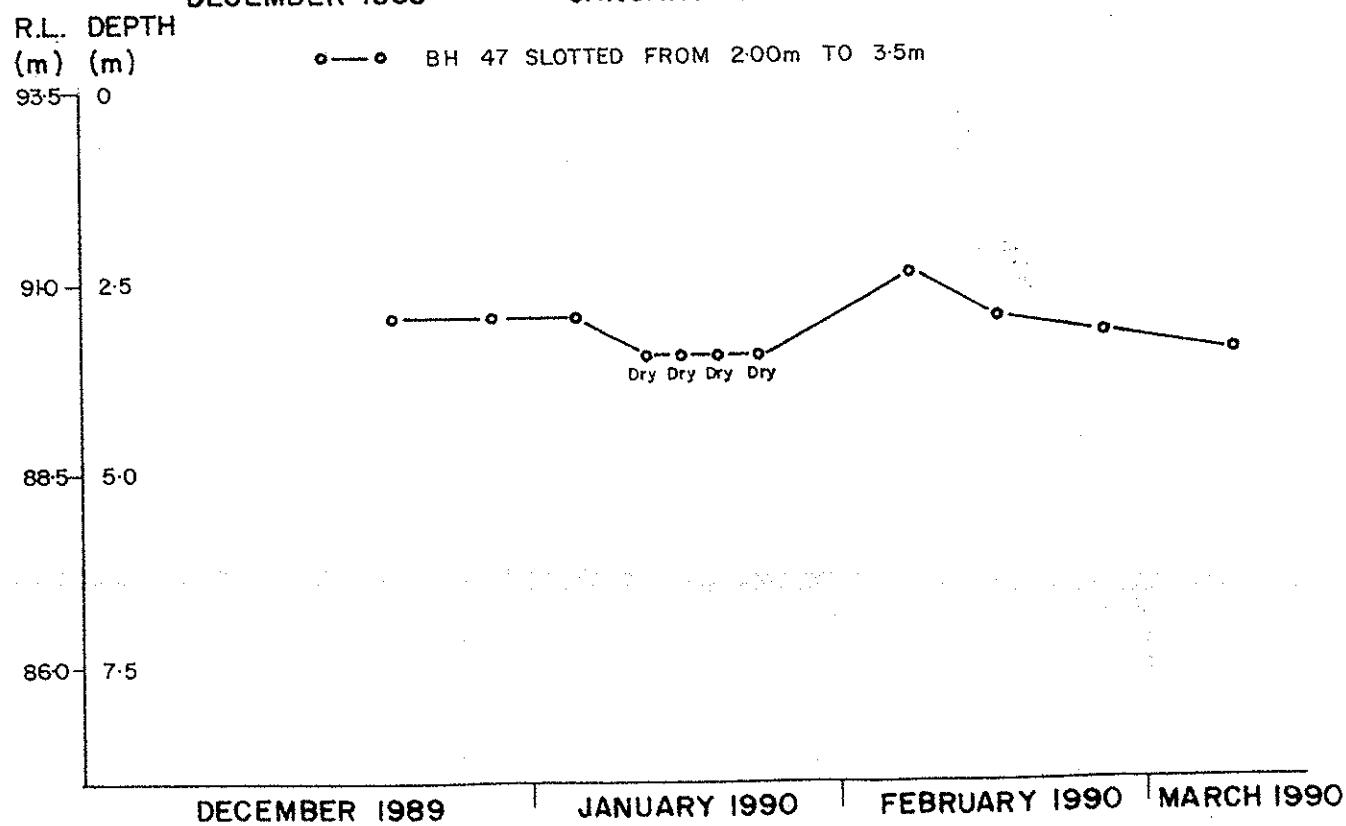




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

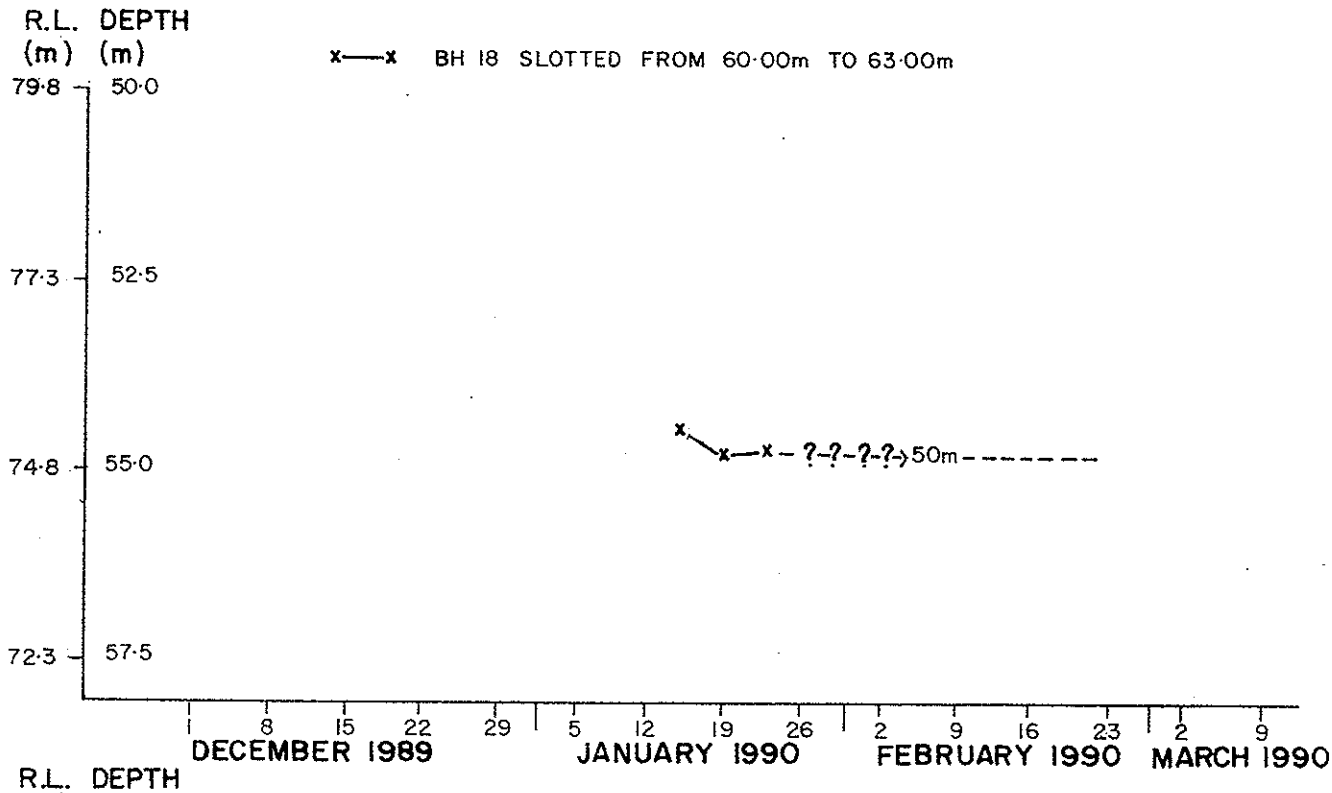
PIEZOMETRIC LEVELS VERSUS TIME

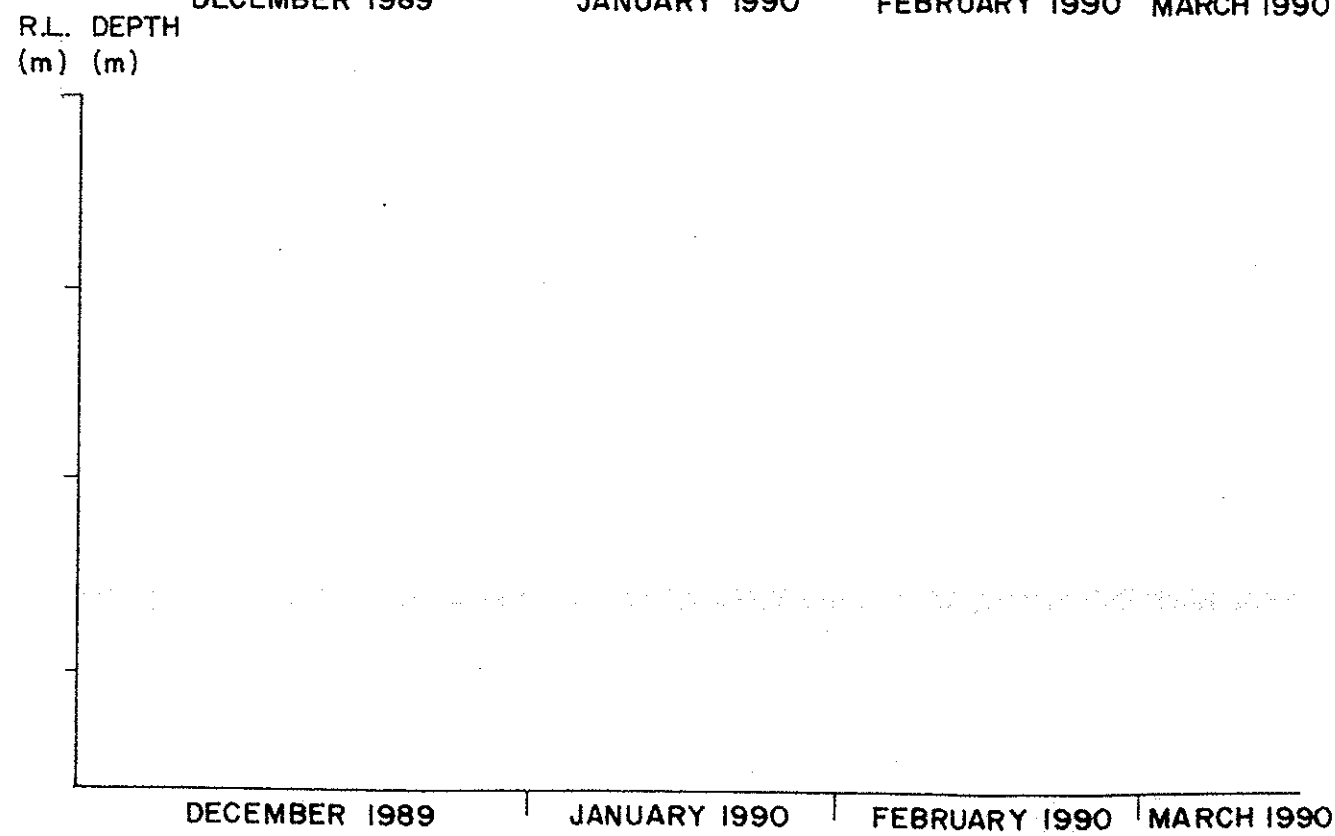




S8463/3
HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
HORNSBY

PIEZOMETRIC LEVELS VERSUS TIME





APPENDIX C

APPENDIX C

LABORATORY TEST RESULTS

BOREHOLE DATA

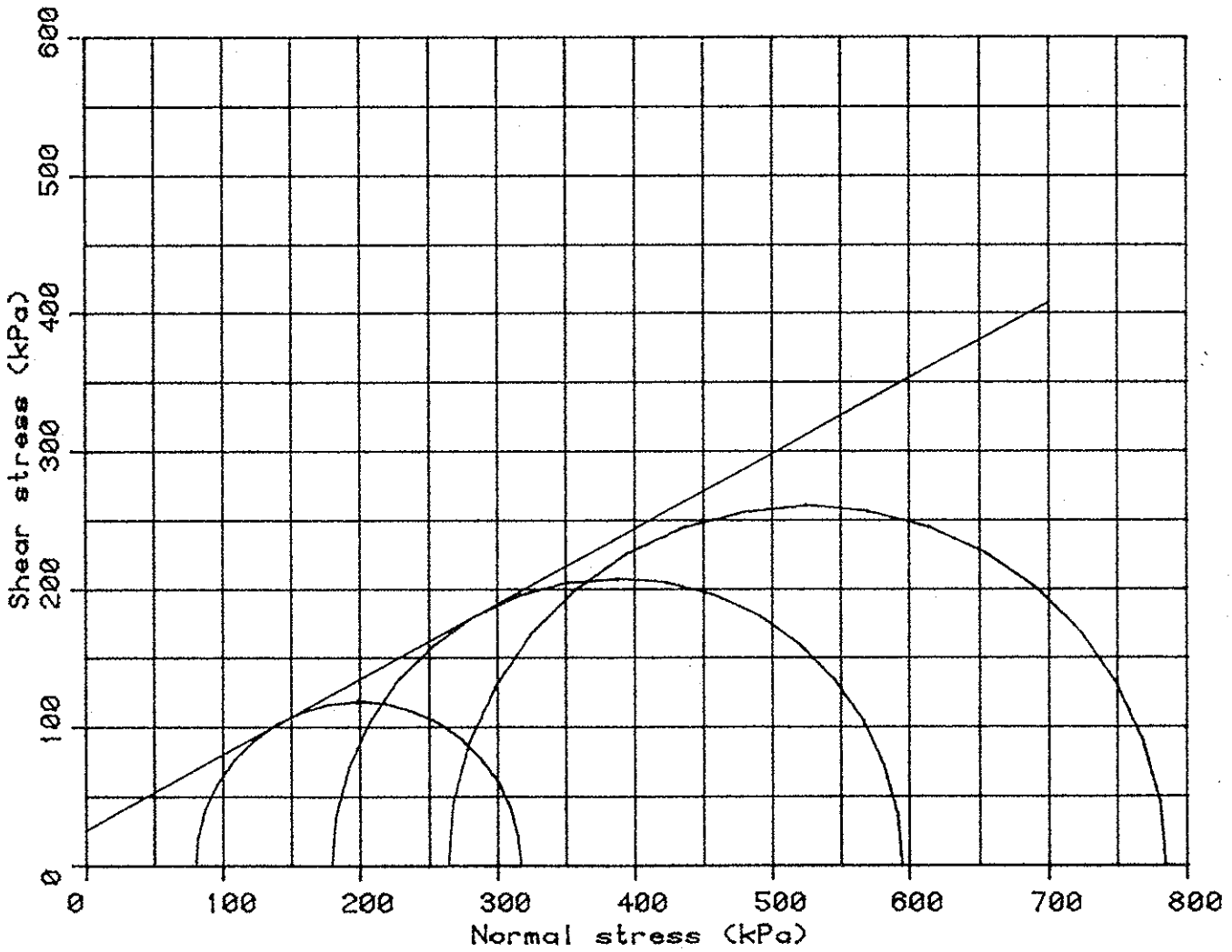
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 13/02/90
LOCATION	: HORNSBY	TEST FILE #	: 117
BOREHOLE: BH 16		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow brown, fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 29 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 25 KPa	INITIAL	: 35.7	%
WET DENSITY		: 1.800 t/m3	FINAL - TOP	: 35.1	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 35.6	%
STRAIN RATE		: 0.004 %Min	- BOTTOM	: 36.4	%

DATA FROM TEST FILE No.s : 117 125 138

Authorised Signature

T74

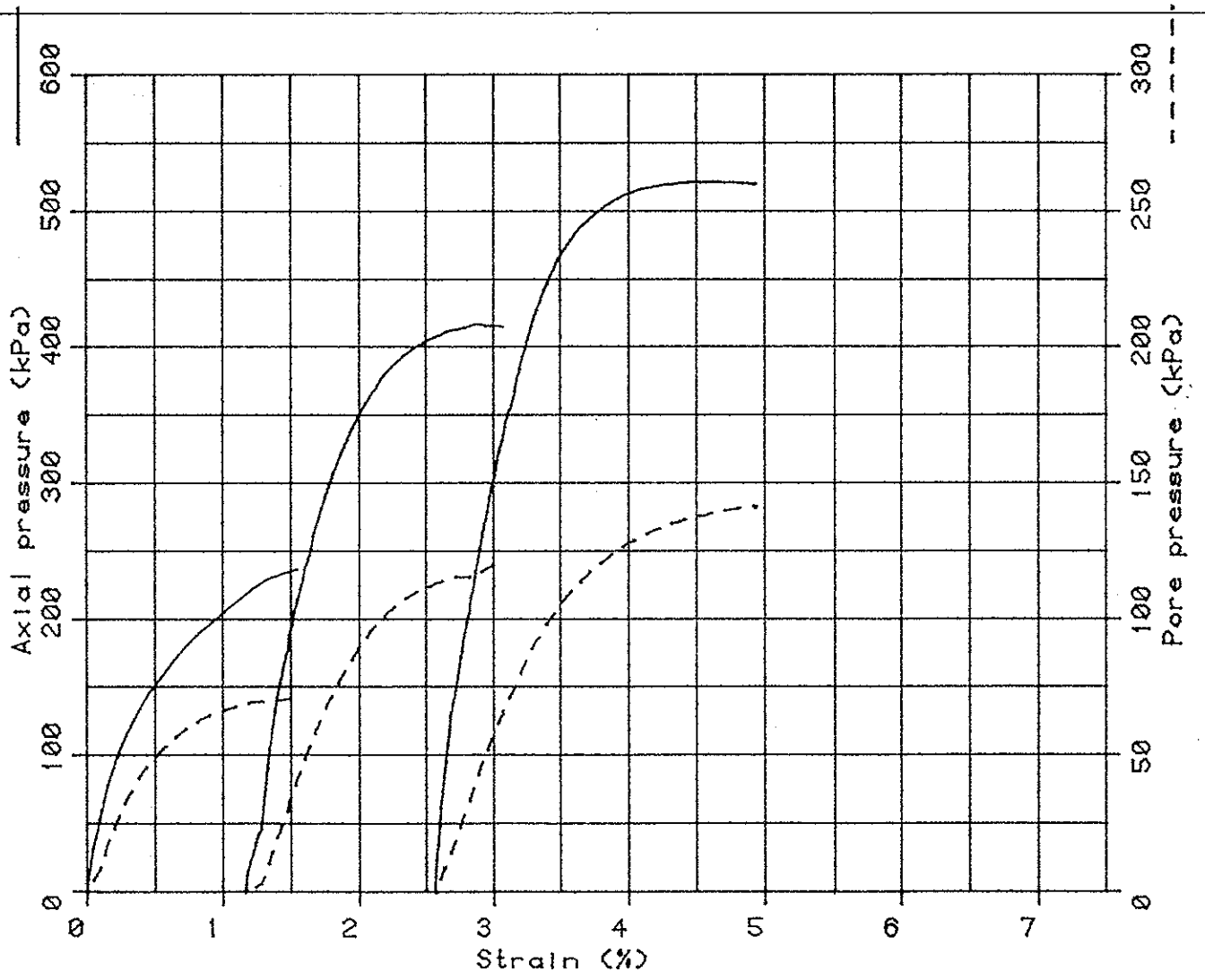
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 13/02/88
LOCATION	: HORNSBY	TEST FILE #	: 117
BOREHOLE: BH 16		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow brown, fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: ..29... deg.	MOISTURE CONTENTS		
COHESION	(C')	: ..25... KPa	INITIAL	: .35.7..	%
WET DENSITY		: 1.800 t/m3	FINAL - TOP	: .35.1..	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: .35.6..	%
STRAIN RATE		: 0.004 %Min	- BOTTOM	: .36.4..	%

DATA FROM TEST FILE No.s : 117 125 138

Authorised Signature

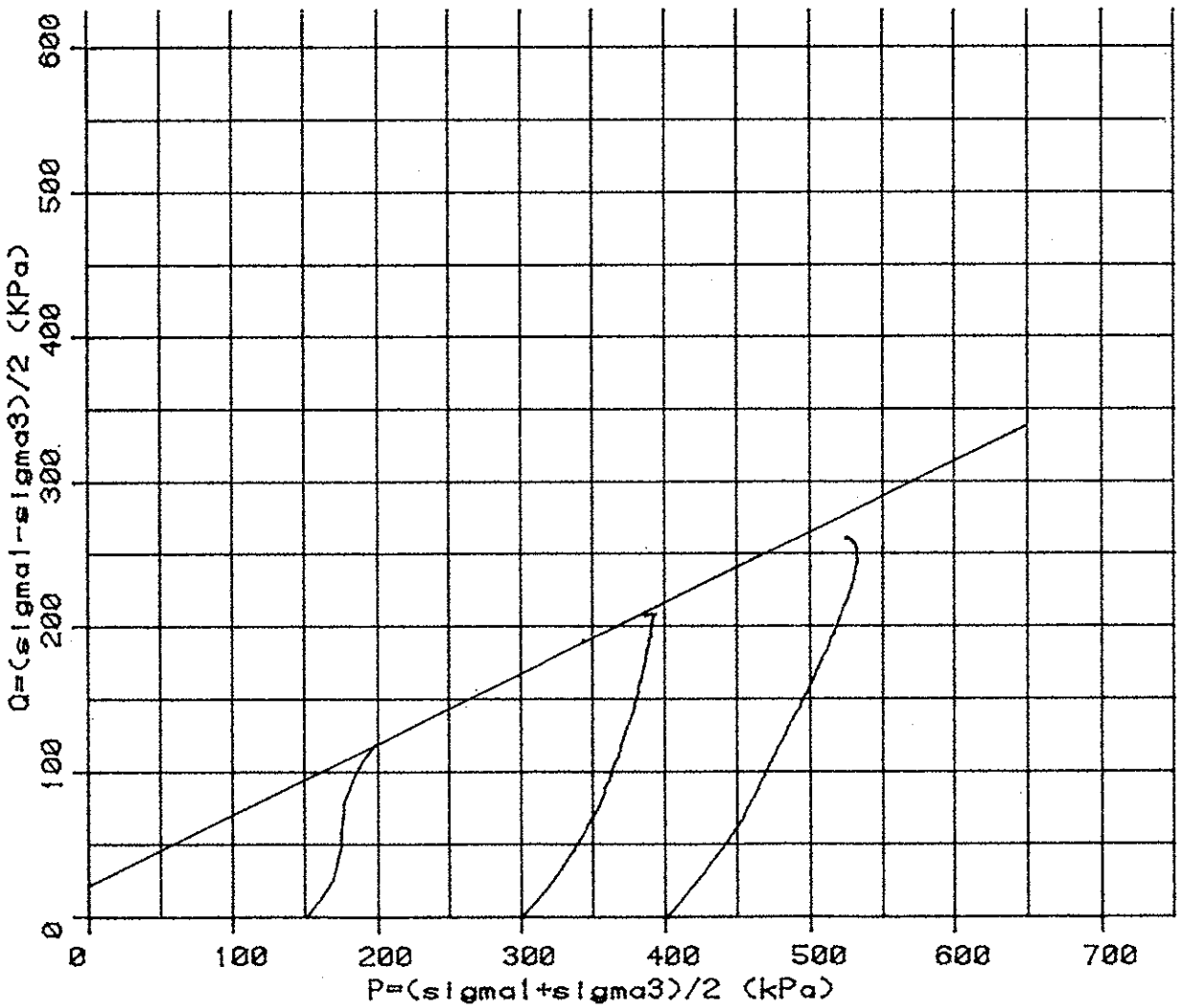
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8483/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 13/02/90
LOCATION	: HORNSBY	TEST FILE #	: 117
BOREHOLE: BH 16		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow brown, fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 29 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 25 KPa	INITIAL	: 35.7	%
WET DENSITY		: 1.800 t/m3	FINAL - TOP	: 35.1	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 35.6	%
STRAIN RATE		: 0.004 %Min	- BOTTOM	: 36.4	%

DATA FROM TEST FILE No.s : 117 125 138

Authorised Signature

Coffey & Partners Pty. Ltd.
Inc in Qld

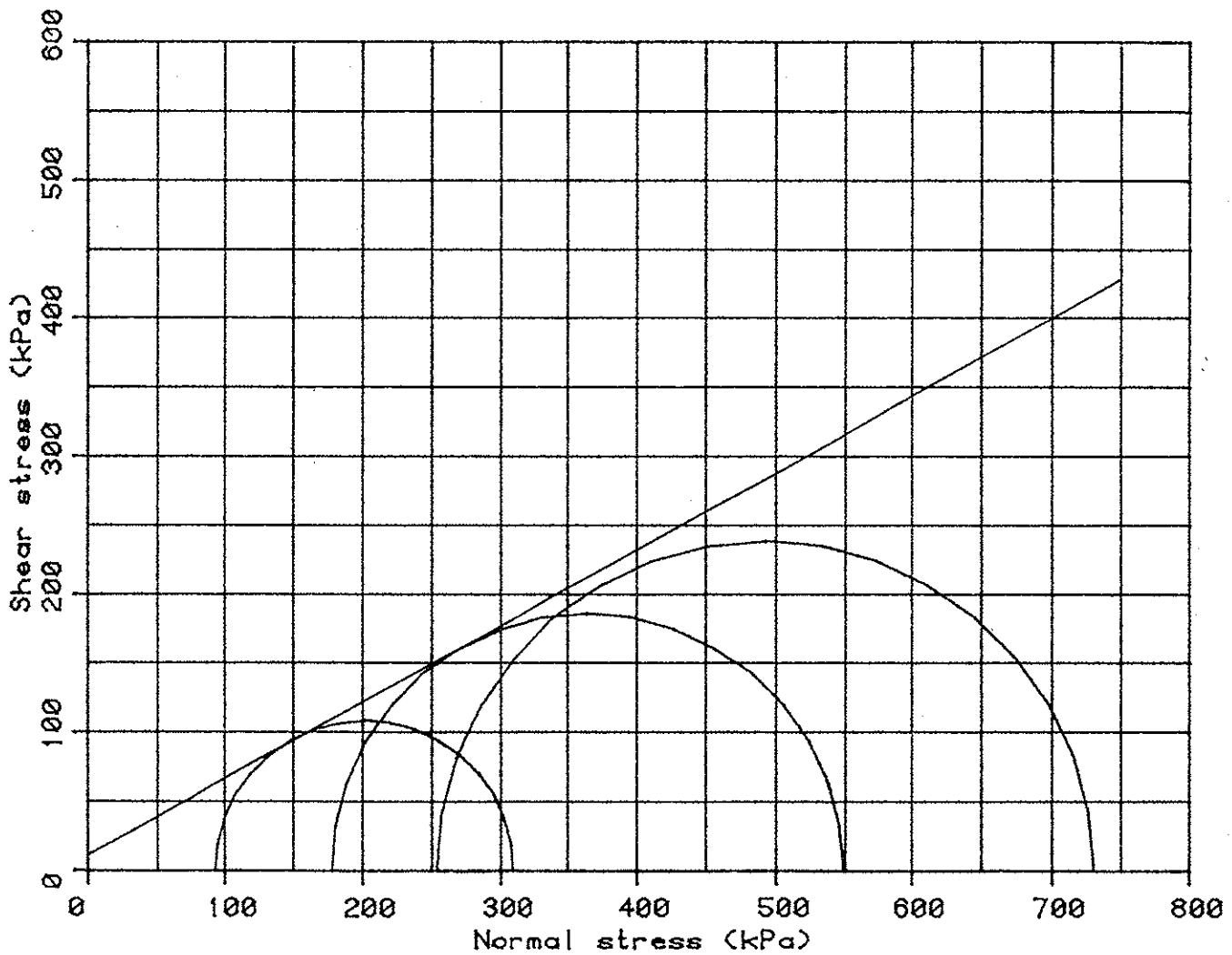
COFFEY

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 20/02/90
LOCATION	: HORNSBY	TEST FILE #	: 120
BOREHOLE: BH 26		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.00

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, red yellow brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 29 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 11.5 KPa	INITIAL	: 40.0	%
WET DENSITY		: 1.830 t/m3	FINAL - TOP	: 38.4	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 37.4	%
STRAIN RATE		: 0.007 %Min	- BOTTOM	: 39.1	%

DATA FROM TEST FILE No.s : 120 131 142

NATA

Authorised Signature

T74

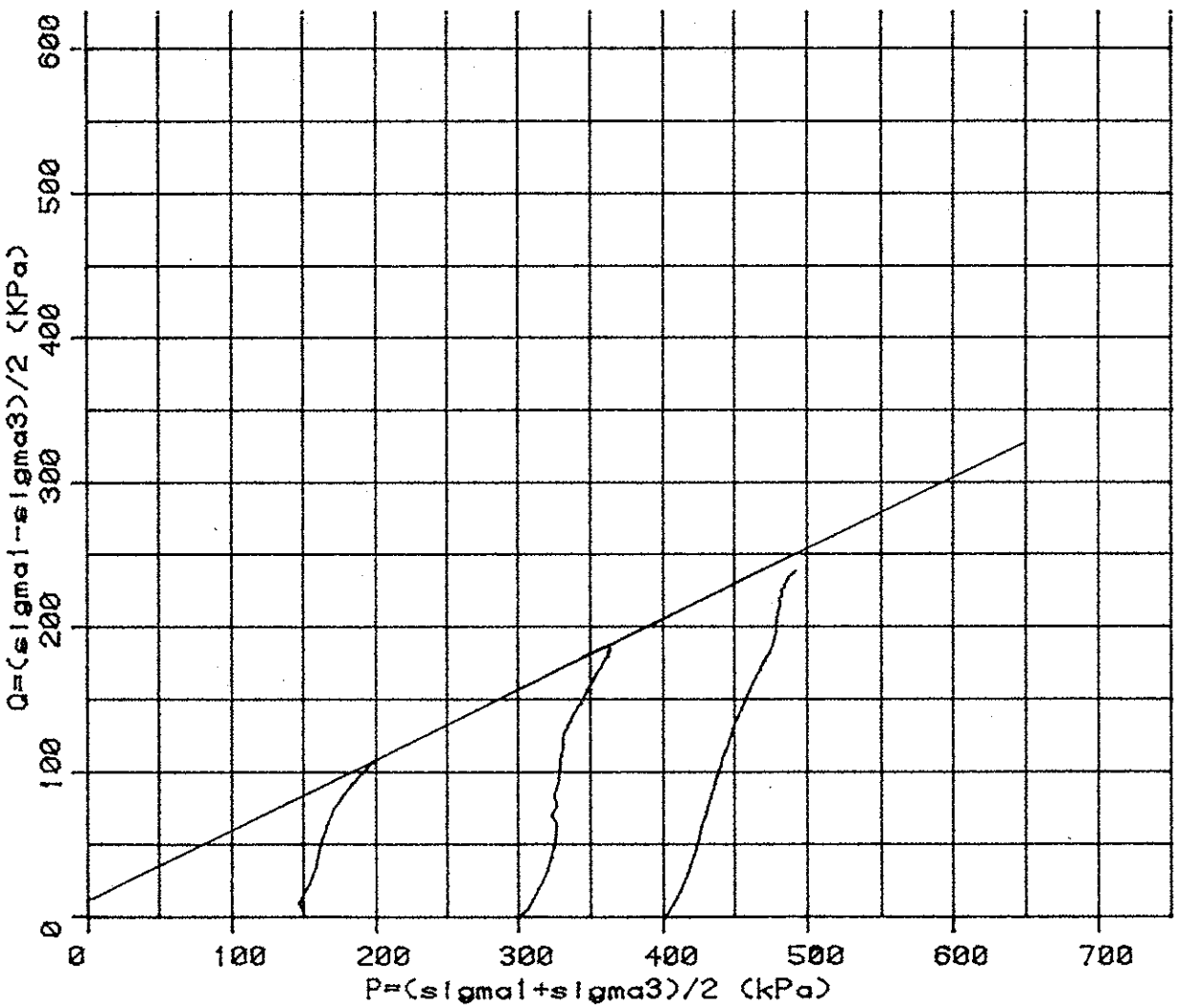
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 20/02/90
LOCATION	: HORNSBY	TEST FILE #	: 120
BOREHOLE: BH 28		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.00

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, red yellow brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 29 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 11.5 KPa	INITIAL	: 40.0	%
WET DENSITY		: 1.830 t/m3	FINAL - TOP	: 38.4	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 37.4	%
STRAIN RATE		: 0.007 %Min	- BOTTOM	: 39.1	%

DATA FROM TEST FILE No.# : 120 131 142

Authorised Signature

T74

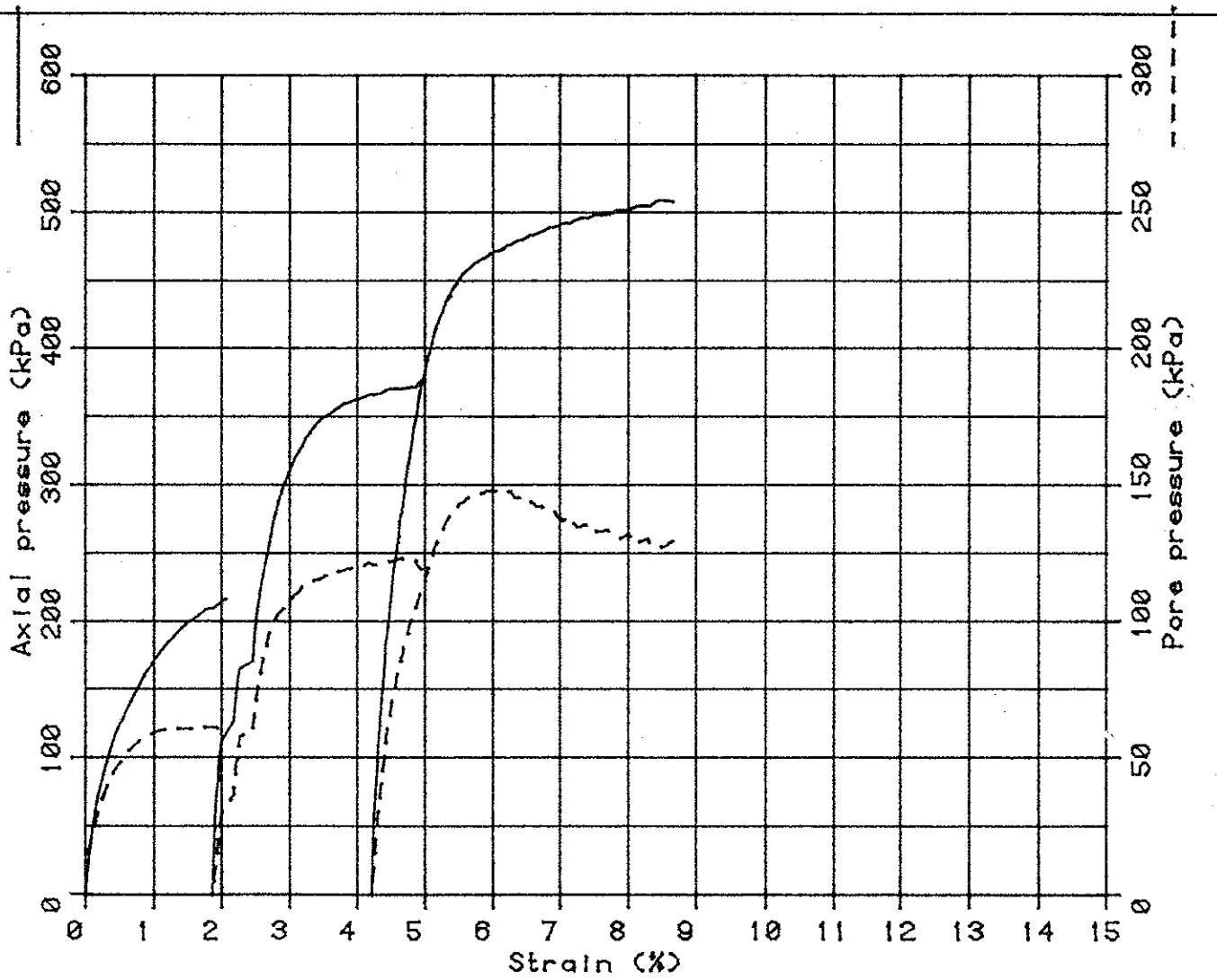
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 20/02/90
LOCATION	: HORNSBY	TEST FILE #	: 120
BOREHOLE: BH 26		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.00

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, red yellow brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 29 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 11.5 KPa	INITIAL	: 40.0	%
WET DENSITY		: 1.830 t/m3	FINAL - TOP	: 38.4	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 37.4	%
STRAIN RATE		: 0.007 %Min	- BOTTOM	: 39.1	%

DATA FROM TEST FILE No.s : 120 131 142

Authorised Signature

T74

Coffey & Partners Pty. Ltd.
Inc in Qld

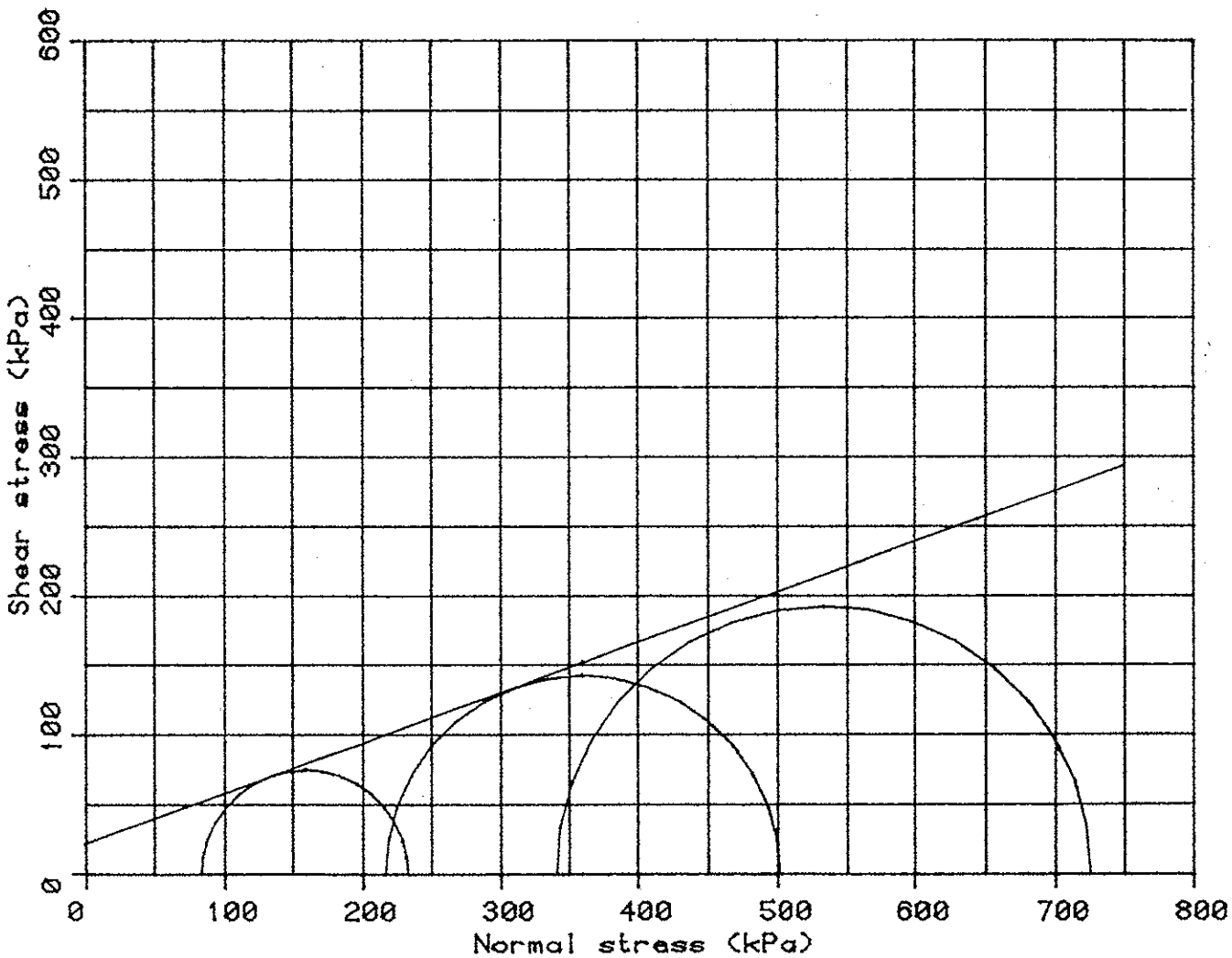
COFFEY

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 27/02/90
LOCATION	: HORNSBY	TEST FILE #	: 136
BOREHOLE: BH 33		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 0.95

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, mottled yellow red grey brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 20.2 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 21 KPa	INITIAL	: 30.5	%
WET DENSITY		: 1.740 t/m3	FINAL - TOP	: 37.3	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 34.1	%
STRAIN RATE		: 0.005 %Min	- BOTTOM	: 33.4	%

DATA FROM TEST FILE No.s : 136 154 160

Authorised Signature

T74

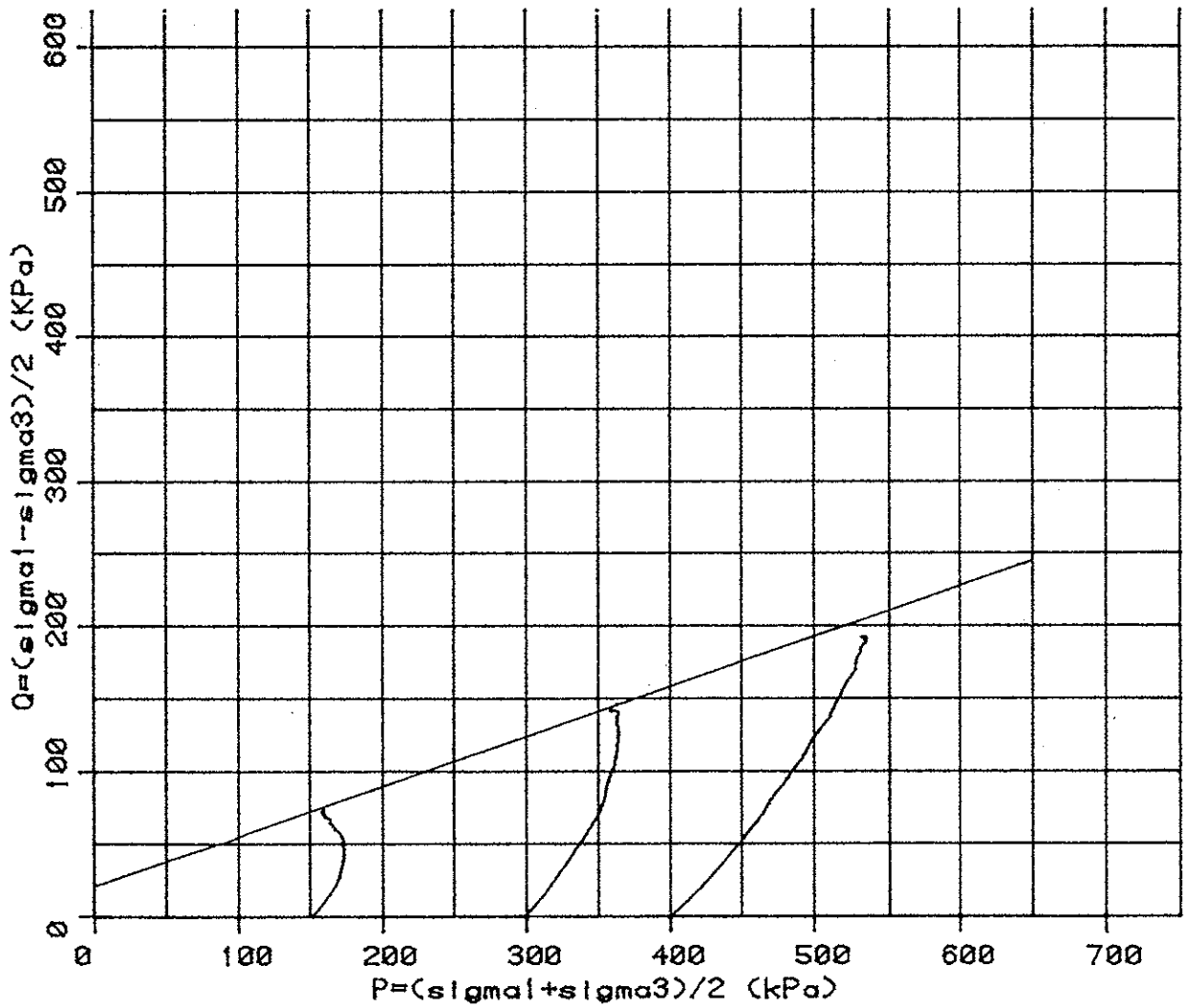
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 27/02/90
LOCATION	: HORNSBY	TEST FILE #	: 136
BOREHOLE: BH 33		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 0.95

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, mottled yellow red grey brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 20 21 deg.	MOISTURE CONTENTS		
COHESION	(C')	: KPa	INITIAL	: 30.5	%
WET DENSITY		: 1.740 t/m3	FINAL - TOP	: 37.3	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 34.1	%
STRAIN RATE		: 0.005 %Min	- BOTTOM	: 33.4	%

DATA FROM TEST FILE No.s : 136 154 160

Authorised Signature

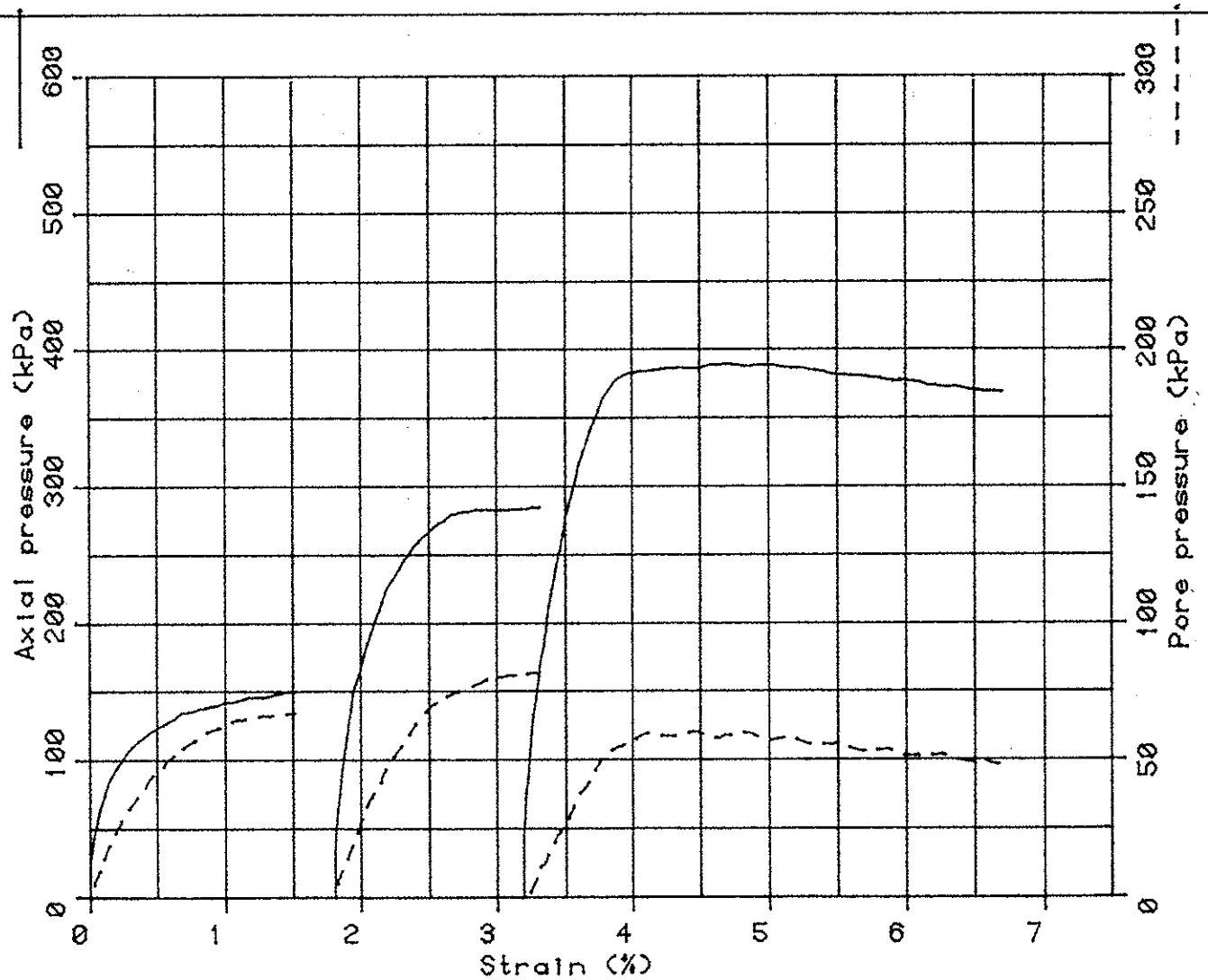
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 27/02/90
LOCATION	: HORNSBY	TEST FILE #	: 136
BOREHOLE: BH 33		DEPTH	: 0.70 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 0.95

MATERIAL CLASSIFICATION : (CH) CLAY - high plasticity, mottled yellow red grey brown, some fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(C')	: 20 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 21 KPa	INITIAL	: 30.5	%
WET DENSITY		: 1.740 t/m3	FINAL - TOP	: 37.3	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 34.1	%
STRAIN RATE		: 0.005 %Min	- BOTTOM	: 33.4	%

DATA FROM TEST FILE No.s : 136 154 160

Authorised Signature

Coffey & Partners Pty. Ltd.
Inc in Qld

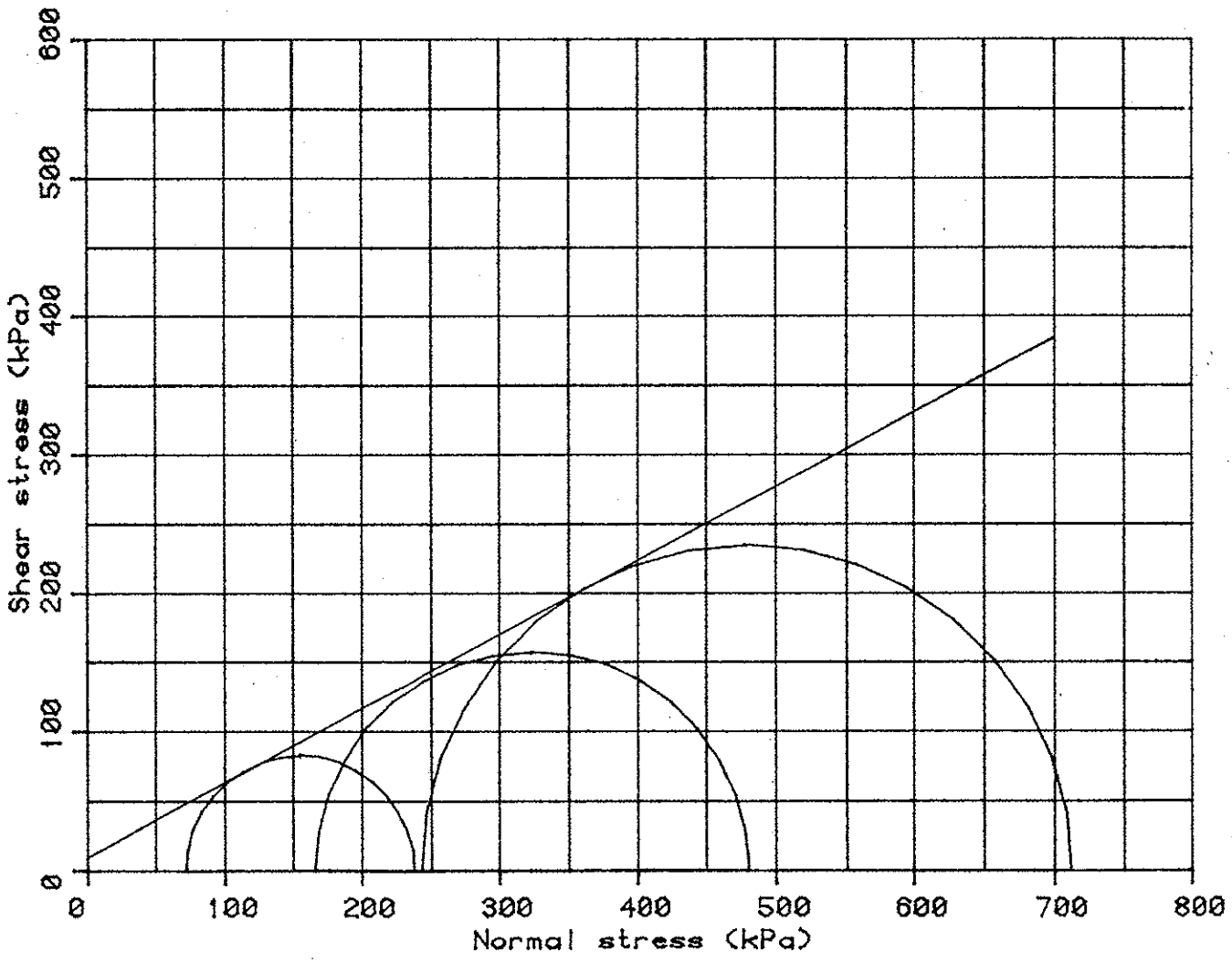
COFFEY

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 01/05/90
LOCATION	: HORNSBY	TEST FILE #	: 208
BOREHOLE: BH 41		DEPTH	: 2.30 --
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.60

MATERIAL CLASSIFICATION : (CL) Sandy CLAY - medium plasticity, grey mottled yellow brown, fine to coarse sand.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: ...28.. deg.	MOISTURE CONTENTS		
COHESION	(C')	: ...10.. KPa	INITIAL	: .19.1.	%
WET DENSITY		: 2.020 t/m3	FINAL - TOP	: .16.0.	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: .16.8.	%
STRAIN RATE		: 0.000 %Min	- BOTTOM	: .16.7.	%

DATA FROM TEST FILE No.s : 208 238 251

Authorised Signature

T74

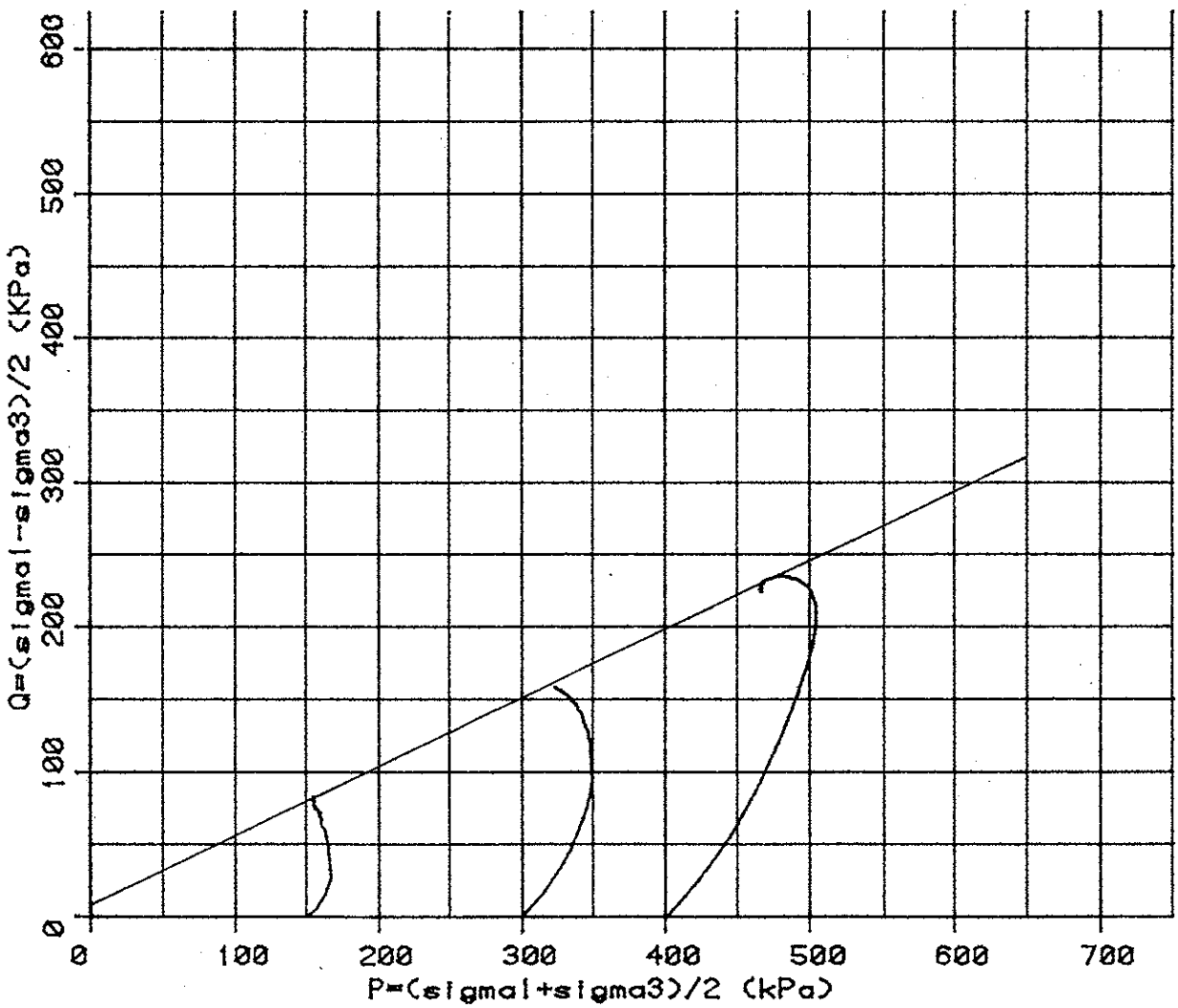
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 01/05/90
LOCATION	: HORNSBY	TEST FILE #	: 208
BOREHOLE: BH 41		DEPTH	: 2.30 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.60

MATERIAL CLASSIFICATION : (CL) Sandy CLAY - medium plasticity, grey mottled yellow brown, fine to coarse sand



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 28 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 10 KPa	INITIAL	: 19.1	%
WET DENSITY		: 2.020 t/m3	FINAL - TOP	: 16.0	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 16.8	%
STRAIN RATE		: 0.000 %Min	- BOTTOM	: 16.7	%

DATA FROM TEST FILE No.s : 208 238 251

Authorised Signature

T74

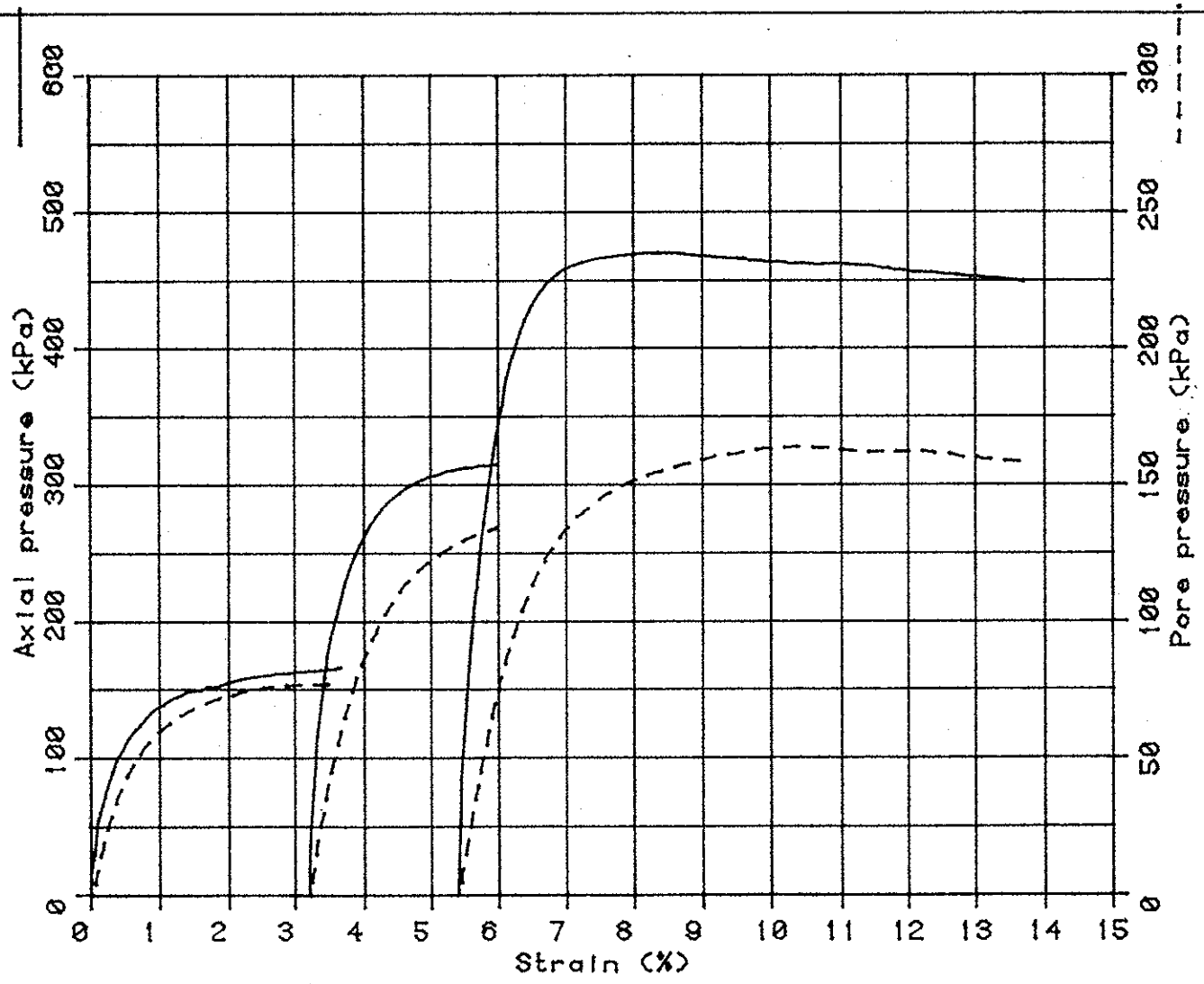
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 01/05/90
LOCATION	: HORNSBY	TEST FILE #	: 208
BOREHOLE: BH 41		DEPTH	: 2.30 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.60

MATERIAL CLASSIFICATION : (CL) Sandy CLAY - medium plasticity, grey mottled yellow brown, fine to coarse sand



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 28 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 10 KPa	INITIAL	: 19.1	%
WET DENSITY		: 2.020 t/m3	FINAL - TOP	: 16.0	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 16.8	%
STRAIN RATE		: 0.000 %Min	- BOTTOM	: 16.7	%

DATA FROM TEST FILE No.s : 208 236 251

Authorised Signature

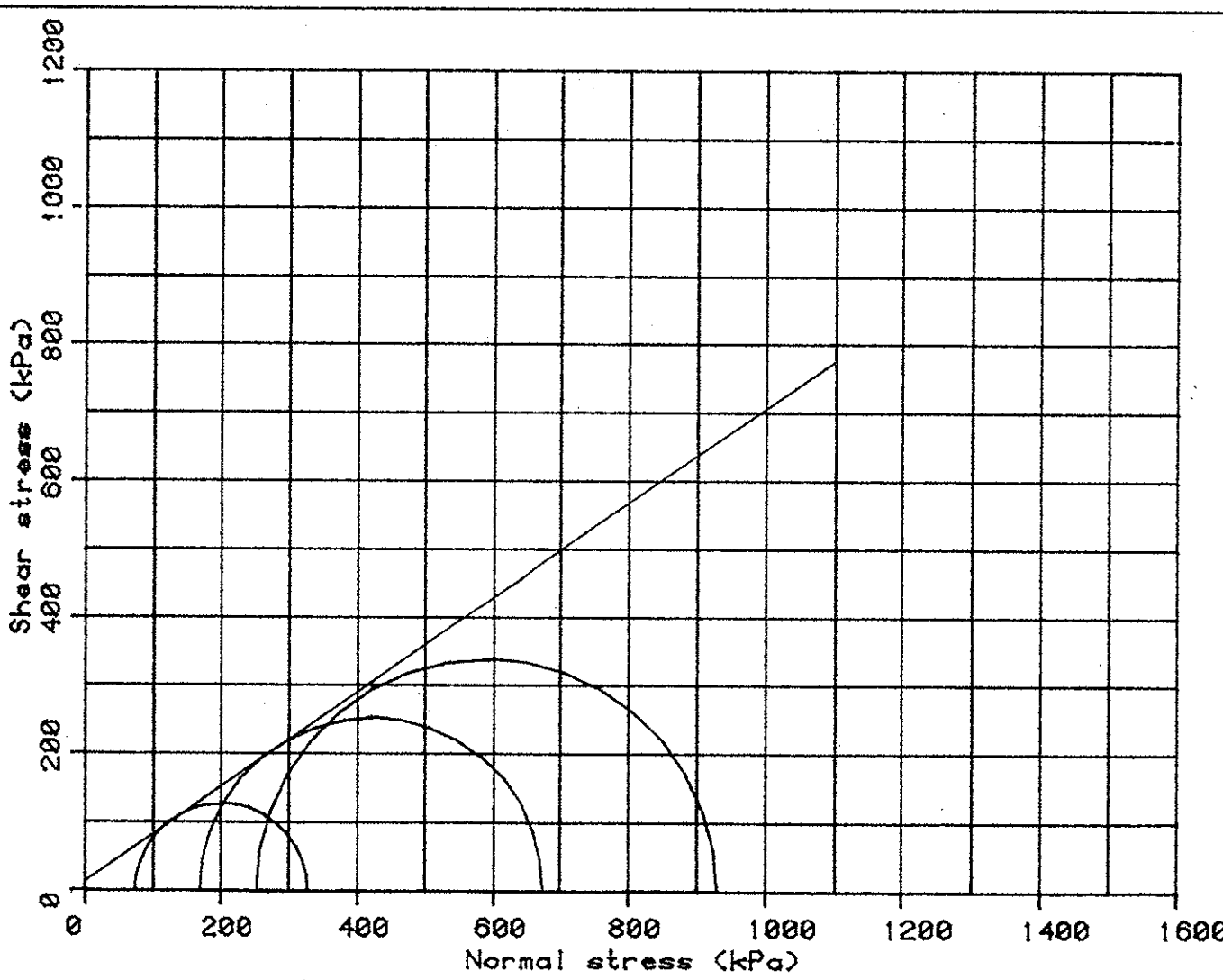
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8469/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 24/03/90
LOCATION	: HORNSBY	TEST FILE #	: 176
BOREHOLE: BH 45		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow red brown, fine to coarse sand, some fine gravel. (EW)BRECCIA



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 34.5 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 13.5 KPa	INITIAL	: 27.1	%
WET DENSITY		: 1.880 t/m3	FINAL - TOP	: 32.2	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 30.8	%
STRAIN RATE		: 0.006 %Min	- BOTTOM	: 30.9	%

DATA FROM TEST FILE No.s : 176 181 186

Authorised Signature

T74—057

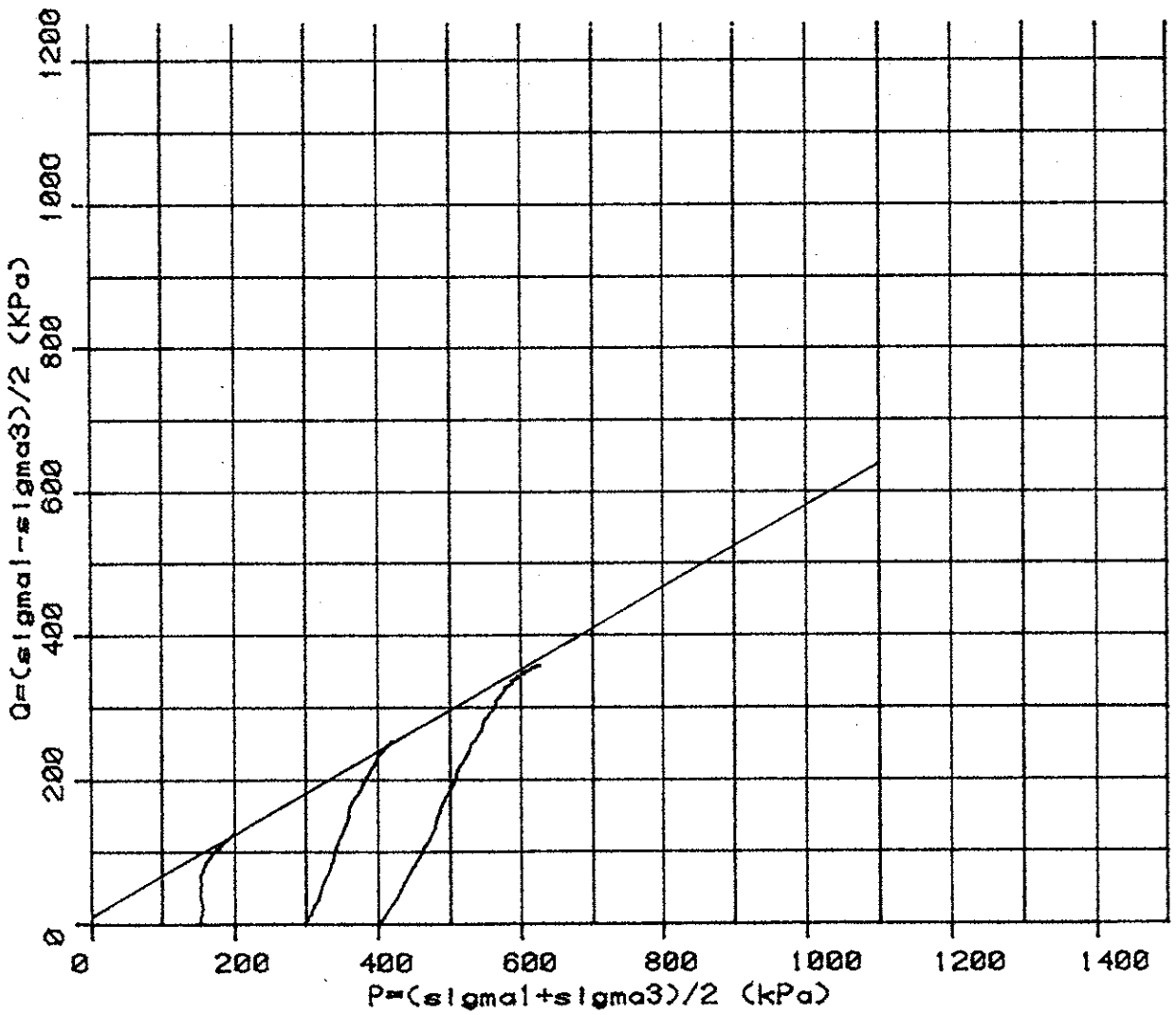
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 24/03/90
LOCATION	: HORNSBY	TEST FILE #	: 176
BOREHOLE: BH 45		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow red brown, fine to coarse sand, some fine gravel. (EW)BRECCIA



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 34.5 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 13.5 KPa	INITIAL	: 27.1	%
WET DENSITY		: 1.880 t/m3	FINAL - TOP	: 32.2	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 30.8	%
STRAIN RATE		: 0.006 %Min	- BOTTOM	: 30.9	%

DATA FROM TEST FILE No.s : 176 181 186

Authorised Signature

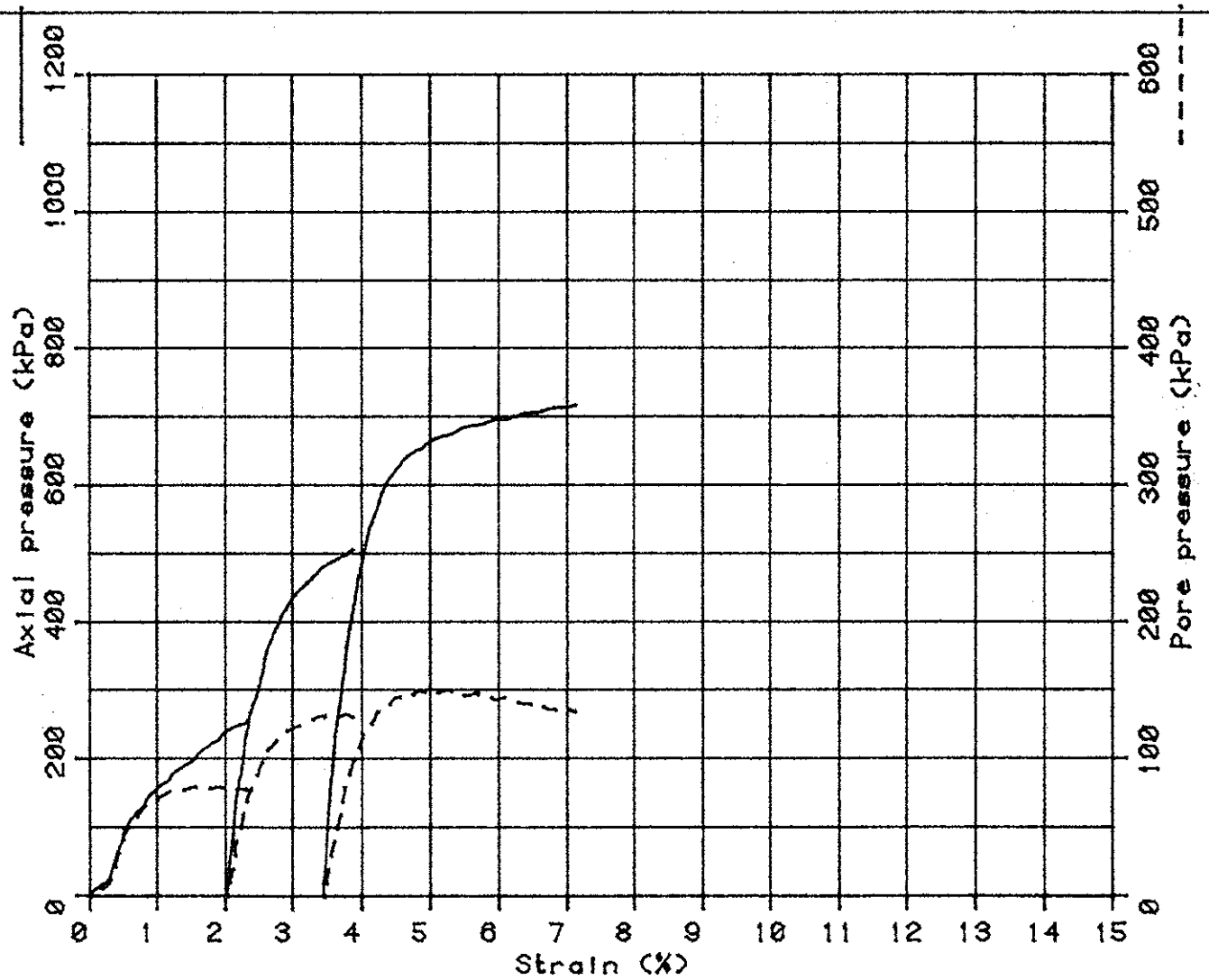
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8483/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 24/03/90
LOCATION	: HORNSBY	TEST FILE #	: 176
BOREHOLE: BH 45		DEPTH	: 0.80 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 1.15

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, yellow red brown, fine to coarse sand, some fine gravel. (EW) BRECCIA



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(ϕ')	: 34.5	deg.	MOISTURE CONTENTS	
COHESION	(C')	: 13.5	KPa	INITIAL	: 27.1 %
WET DENSITY		: 1.880	t/m3	FINAL - TOP	: 32.2 %
BACK PRESSURE		: 200.000	kPa	- MIDDLE	: 30.8 %
STRAIN RATE		: 0.006	%Min	- BOTTOM	: 30.9 %

DATA FROM TEST FILE No.s : 176 191 196

Authorised Signature

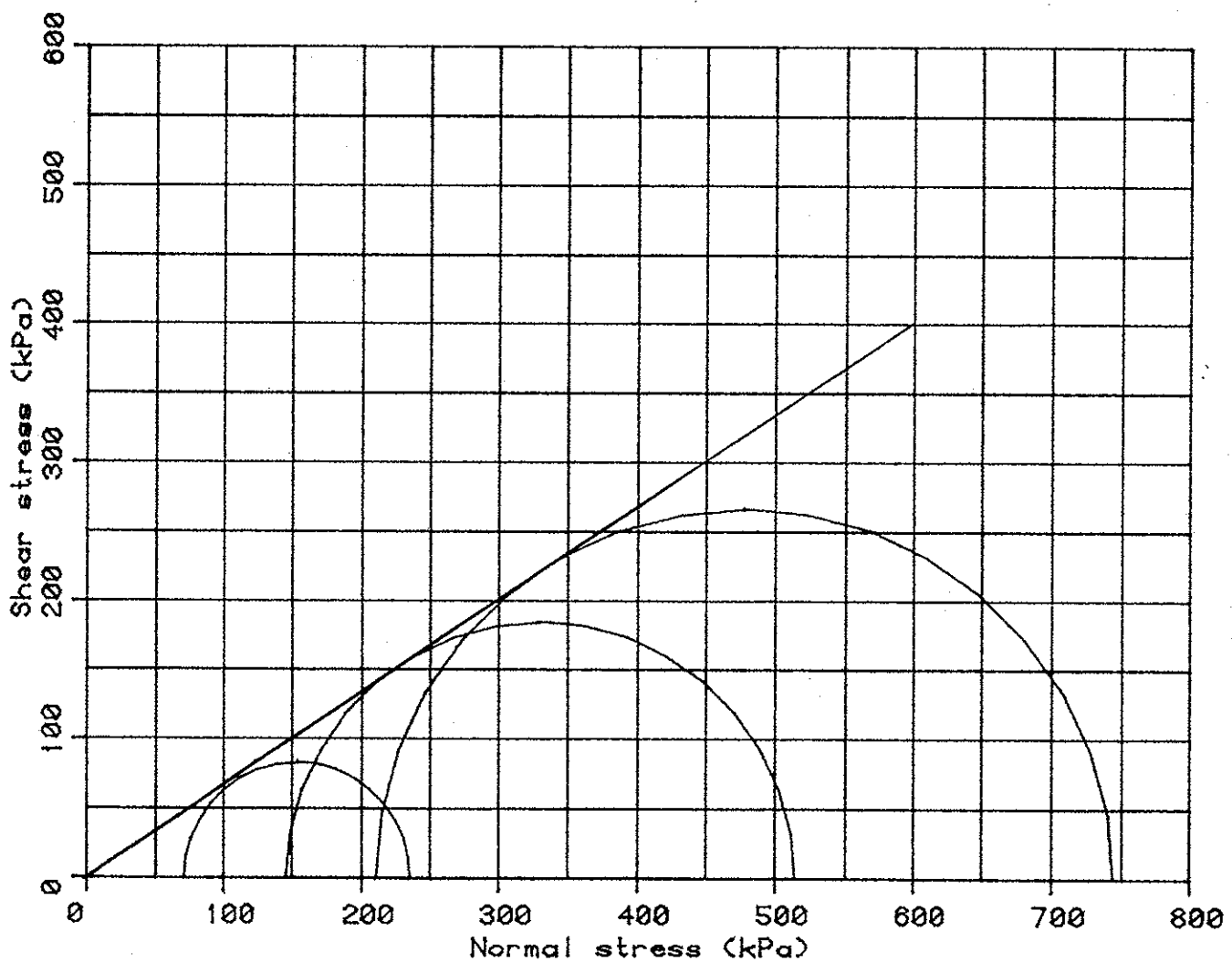
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 23/03/90
LOCATION	: HORNSBY	TEST FILE #	: 174
BOREHOLE: BH46		DEPTH	: 2.40 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.70

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, mottled yellow red grey brown, fine to coarse sand, some fine gravel.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 33.5 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 0 KPa	INITIAL	: 23.3	%
WET DENSITY		: 1.870 t/m3	FINAL - TOP	: 24.7	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 26.5	%
STRAIN RATE		: 0.008 %Min	- BOTTOM	: 28.8	%

DATA FROM TEST FILE No.s : 174 184 189

Authorised Signature

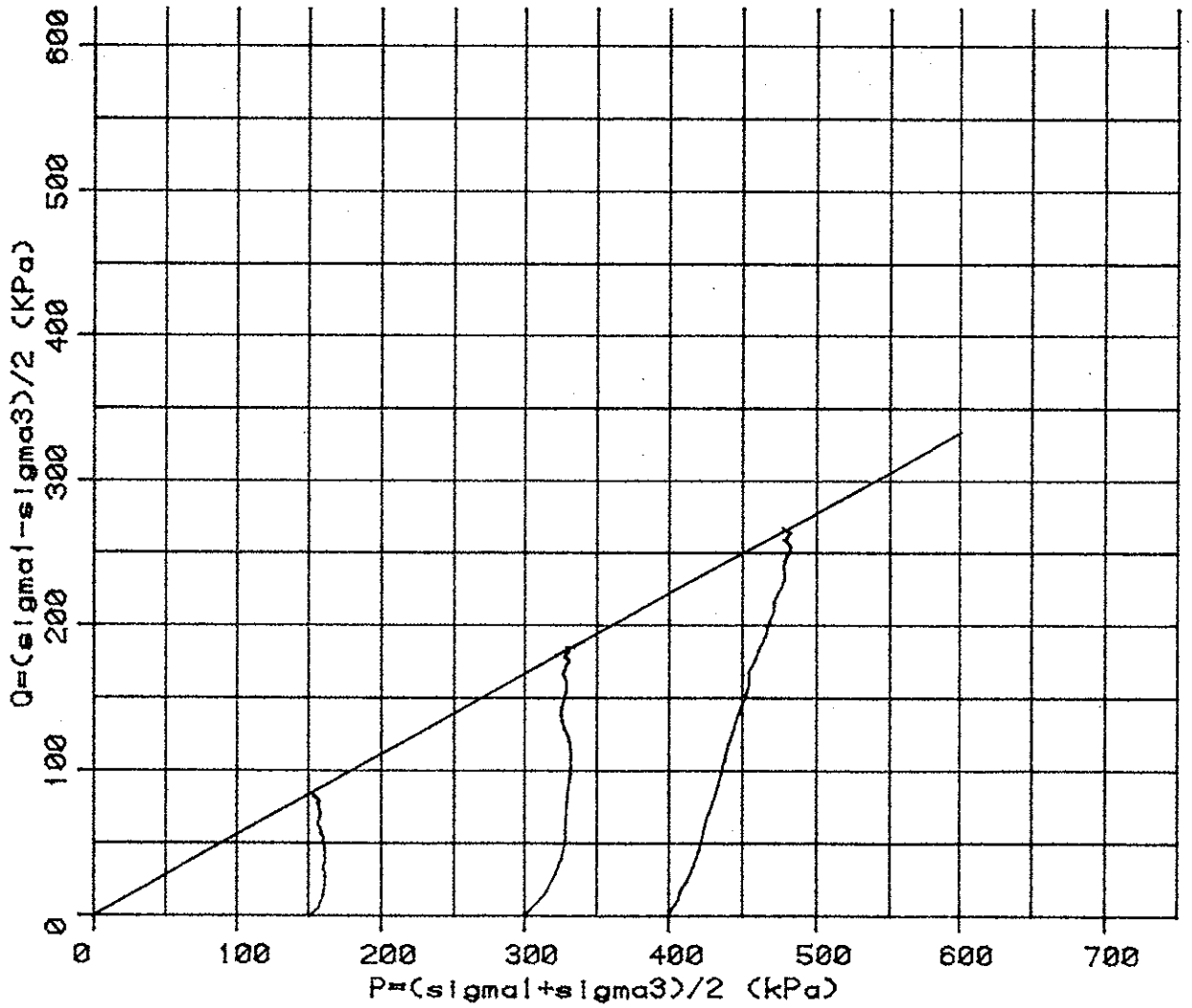
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S6463/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 23/03/90
LOCATION	: HORNSBY	TEST FILE #	: 174
BOREHOLE: BH46		DEPTH	: 2.40 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.70

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, mottled yellow red grey brown, fine to coarse sand, some fine gravel.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 33.5 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 0 KPa	INITIAL		: 23.3 %
WET DENSITY		: 1.870 t/m3	FINAL	- TOP	: 24.7 %
BACK PRESSURE		: 200.000 kPa		- MIDDLE	: 26.5 %
STRAIN RATE		: 0.008 %Min		- BOTTOM	: 28.8 %

DATA FROM TEST FILE No.s : 174 184 189

Authorised Signature

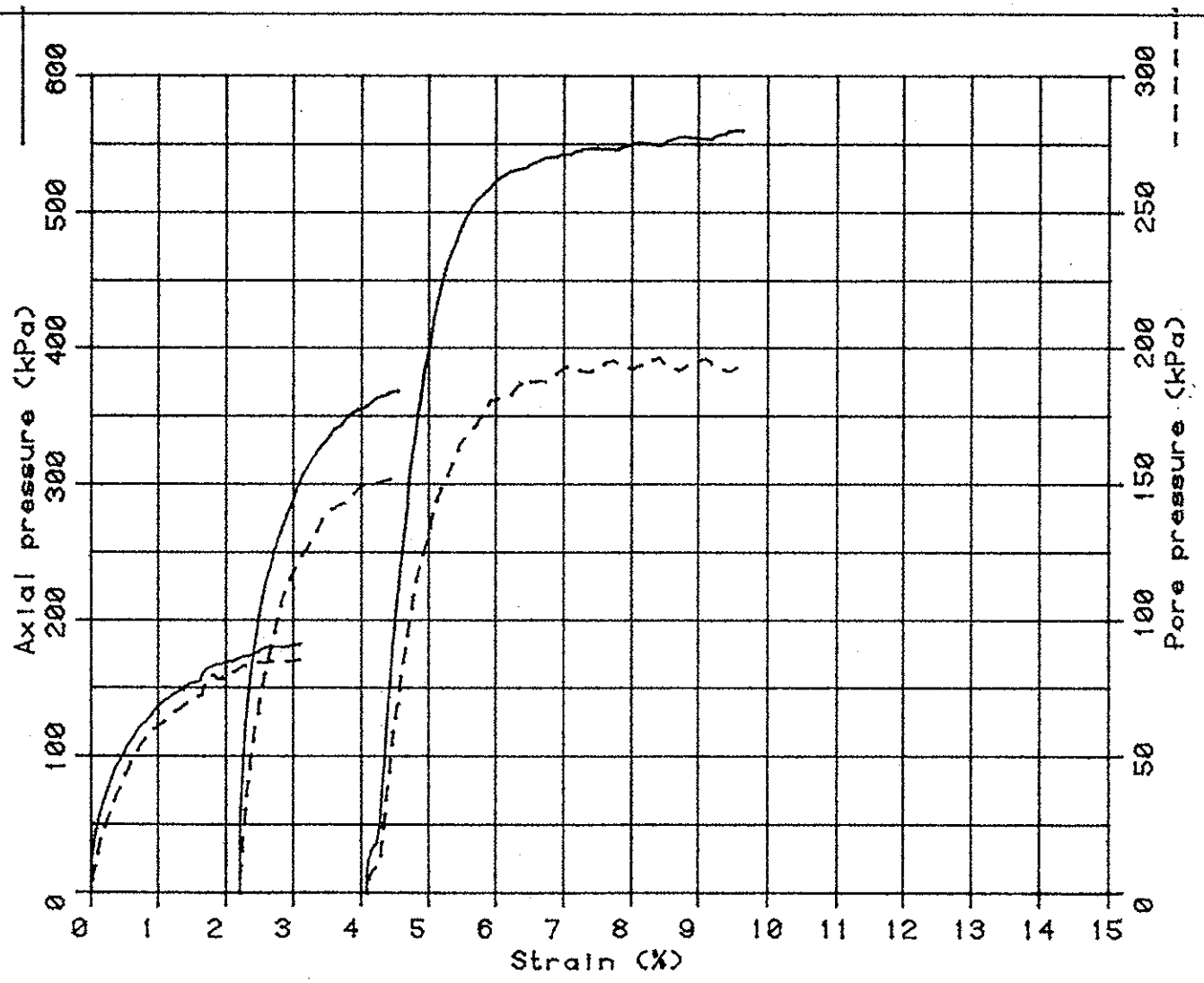
Coffey & Partners Pty. Ltd.
Inc in Qld

triaxial shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: JR
PROJECT	: OLD MANS VALLEY	DATE	: 23/03/90
LOCATION	: HORNSBY	TEST FILE #	: 174
BOREHOLE: BH46		DEPTH	: 2.40 -
FAILURE CRITERIA: PEAK PRINCIPAL STRESS RATIO			: 2.70

MATERIAL CLASSIFICATION : (CH) Sandy CLAY - high plasticity, mottled yellow red grey brown, fine to coarse sand, some fine gravel.



TYPE OF TEST : CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT

ANGLE OF FRICTION	(Ø')	: 33.5 deg.	MOISTURE CONTENTS		
COHESION	(C')	: 0 KPa	INITIAL	: 23.3	%
WET DENSITY		: 1.870 t/m3	FINAL - TOP	: 24.7	%
BACK PRESSURE		: 200.000 kPa	- MIDDLE	: 26.5	%
STRAIN RATE		: 0.008 %Min	- BOTTOM	: 28.8	%

DATA FROM TEST FILE No.s : 174 184 189

Authorised Signature

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Fax (02) 888 9880
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test results

principal: /Client: HORNSBY SHIRE COUNCIL
project: OLD MAN'S VALLEY
location: HORNSBY
date: 9-3-90 job no: S8463/3

test procedure: AS1289 C1.1, C2.1, C3.1, C4.1 - 1977

SAMPLE IDENTIFICATION	Liquid Limit W_L	Plastic Limit Wp	Plasticity Index Ip	Linear Shrinkage L.S%
BH16 (Residual) (0.8 - 1.15m)	71	26	45	10.0
BH26 (Residual) (0.7 - 1.0m)	66	29	37	17.5
BH29 (Fill) (1.1 - 1.28m)	41	24	17	10.0
BH29 (Residual) 10.8 - 11.15m)	49	31	18	11.0
BH33 (EW) (0.7 - 0.95m)	51	31	20	11.0
BH37 (Fill) (11.15 - 11.30m)	77	23	54	20.5
BH37 (Residual) (15.55 - 15.80m)	30	22	8	5.5

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test results

principal/Client: HORNSBY SHIRE COUNCIL
project: OLD MAN'S VALLEY
location: HORNSBY
date: 6-6-90 job no: S8463/3

test procedure: AS1289 C1.1, C2.1, C3.1, C4.1 - 1977

SAMPLE IDENTIFICATION	Liquid Limit W_L	Plastic Limit Wp	Plasticity Index Ip	Linear Shrinkage L.S%
BH41 (2.3-2.6m) (Residual/EW Breccia)	38	15	23	10 **
BH45 (0.8 - 1.15m) (EW Breccia)	49	29	20	10 ***
BH46 (2.4 - 2.7m) (EW Breccia)	37	15	22	9 **

NOTE: SAMPLE HISTORY AND PREPARATION

All samples dry sieved and oven dried,

* Standard Method used to obtain results

LINEAR SHRINKAGE L.S%

Size of Mould = 250mm

** Curling occured

*** Cracking occured

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APPENDIX D

APPENDIX B

LABORATORY TEST RESULTS

DIRECT SHEAR TESTING

S8463/3-AG
18th July, 1990

DIRECT SHEAR TEST - LABORATORY PROCEDURE

SAMPLE PREPARATION

Block samples of the extremely to highly weathered breccia were obtained from the base of test pits excavated by backhoe. The samples were trimmed by shovel and handpicks prior to transportation to the testing laboratory. A total of five samples were selected for shear testing.

TEST PROCEDURE

The shearbox accommodated a maximum sample size of 300x300x150mm. Each test specimen was prepared by carefully trimming the block sample to a slightly smaller size (about 285x285mm) and mounting it in the shearbox. Plaster of Paris was used to fill gaps between the specimen and the base, sides and top cover of the box except for the zone to be sheared. The trimmed materials were retained for moisture content determination.

The required vertical load was applied and the specimen allowed to consolidate, a process which took several hours. The first two samples from TP10 were tested without water added to the apparatus, whereas the later three samples from TP11 were immersed in water.

Following consolidation the specimen was then sheared at a rate of 0.1mm/min. Peak shear strength was generally reached after 90 to 180 minutes at about 2% to 5% strain. Dial gauge readings were taken manually.

After completion of the test, the dimensions of the shear plane are measured prior to removal of the specimen from the shearbox. Some of the sample was retained for moisture content determination.

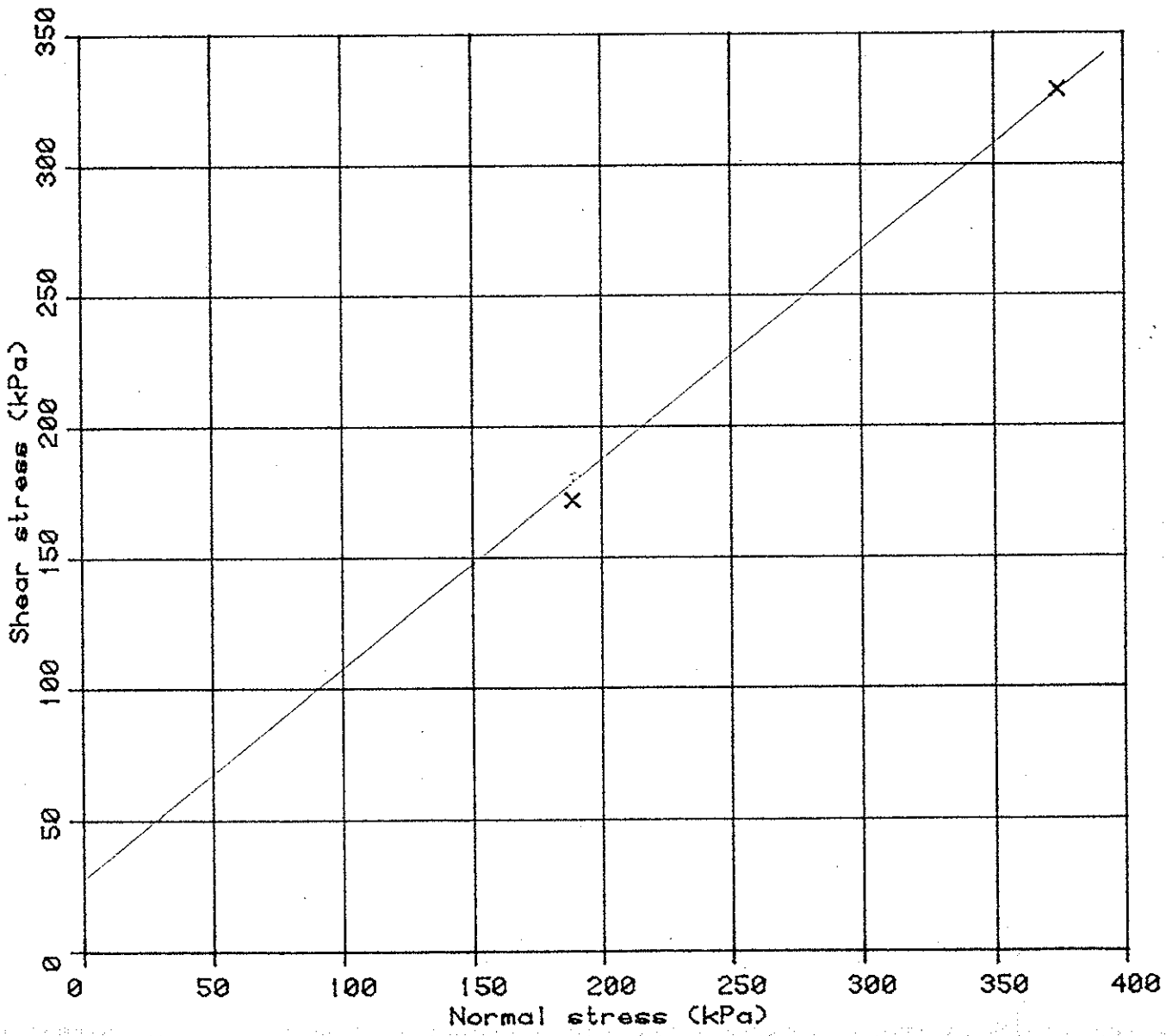
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MANS VALLEY	DATE	: 12/02/90
LOCATION	: HORNSBY		
TP10 - BLOCK SAMPLE		DEPTH	: 1.00 -
SHEAR STRESS	: PEAK		: 1.30

MATERIAL CLASSIFICATION EW/HW BRECCIA, yellow red brown. BLOCK SAMPLES



SHEAR RATE : 0.100 mm/Min
WET DENSITY : 2.20 t/m3 COHESION C : 28 kPa
INITIAL MOISTURE CONTENT : % ANGLE OF FRICTION : 39 deg.

DATA FROM TEST FILE No.s : 113 114

Authorised Signature

060

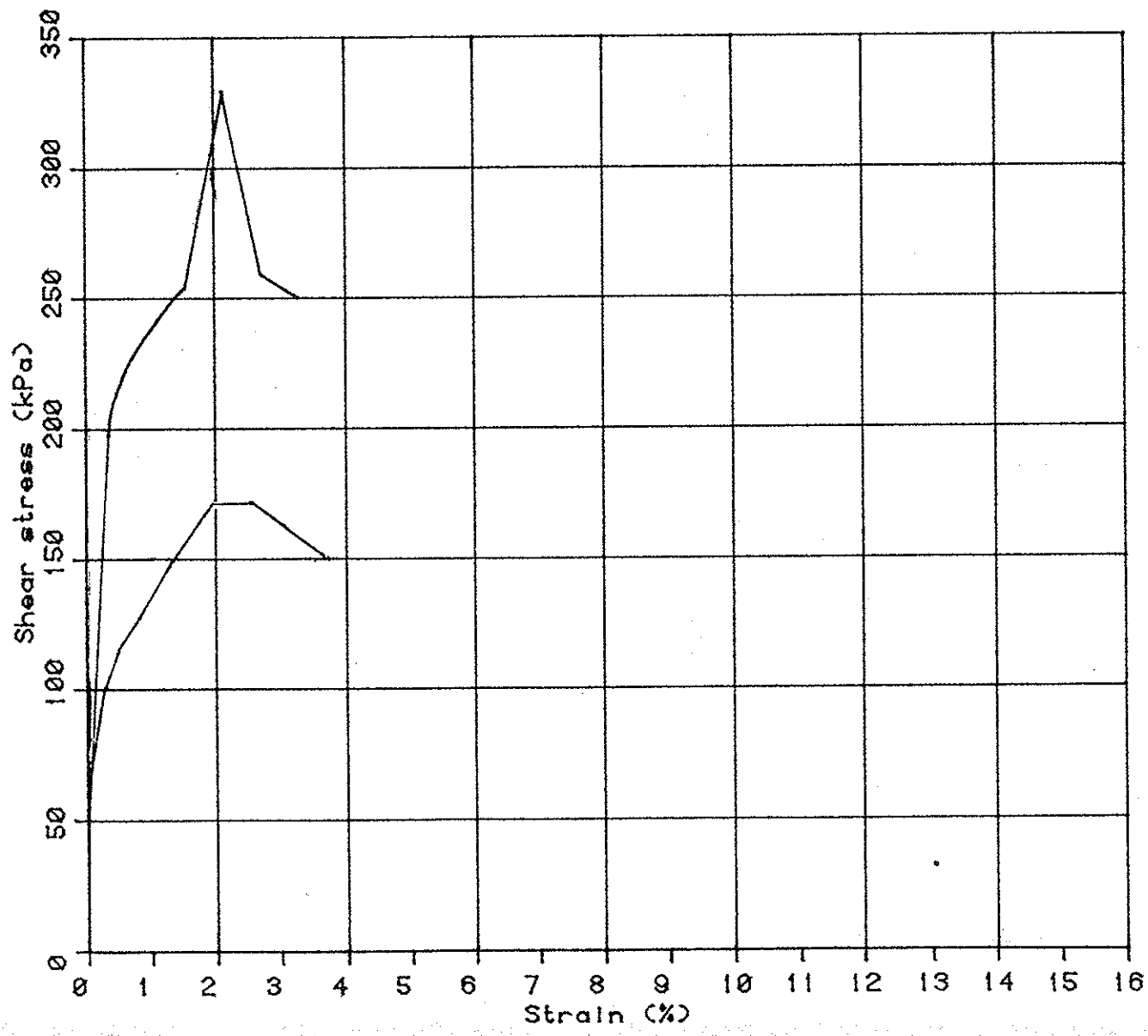
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MANS VALLEY	DATE	: 12/02/90
LOCATION	: HORNSBY	TEST FILE #	: 113
TP10 - BLOCK SAMPLE		DEPTH	: 1.00 -
SHEAR STRESS	: PEAK		: 1.30

MATERIAL CLASSIFICATION : EW/HW BRECCIA, yellow red brown, BLOCK SAMPLES



SHEAR RATE : 0.100 mm/Min
WET DENSITY : 2.20 t/m3 COHESION C : 28 kPa
INITIAL MOISTURE CONTENT : % ANGLE OF FRICTION : 39 deg.

DATA FROM TEST FILE No.s : 113 114

Authorised Signature

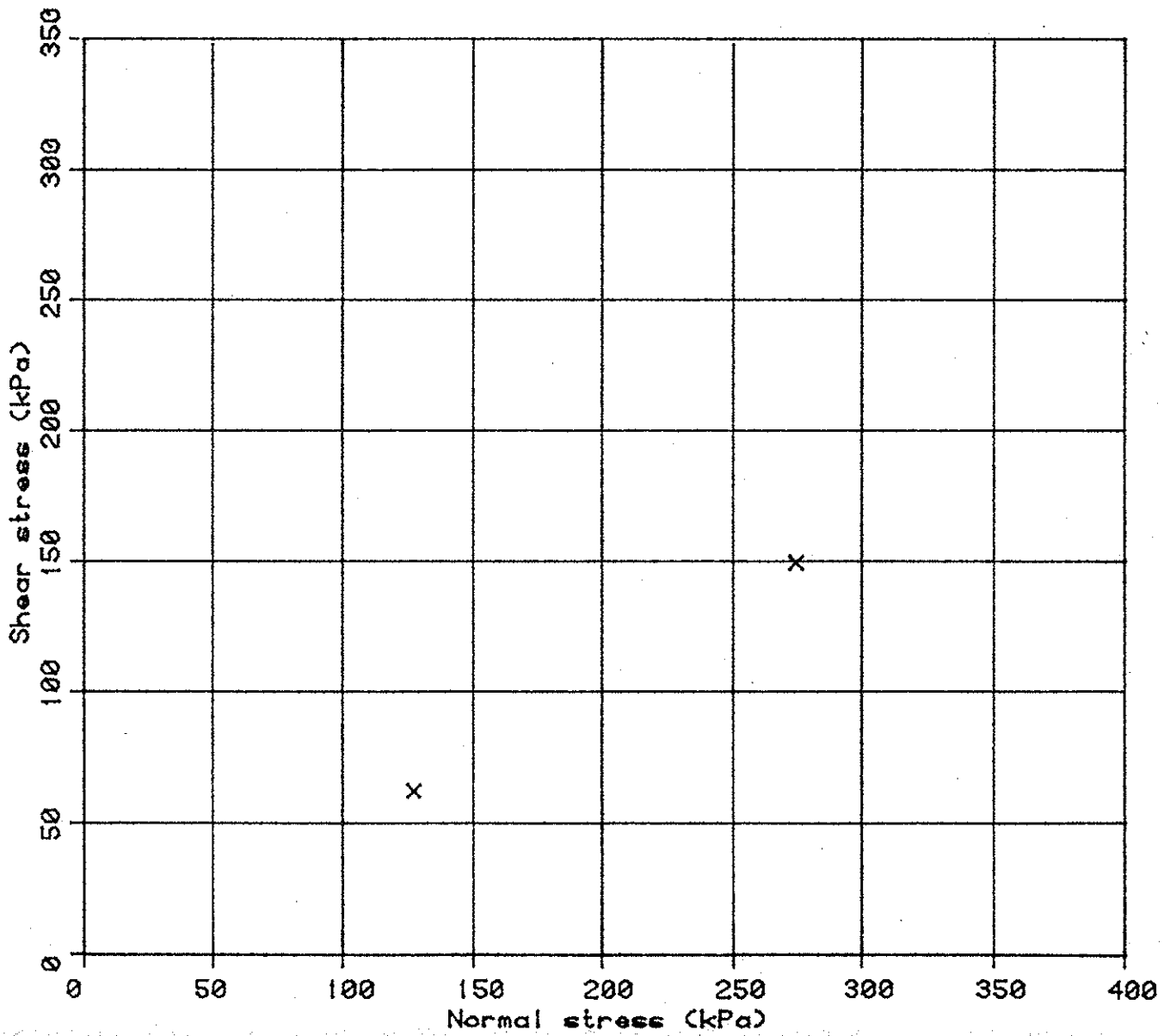
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 16/05/90
LOCATION	: HORNSBY QUARRY		
BOREHOLE: TP11 - Sample 1		DEPTH	: 1.20 -
SHEAR STRESS	: PEAK		: 1.50

MATERIAL CLASSIFICATION : (CL) Sandy Gravelly CLAY, medium plasticity, yellow brown, Gravel fine to coarse, Sand fine to coarse.



SHEAR RATE	:	0.100 mm/Min			
WET DENSITY	:	2.13 t/m3	COHESION C	:	kPa
INITIAL MOISTURE CONTENT	:	32.0%%	ANGLE OF FRICTION	:	deg.
FINAL MOISTURE CONTENT	:	35.9%			

DATA FROM TEST FILE No.s : 241 242

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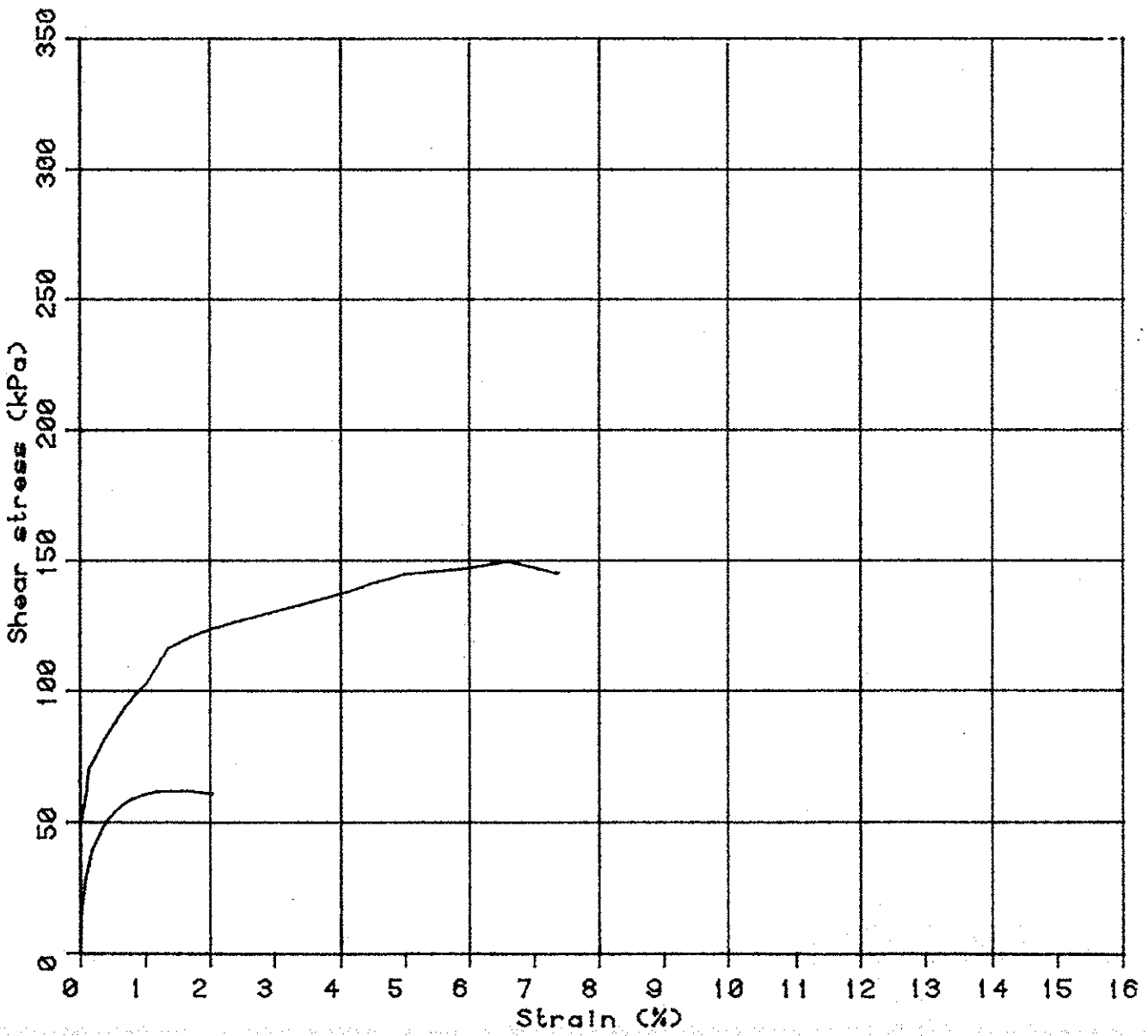
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 16/05/90
LOCATION	: HORNSBY QUARRY	TEST FILE #	: 241
BOREHOLE: TP11 - Sample 1		DEPTH	: 1.20 -
SHEAR STRESS	: PEAK		: 1.50

MATERIAL CLASSIFICATION : (CL) Sandy Gravelly CLAY, medium plasticity, yellow brown, Gravel fine to coarse, Sand fine to coarse.



SHEAR RATE : 0.100 mm/Min
WET DENSITY : 2.13 t/m3 COHESION C : ..... kPa
INITIAL MOISTURE CONTENT : 32.0 % ANGLE OF FRICTION : ..... deg.
FINAL MOISTURE CONTENT : 35.9%

DATA FROM TEST FILE No.s : 241 242

Authorised Signature

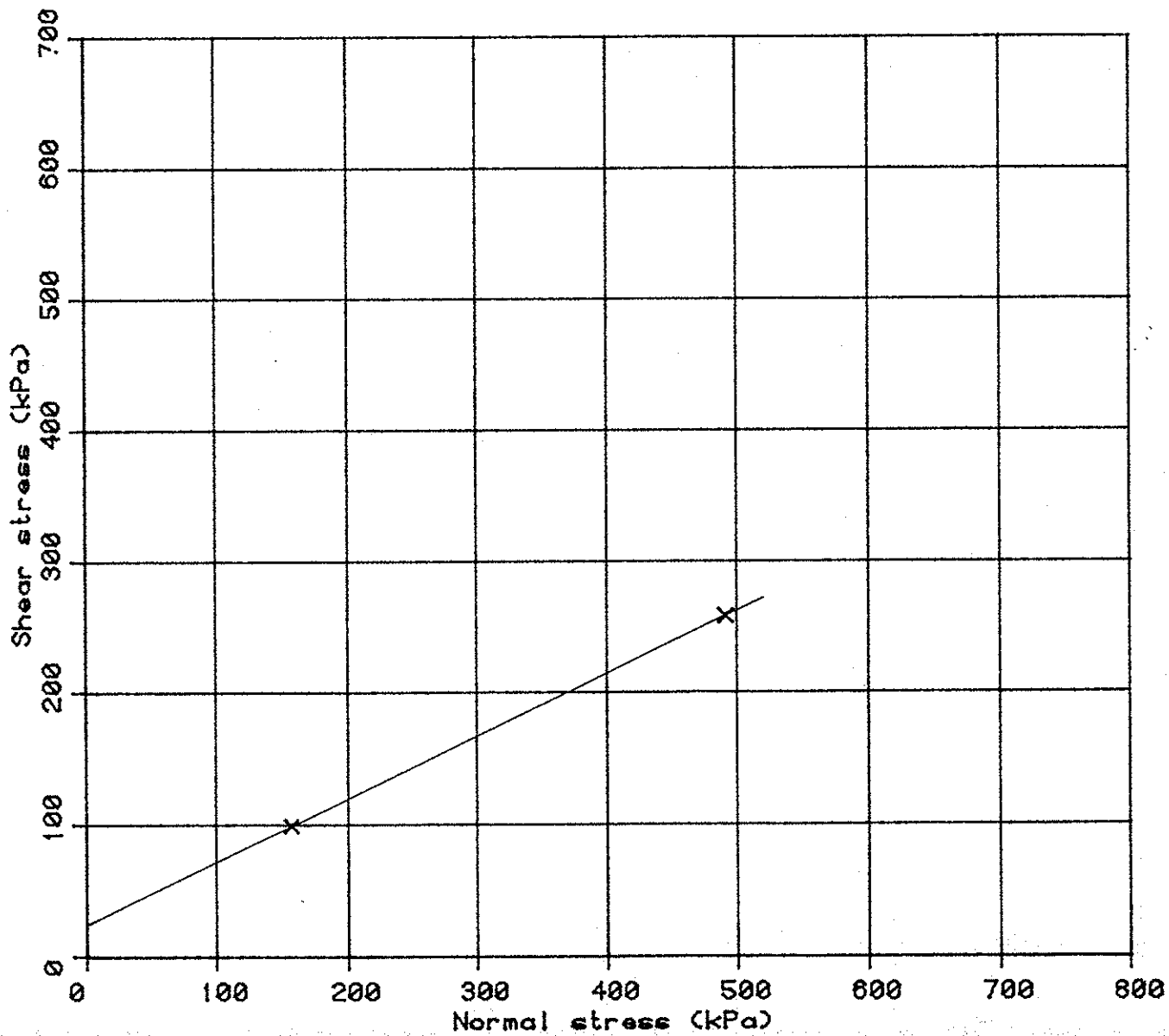
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 25/03/98
LOCATION	: HORNSBY QUARRY		
BOREHOLE: TP 11 - Sample 2		DEPTH	: 1.20 - 1.50
SHEAR STRESS	: PEAK		

MATERIAL CLASSIFICATION : (CL) SANDY GRAVELLY CLAY, medium plasticity, yellow-brown, Gravel, fine to coarse, Sand, fine to coarse.



SHEAR RATE	: 0.100 mm/Min		
WET DENSITY	: 2.13 t/m3	COHESION C	: ...25..... kPa
INITIAL MOISTURE CONTENT	: 36.4 %	ANGLE OF FRICTION	: ...26.0... deg.
FINAL MOISTURE CONTENT	: 37.2		

DATA FROM TEST FILE No.s : 177 178

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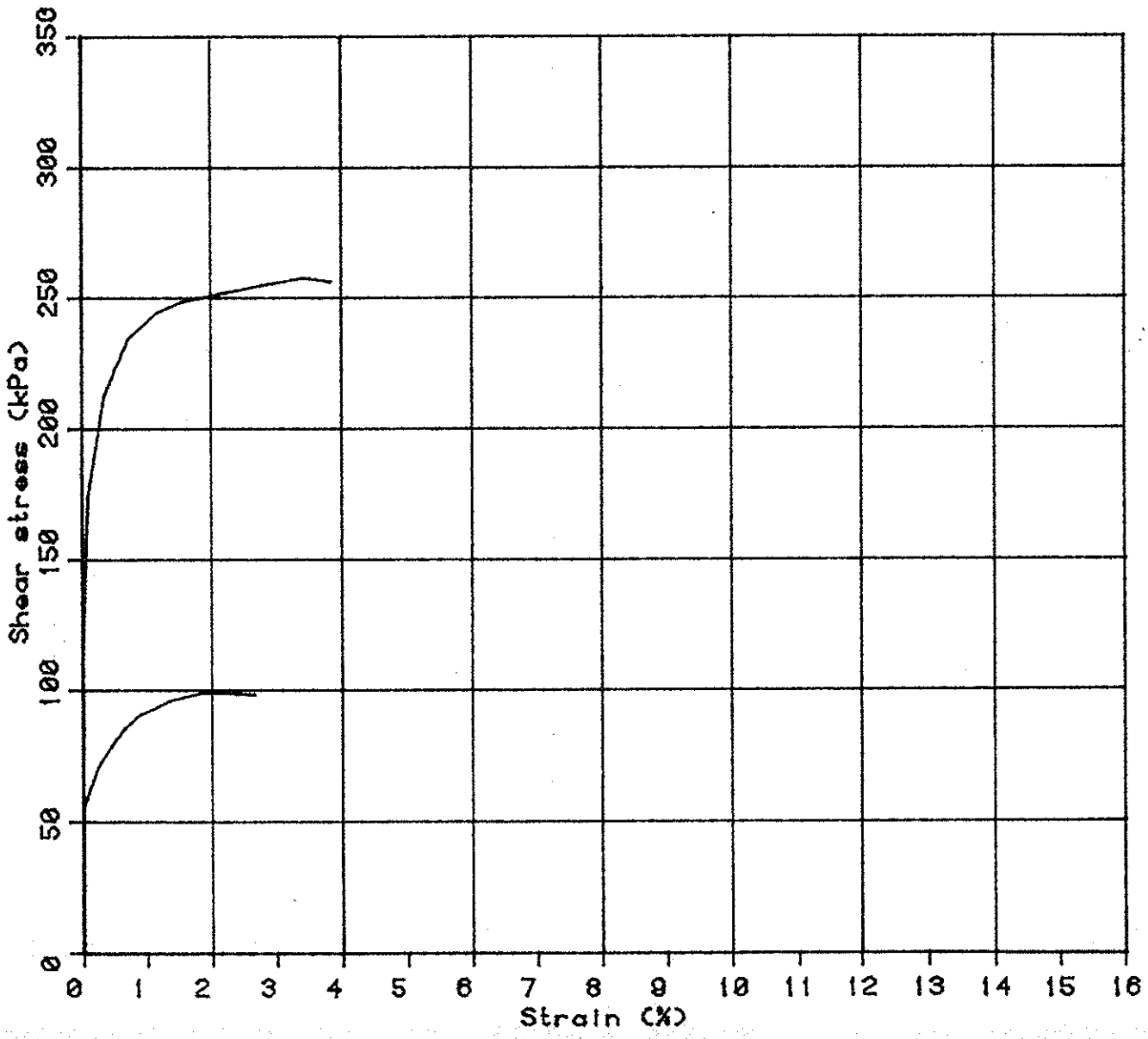
direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 25/03/98
LOCATION	: HORNSBY QUARRY	TEST FILE #	: 177
BOREHOLE: TP 11 - Sample 2		DEPTH	: 1.20 -
SHEAR STRESS	: PEAK		: 1.50

MATERIAL CLASSIFICATION : (CL) Sandy Gravelly CLAY, medium plasticity, yellow brown , Gravel fine to coarse; sand fine to coarse.



SHEAR RATE	:	0.100 mm/Min			
WET DENSITY	:	2.13 t/m3	COHESION C	: 25	kPa
INITIAL MOISTURE CONTENT	:	36.4 %	ANGLE OF FRICTION	: 26.0	deg.
FINAL MOISTURE CONTENT	:	37.2%			
DATA FROM TEST FILE No.s	:	177 178			

NATA

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060

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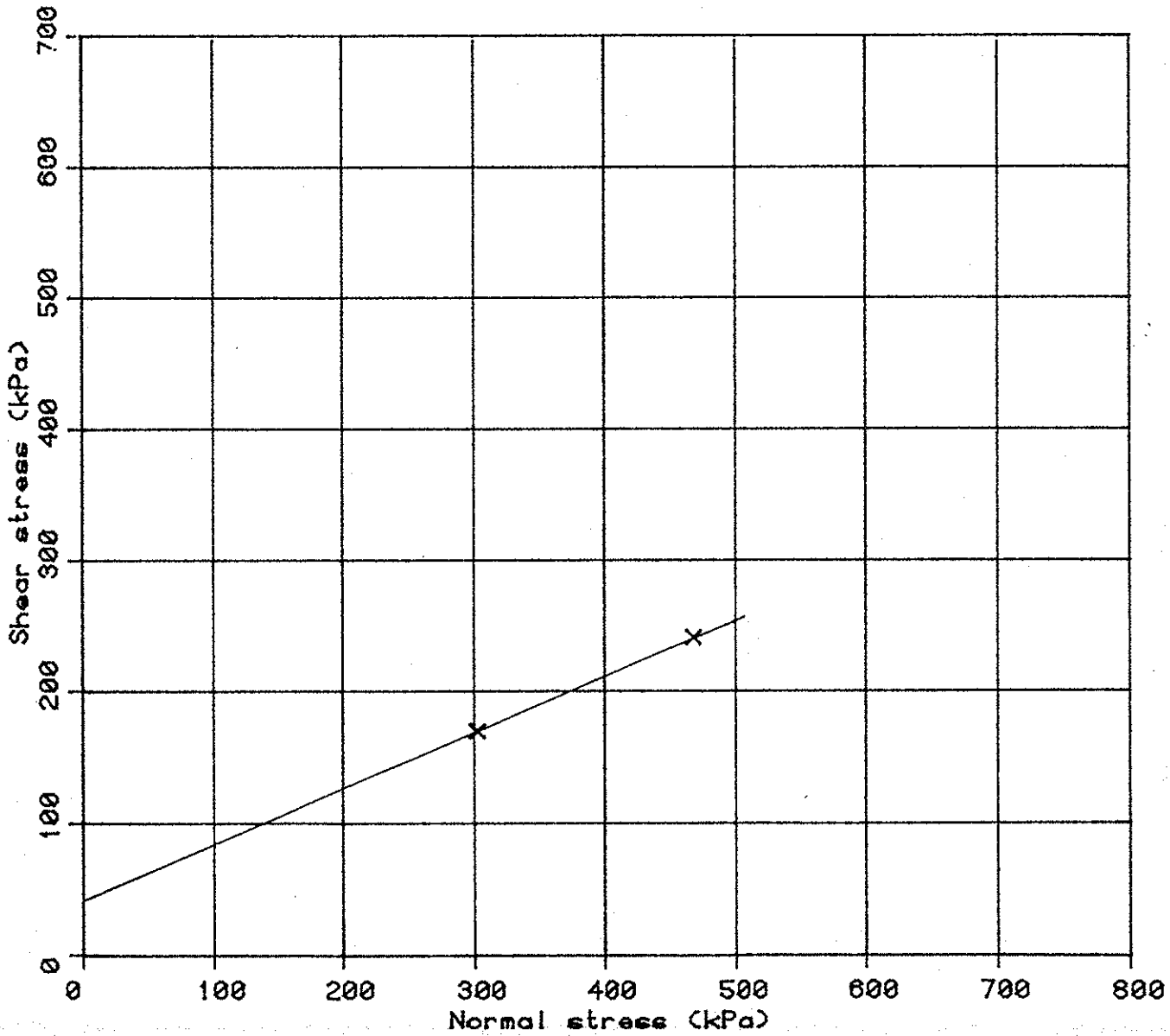
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8483/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 5/90
LOCATION	: HORNSBY QUARRY		
BOREHOLE: TP 11 Sample 3		DEPTH	: 1.20 -
SHEAR STRESS	: PEAK		: 1.50

MATERIAL CLASSIFICATION : (CL) Sandy Gravelly CLAY, medium plasticity, yellow brown, Gravel fine to coarse, sand fine to coarse.



SHEAR RATE	: 0.100 mm/Min		
WET DENSITY	: 2.13 t/m3	COHESION C	: ....40.... kPa
INITIAL MOISTURE CONTENT	: 28.00 %	ANGLE OF FRICTION	: ....24.0.. deg.
FINAL MOISTURE CONTENT	: 31.30%		

DATA FROM TEST FILE No.s : 245 246

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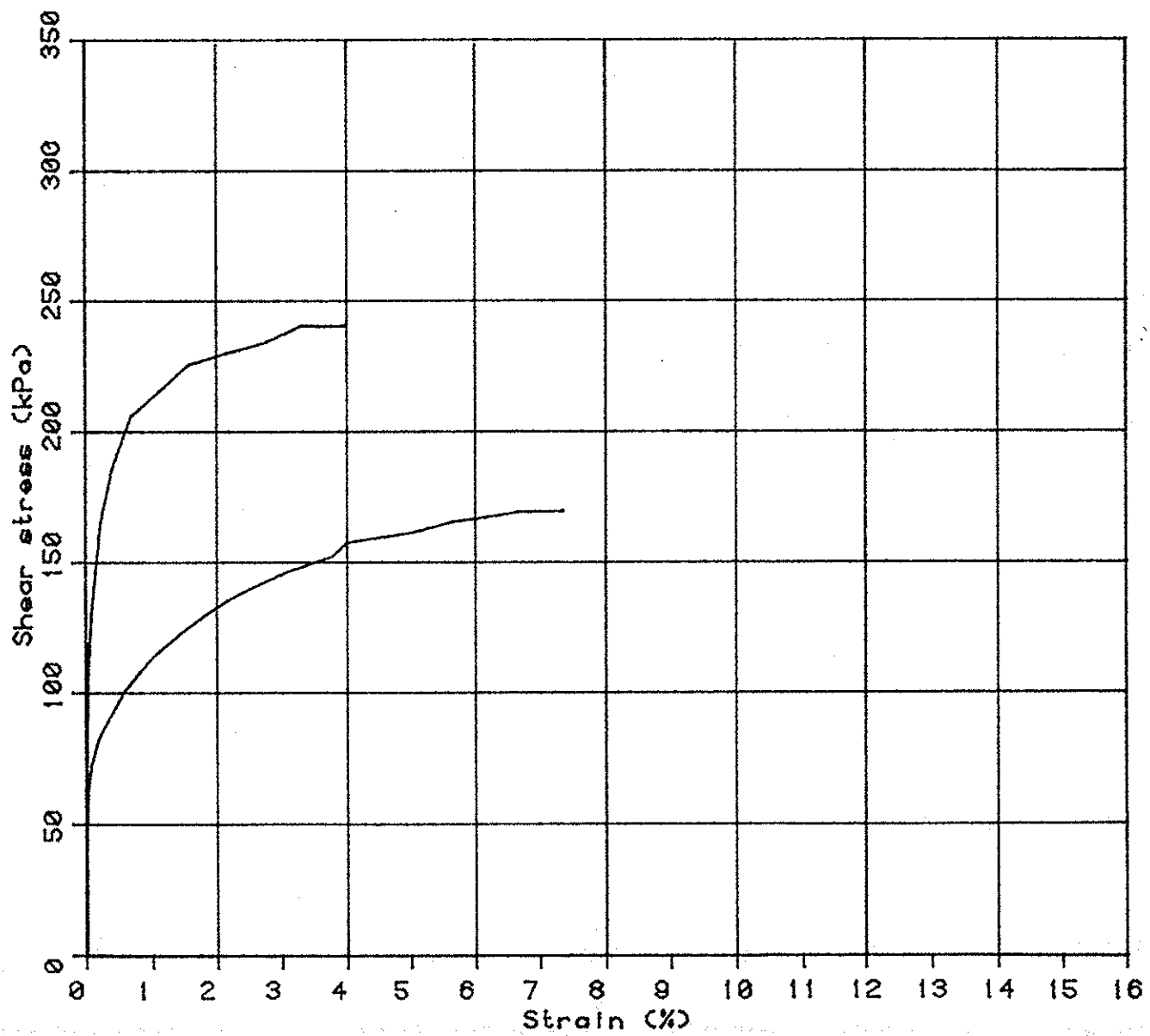
direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/3
PRINCIPAL	:	TESTED BY	: SRM
PROJECT	: OLD MAN'S VALLEY	DATE	: 5/90
LOCATION	: HORNSBY QUARRY	TEST FILE #	: 245
BOREHOLE: TP 11		DEPTH	: 1.20 -
SHEAR STRESS	: PEAK		: 1.50

MATERIAL CLASSIFICATION : (CL) Sandy Gravelly CLAY, medium plasticity, yellow brown, Gravel fine to coarse, Sand fine to coarse.



SHEAR RATE	: 0.100 mm/Min		
WET DENSITY	: 2.13 t/m3	COHESION C	: 40 kPa
INITIAL MOISTURE CONTENT	: 29.80 %	ANGLE OF FRICTION	: 24.0 deg.
FINAL MOISTURE CONTENT	: 31.30%		

DATA FROM TEST FILE No.s : 245 246

Authorised Signature

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test results

principal:/Client: HORNSBY SHIRE COUNCIL
project: OLD MAN'S VALLEY
location: HORNSBY
date: 6-6-90 job no: S8463/3

test procedure: AS1289 B1.1 - 1977

SAMPLE IDENTIFICATION	MOISTURE CONTENT %
Sample 1 (Before Test)	32.0
Sample 1 (After Test)	35.9
Sample 2 (Before Test)	36.4
Sample 2 (After Test)	37.2
Sample 3 (Before Test)	29.9
Sample 3 (After Test)	31.3

Note: All Moistures from Direct Shear Samples from TP11.

Authorised Signature

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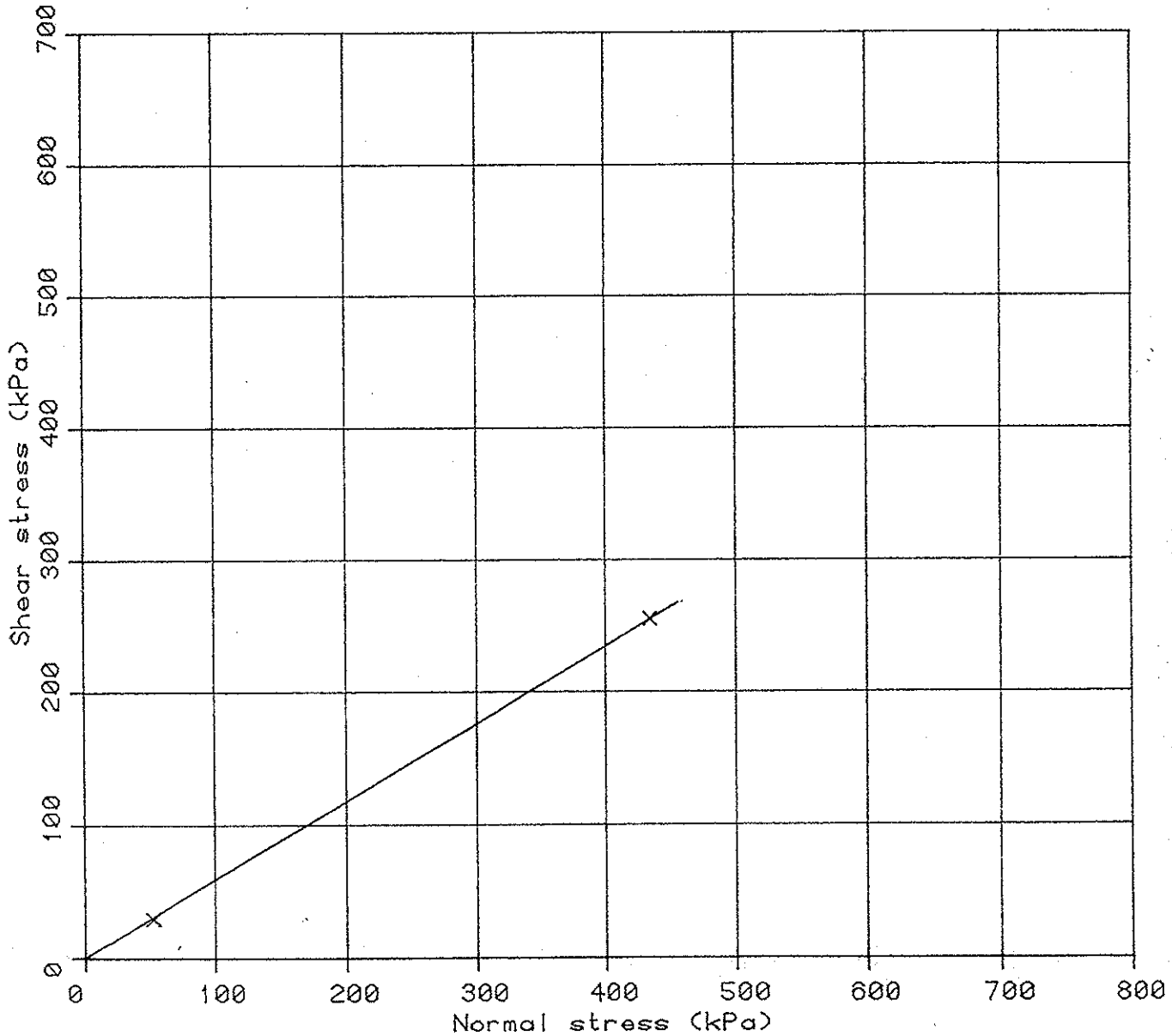
direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463//2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 21/09/89
LOCATION	: HORNSBY		
SAMPLE	#1 SE OF FIELD	DEPTH	: 0.00 -
SHEAR STRESS	: PEAK		: 0.00

MATERIAL CLASSIFICATION : (SC) Clayey GRAVELLY SAND - fine to coarse, yellow brown, fine to coarse gravel, fines of medium plasticity.



SHEAR RATE	: 0.005 mm/Min		
WET DENSITY	: 1.96 t/m3	COHESION C	: ...0..... kPa
INITIAL MOISTURE CONTENT	: 20.70%	ANGLE OF FRICTION	: ..35.0.... deg.

DATA FROM TEST FILE No.s : 868 924

Authorised Signature

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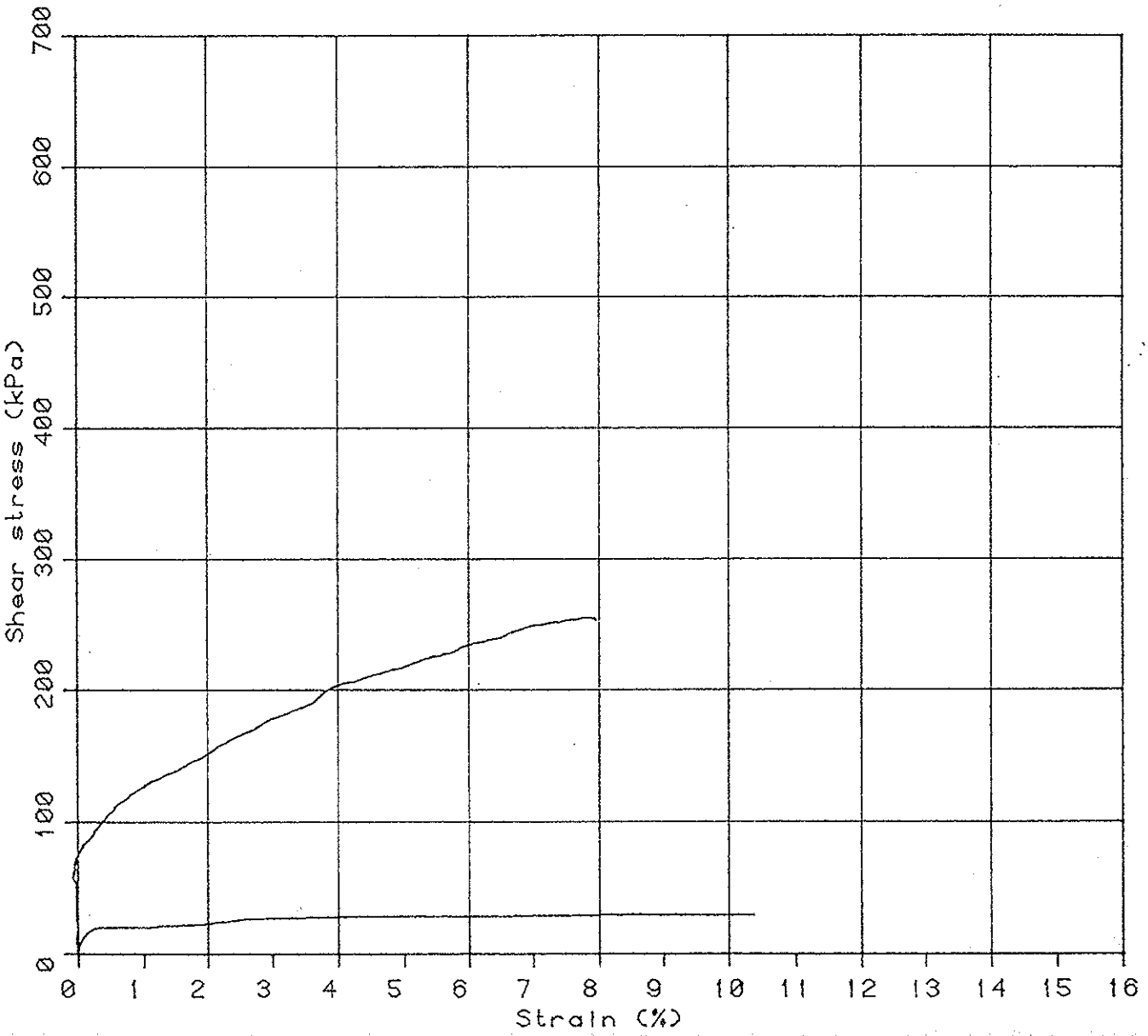
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463//2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 21/09/89
LOCATION	: HORNSBY	TEST FILE #	: 868
SAMPLE	#1 SE OF FIELD	DEPTH	: 0.00 -
SHEAR STRESS	: PEAK		: 0.00

MATERIAL CLASSIFICATION : (SC) Clayey GRAVELLY SAND - fine to coarse, yellow brown, fine to coarse gravel, fines of medium plasticity.



SHEAR RATE : 0.005 mm/Min
WET DENSITY : 1.96 t/m3 COHESION C : ...0..... kPa
INITIAL MOISTURE CONTENT : 20.70 % ANGLE OF FRICTION : ..30.5.... deg.

DATA FROM TEST FILE No.s : 868 924

Authorised Signature

Coffey & Partners Pty. Ltd.
Inc in Qld

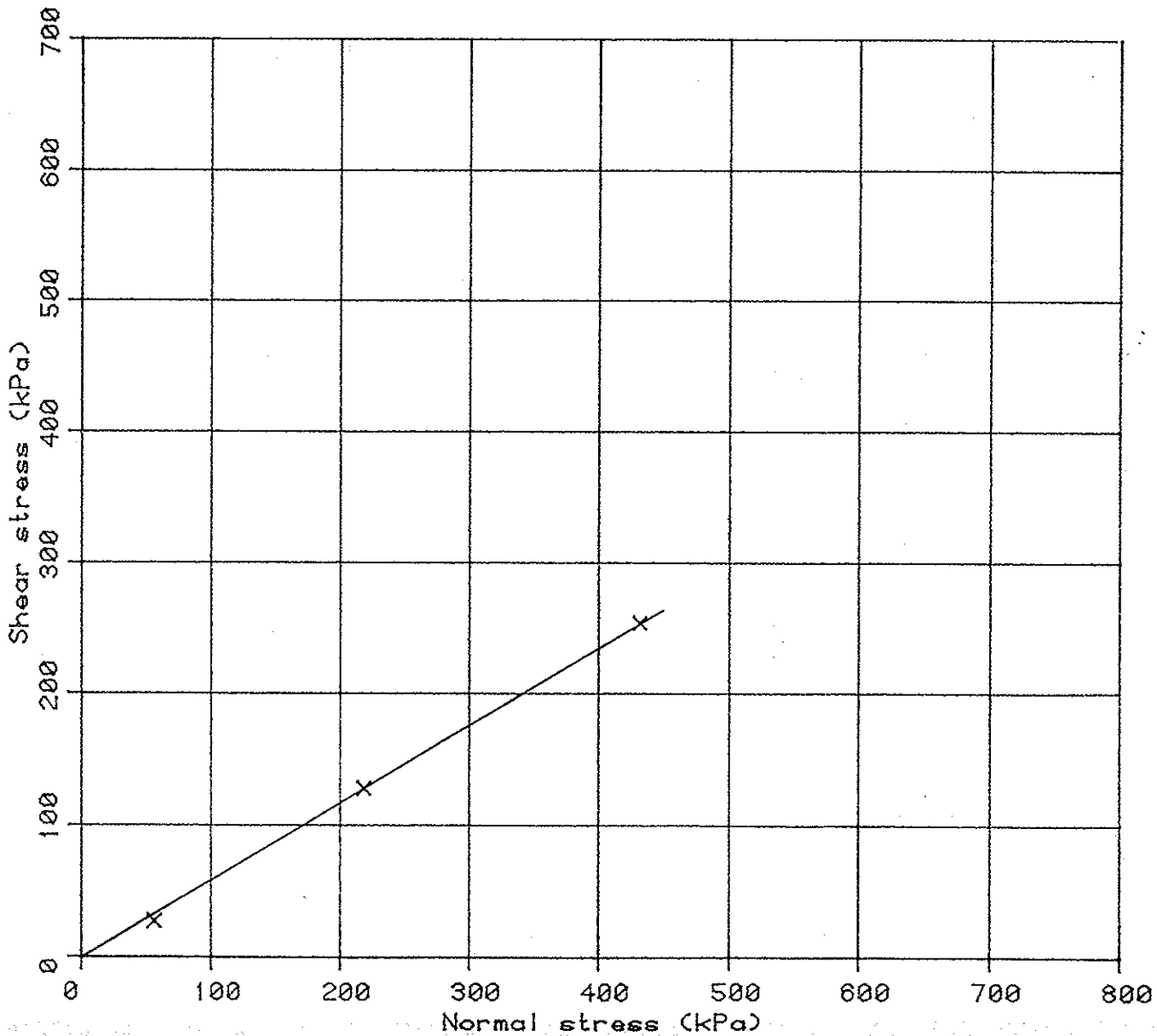
direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 23/09/89
LOCATION	: HORNSBY		

SAMPLE	#1 SE OF FIELD	DEPTH	: 0.00 -
SHEAR STRESS	: RESIDUAL		: 0.00

MATERIAL CLASSIFICATION : (SC) Clayey GRAVELLY SAND - fine to coarse, yellow brown, fine to coarse gravel, fines of medium plasticity.



SHEAR RATE	:	0.016 mm/Min			
WET DENSITY	:	1.96 t/m3	COHESION C	:	0 kPa
INITIAL MOISTURE CONTENT	:	20.9%	ANGLE OF FRICTION	:	31 deg.

DATA FROM TEST FILE No.s : 870 877 879

Authorised Signature

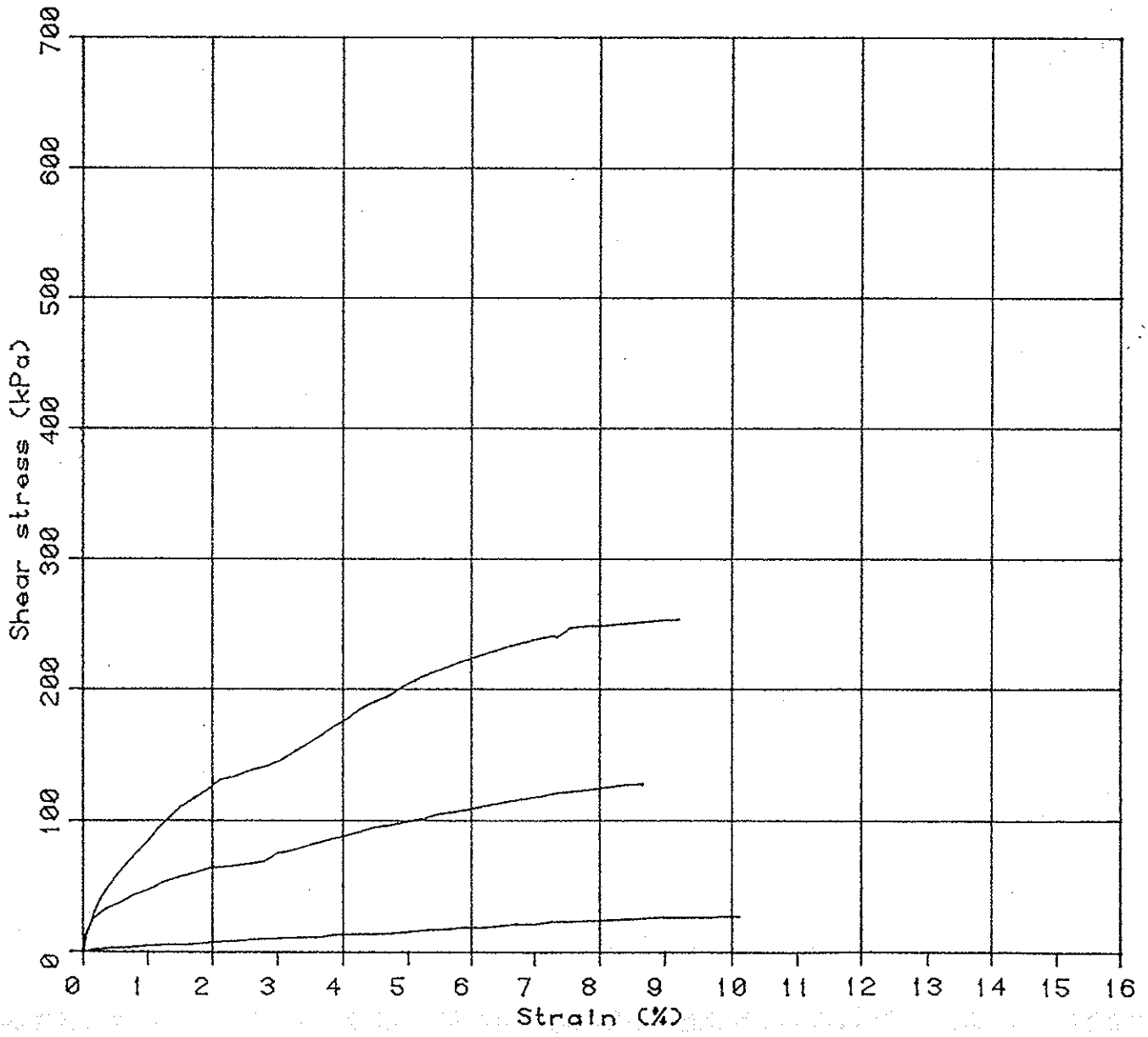
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 23/09/89
LOCATION	: HORNSBY	TEST FILE #	: 870
SAMPLE	#1 SE OF FIELD	DEPTH	: 0.00 -
SHEAR STRESS	: RESIDUAL		: 0.00

MATERIAL CLASSIFICATION : (SC) Clayey GRAVELLY SAND - fine to coarse, yellow brown, fine to coarse gravel, fines of medium plasticity.



SHEAR RATE	:	0.016 mm/Min			
WET DENSITY	:	1.96 t/m3	COHESION C	:	....0.... kPa
INITIAL MOISTURE CONTENT	:	20.9%	ANGLE OF FRICTION	:	....31.... deg.

DATA FROM TEST FILE No.s : 870 877 879

Authorised Signature

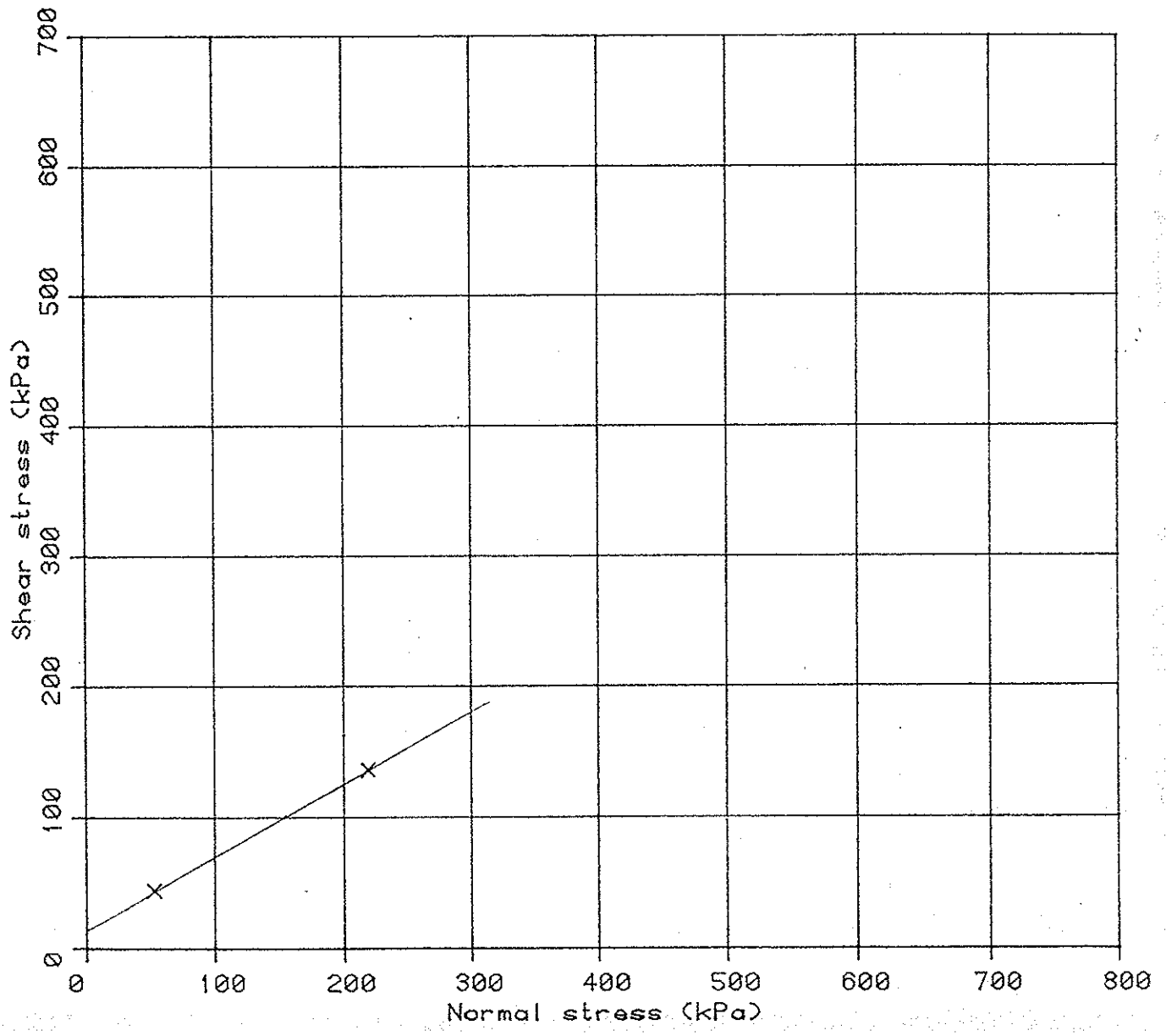
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 04/10/89
LOCATION	: HORNSBY		
SAMPLE	#2 STOCKPILE	DEPTH	: 0.00 -
SHEAR STRESS	: PEAK		: 0.00

MATERIAL CLASSIFICATION : (GC) Clayey SANDY GRAVEL - fine to coarse, yellow brown, fines of medium plasticity, fine to coarse sand.



SHEAR RATE	:	0.005 mm/Min			
WET DENSITY	:	1.98 t/m3	COHESION C	: 15	kPa
INITIAL MOISTURE CONTENT	:	19.70 %	ANGLE OF FRICTION	: 29.5	deg.

DATA FROM TEST FILE No.s : 871 914

Authorised Signature

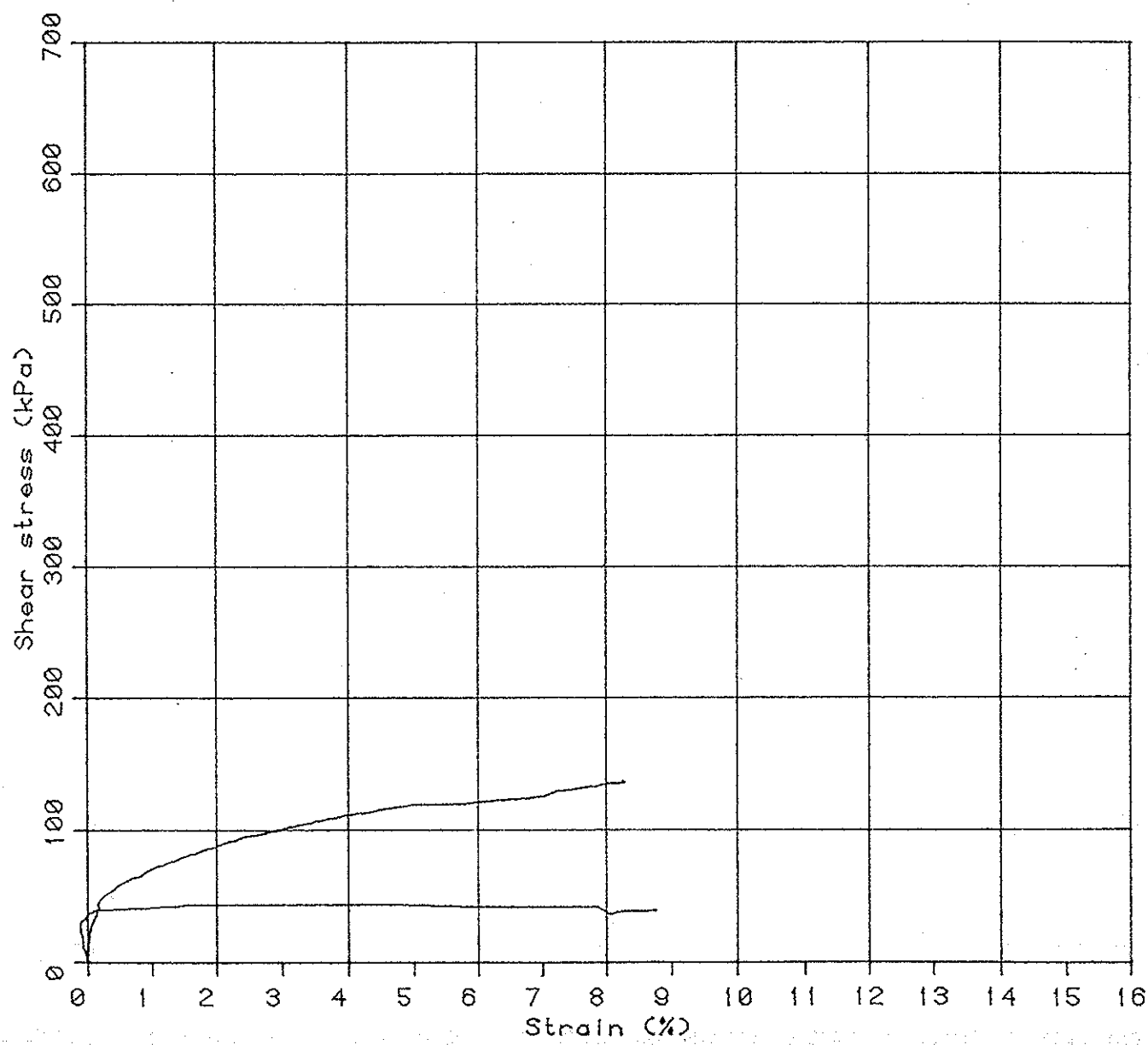
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 04/10/89
LOCATION	: HORNSBY	TEST FILE #	: 871
SAMPLE	#2 STOCKPILE	DEPTH	: 0.00 -
SHEAR STRESS	: PEAK		: 0.00

MATERIAL CLASSIFICATION : (GC) Clayey SANDY GRAVEL - fine to coarse, yellow brown, fines of medium plasticity, fine to coarse sand.



SHEAR RATE	:	0.005 mm/Min			
WET DENSITY	:	1.98 t/m3	COHESION C	:	15 kPa
INITIAL MOISTURE CONTENT	:	19.70 %	ANGLE OF FRICTION	:	29.5 deg.

DATA FROM TEST FILE No.s : 871 914

Authorised Signature

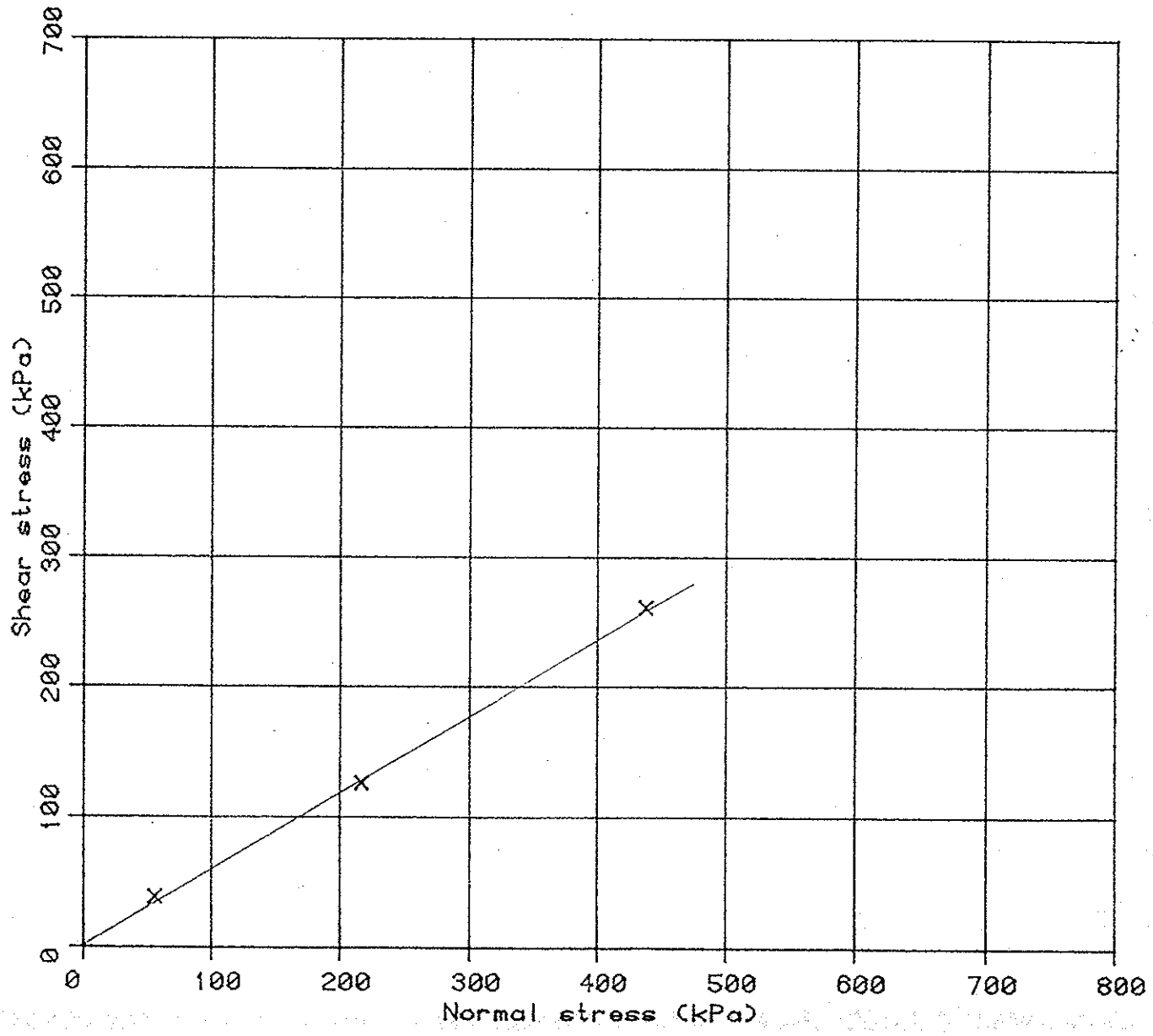
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 06/10/89
LOCATION	: HORNSBY		
SAMPLE	#2 STOCKPILE	DEPTH	: 0.00 -
SHEAR STRESS	: RESIDUAL		: 0.00

MATERIAL CLASSIFICATION : (GC) Clayey SANDY GRAVEL - fine to coarse, yellow brown, fines of medium plasticity, fine to coarse sand.



SHEAR RATE : 0.027 mm/Min
WET DENSITY : 1.98 t/m3 COHESION C : ....0..... kPa
INITIAL MOISTURE CONTENT : 19.7% ANGLE OF FRICTION : ...31..... deg.

DATA FROM TEST FILE No.s : 875 876 878

Authorised Signature

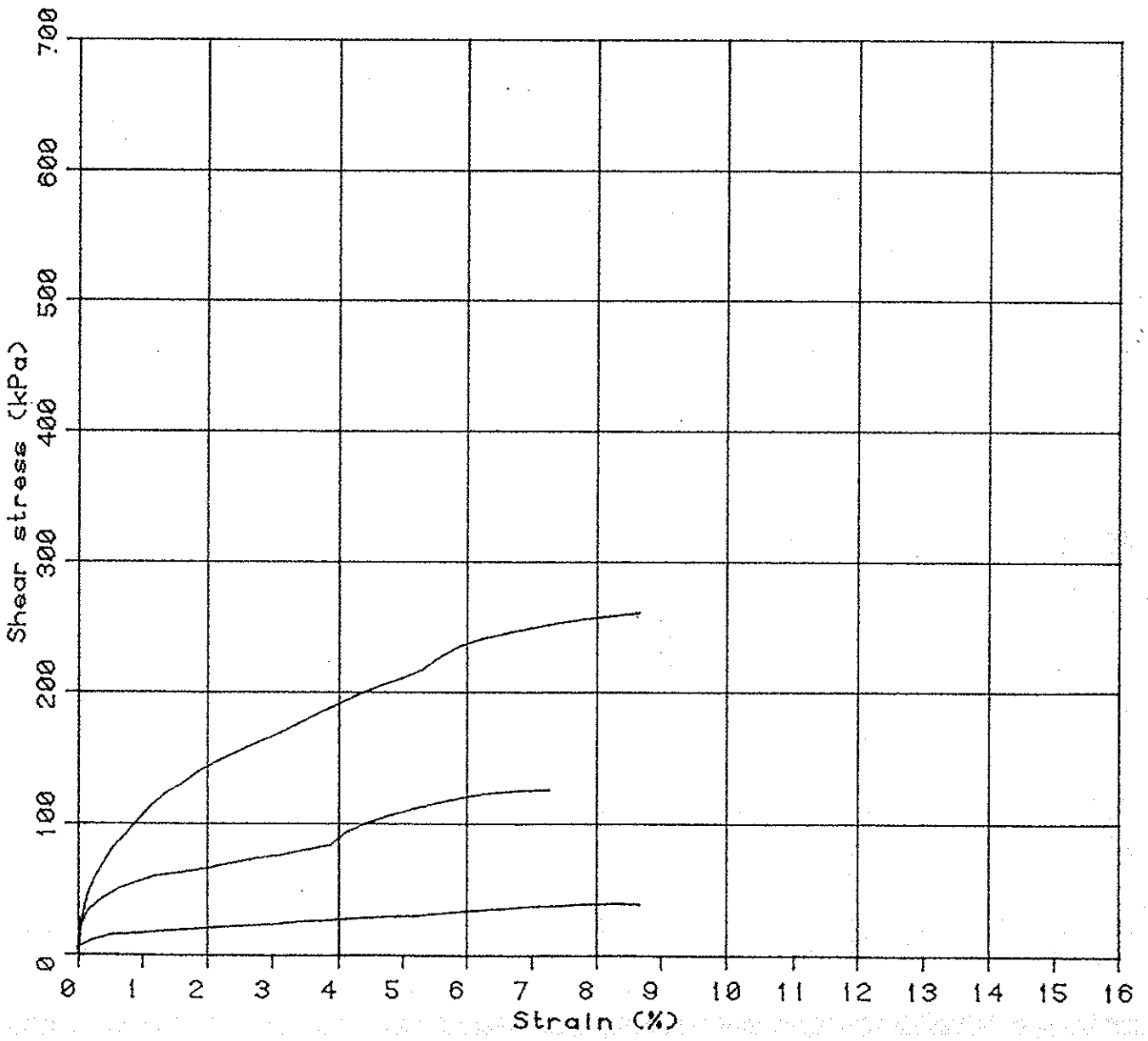
Coffey & Partners Pty. Ltd.
Inc in Qld

direct shear test

LABORATORY : SYDNEY

CLIENT	: HORNSBY SHIRE COUNCIL	JOB NO	: S8463/2
PRINCIPAL	:	TESTED BY	: GC
PROJECT	: OLD MAN'S VALLEY	DATE	: 06/10/89
LOCATION	: HORNSBY	TEST FILE #	: 875
SAMPLE	#2 STOCKPILE	DEPTH	: 0.00 -
SHEAR STRESS	: RESIDUAL		: 0.00

MATERIAL CLASSIFICATION : (GC) Clayey SANDY GRAVEL - fine to coarse, yellow brown, fines of medium plasticity, fine to coarse sand.



SHEAR RATE	: 0.027 mm/Min			
WET DENSITY	: 1.98 t/m3	COHESION C	: 0	kPa
INITIAL MOISTURE CONTENT	: 19.7%	ANGLE OF FRICTION	: 31	deg.

DATA FROM TEST FILE No.s : 875 876 878

Authorised Signature

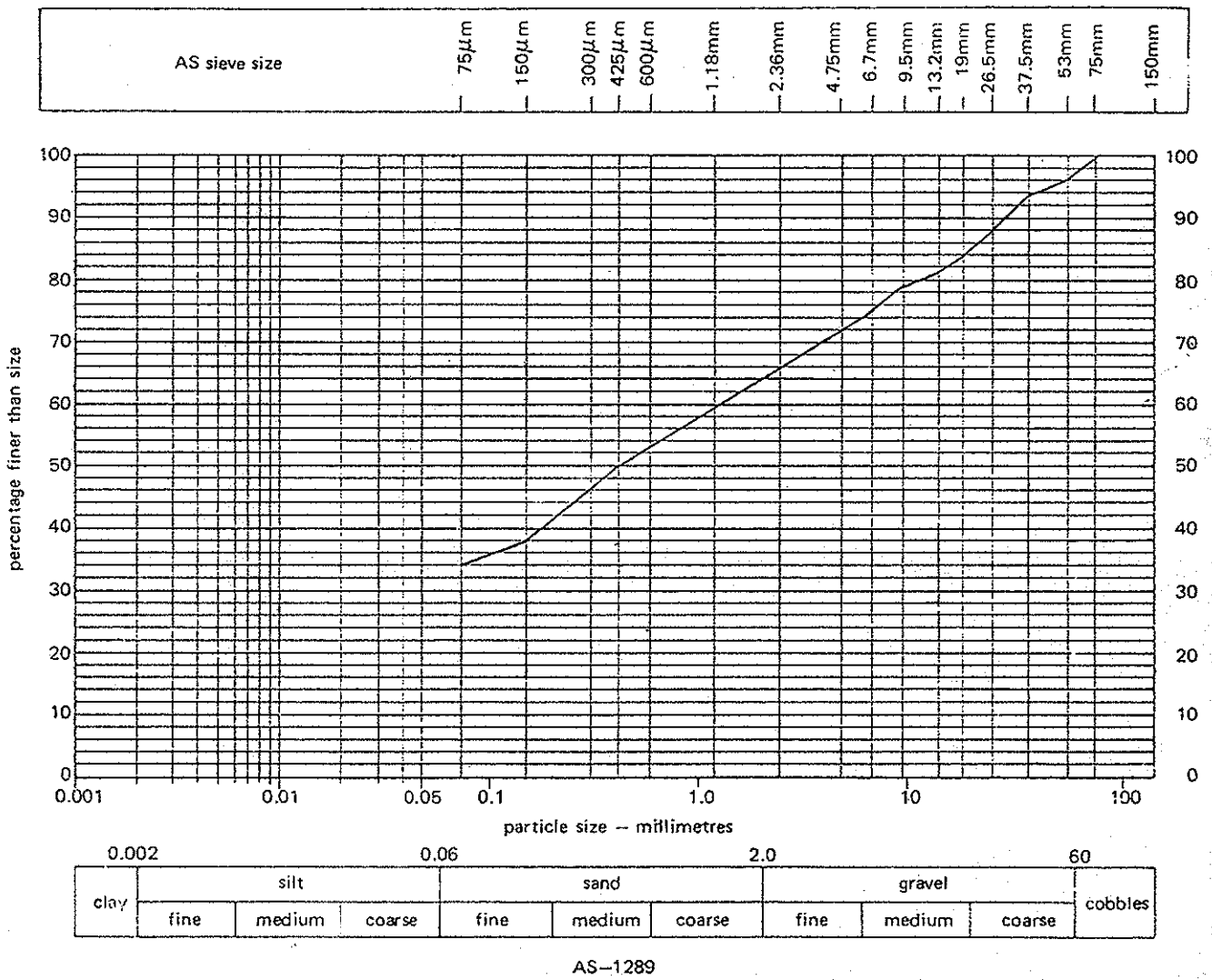
Coffey & Partners Pty. Ltd.
Incorporated in Queensland

particle size distribution

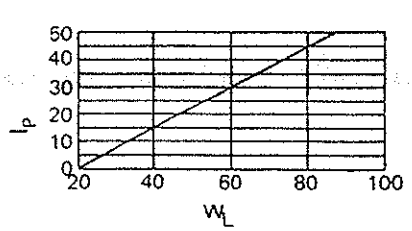
COFFEY

borehole no #2
sheet 1 of 1

		laboratory	SYDNEY
client	HORNSBY SHIRE COUNCIL	job no	S8463/2
principal		date	10-10-89
project	OLD MAN'S VALLEY	tested by	GC
location	HORNSBY	checked by	JR
sample identification	#2 STOCKPILE	depth	–
test procedure	AS1289 C1.1, C2.1, C3.1, C4.1, C6.1 - 1977		



liquid limit	%	46
plastic limit	%	24
plasticity index	%	22
linear shrinkage	%	10.5
particle density	t/m³	
natural moisture	%	



classification

(GC) CLAYEY SANDY GRAVEL, fine to coarse, yellow-brown, fines of medium plasticity, fine to coarse sand.

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Coffey & Partners Pty. Ltd.
Incorporated in Queensland

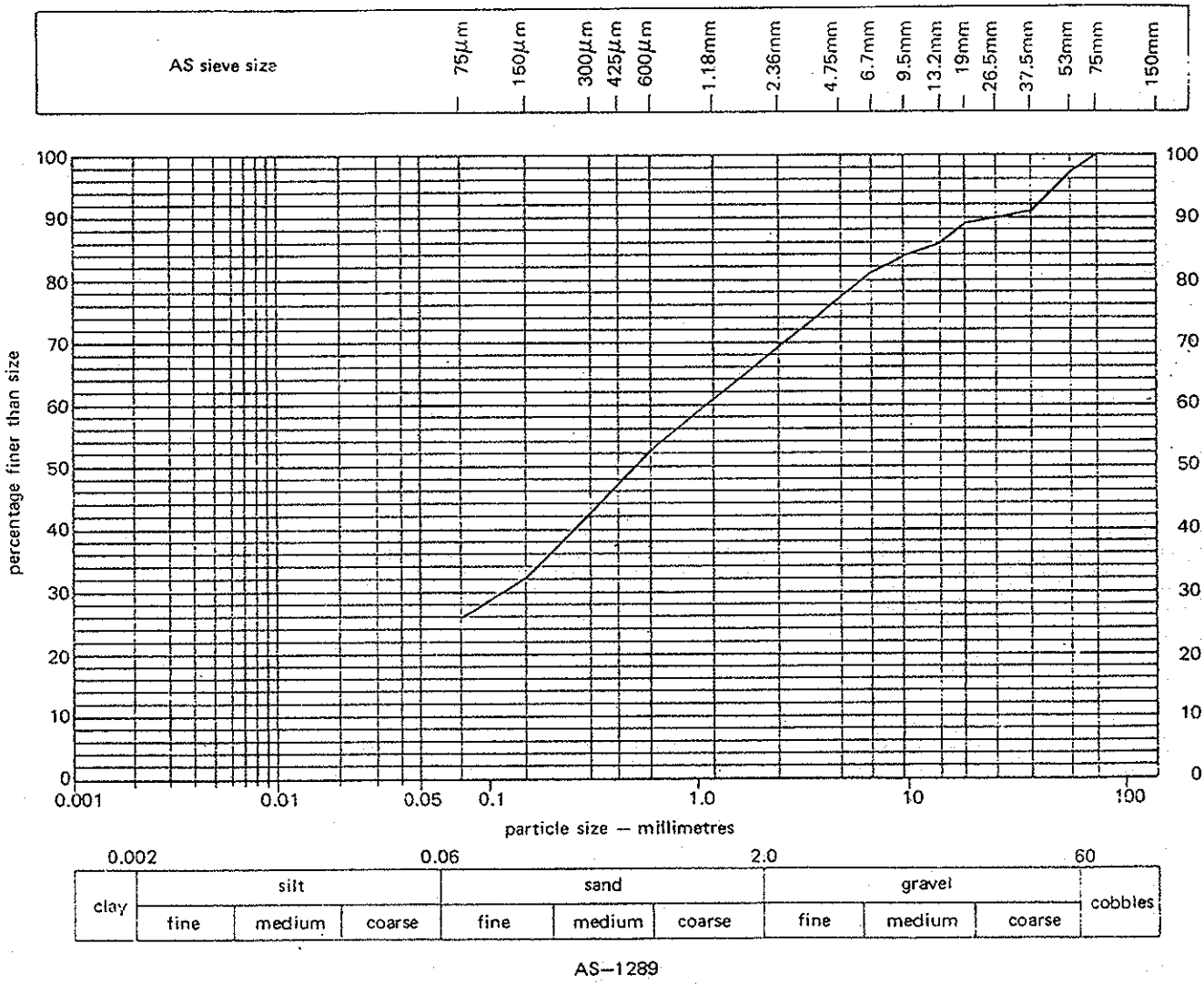
particle size distribution

COFFEY

borehole no #1
sheet 1 of 1

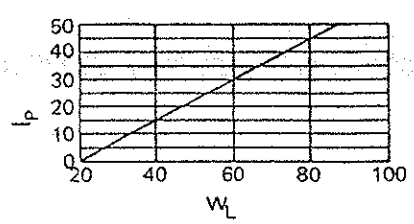
laboratory SYDNEY

client	HORNSBY SHIRE COUNCIL	job no	S8463/2
principal		date	10-10-89
project	OLD MAN'S VALLEY	tested by	GC
location	HORNSBY	checked by	JR
sample identification	#1 - SE of field	depth	
test procedure	AS1289 C1.1, C2.1, C3.1, C4.1, C6.1 - 1977		



AS-1289

liquid limit	%	44
plastic limit	%	22
plasticity index	%	22
linear shrinkage	%	10.5
particle density	t/m³	
natural moisture	%	



classification

(SC) CLAYEY GRAVELLY SAND, fine to coarse, yellow-brown, fine to coarse gravel, fines of medium plasticity.

Authorised Signature

COFFEY

Coffey Partners International Pty Ltd

Consulting Engineers
in the geotechnical sciences
Incorporated in NSW

test results

principal/Client: HORNSBY SHIRE COUNCIL
project: OLD MAN'S VALLEY
location: HORNSBY
date: 20-9-90
job no: S8463/2

test procedure: AS1289 E1.1 - 1977

SAMPLE IDENTIFICATION	MAXIMUM DRY DENSITY t/m^3	OPTIMUM MOISTURE CONTENT %
# 1 SE of Field	1.74	18.5
# 2 Stockpile	1.77	18.0

NATA

This laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with the terms of registration. This document shall not be reproduced except in full without the prior approval of the laboratory.

Authorised Signature

45A

77

CH390 CH330 CH310 CH270 CH230 CH215 CH190 CH150 CH110

E308750

1 IN 2 BATTER

TP2

RESIDUAL CLAY AND EW BRECCIA ERODED IN CREEK BED.

APPROX. BRECCIA/SANDSTONE BOUNDARY

EXISTING PLAYING FIELD

BH5 BH27 BH35 BH4 BH1

RESIDUAL CLAY OVERLYING EW/HW BRECCIA IN GULLY

TOP OF FILL

BH19 BH20 BH18 BH3 BH2

BH36 BH28 BH43

FORMER DRAINAGE GULLY

BH12 BH13 BH11

1 IN 3 BATTER

BH37 BH38 BH31 BH30 BH29 G2 BH7

RESIDUAL & EW BRECCIA EXPOSED ALONG CREEK

15m BERM

BH21 BH22 BH23 BH8 BH17 BH16 BH15 BH14 BH10 BH9

APPROXIMATE TOE OF EXISTING FILLED AREA.

APPROXIMATE TOE OF EXISTING EMBANKMENT

BH26 TP9 TP8

TP1 BH45 BH44

BH33 BH32

LIMIT OF TOE OF FILL IF CREEK IS NOT PIPED

ALLUVIUM OVERLYING EW BRECCIA IN SCOURED CREEK BED

RESIDUAL CLAY OVERLYING EW TO HW BRECCIA IN CREEK BANK.

RESIDUAL CLAY OVERLYING EW BRECCIA.

BH40 BH39 TP10 TP11 BH34 TP3

1 IN 1.5 BATTER

BH47 BH46 TP6 TP7 BH6

BH42 BH41 TP4 TOE OF FILL TP5 BH102 BH101

QUARRY HAUL ROAD

ALLUVIUM EXPOSED IN 6m HIGH BANK.

E308625

E308500

BH103

CH150 CH90

EW-MW BRECCIA IN BATTER, SW-Fr BRECCIA ON BENCH

G1

CH310 CH270 CH230 CH190

CH330 CH290 CH250

GRID CENTERLINE

SURVEY CONTROL PILLAR ♣ SSM 40294, R.L.144·511

LEGEND

- VERTICAL BOREHOLE
- INCLINED BOREHOLE
- BOREHOLE - DRILLED BY GOLDER ASSOCIATES 1982
- TEST PIT
- APPROXIMATE EXTENT OF ALLUVIUM

NOTES:

1. TOPOGRAPHIC INFORMATION PRESENTED ON THIS PLAN IS A COMBINATION OF 1:500 PLAN OF OLD MAN'S VALLEY PREPARED BY H.S.C. IN MAY, 1989 AND AN ENLARGEMENT OF A 1:1000 PLAN OF HORNSBY QUARRY PREPARED BY QASCO (NSW) PTY. LTD. IN FEB., 1989
2. BOREHOLES BH1 TO BH8 WHERE DRILLED BY COFFEY & PARTNERS IN 1989. TEST PITS TP1 TO TP8 WERE EXCAVATED IN 1989 BY COFFEY & PARTNERS
3. MUCH OF THE INFORMATION ON THIS PLAN WAS PRESENTED ON FIGURE 3, REPORT S8463/2-AC JULY, 1989.
4. OUTLINE OF PROPOSED FILL AREA OBTAINED FROM H.S.C PLAN No 428.28, PREPARED AUGUST 1989

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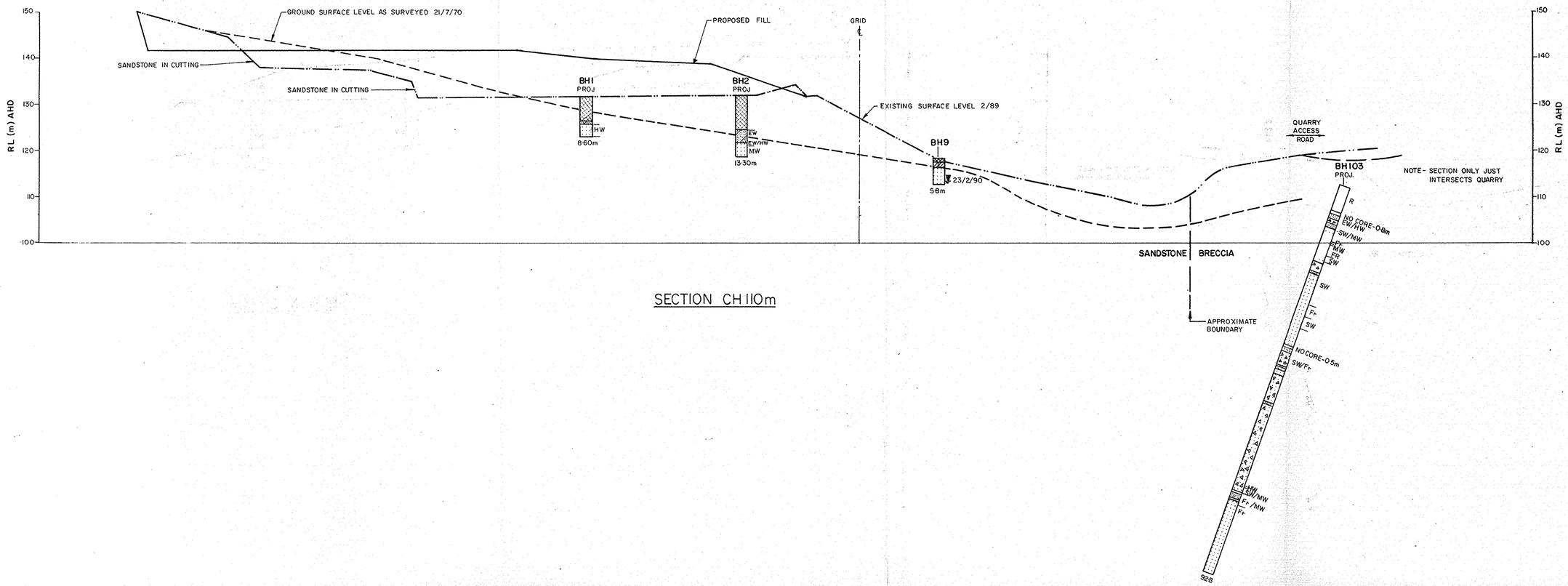
drawn:	PLV/ML
approved:	PLV
date:	18-7-90
scale:	1:500

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SITE PLAN

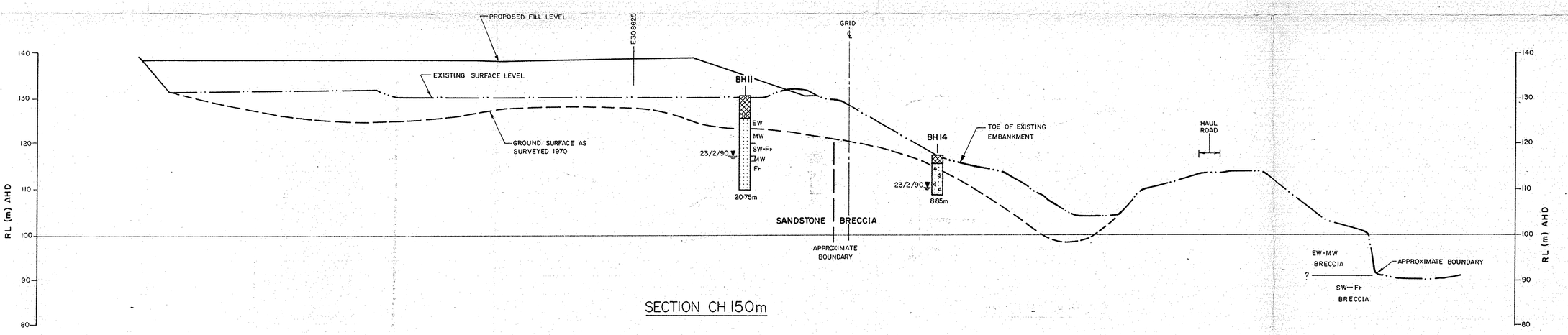
COFFEY

FIGURE 1

job no: S8463/3



SECTION CH 110m



SECTION CH 150m

LEGEND

- FILL
- CLAY
- SAND
- SANDSTONE
- VOLCANIC BRECCIA
- 14/4/89 ▼ WATER LEVEL & DATE OF MEASUREMENT

EW EXTREMELY WEATHERED
HW HIGHLY WEATHERED
MW MODERATELY WEATHERED
SW SLIGHTLY WEATHERED
Fr FRESH

NOTE- THE GROUND SURFACE AS SURVEYED 21/7/70 HAS BEEN SCALED FROM AN IMPERIAL CONTOUR PLAN. SOME DISCREPANCIES BETWEEN THIS SURFACE & THE EXISTING GROUND SURFACE LEVELS ARE NOTED IN AREAS WHERE NO FILL HAS BEEN PLACED. THESE DISCREPANCIES ARE PROBABLY DUE TO SCALING & CONVERSION DIFFICULTIES. THEREFORE, THE 1970 GROUND SURFACE LEVELS PROVIDE INDICATIVE PROFILES ONLY.

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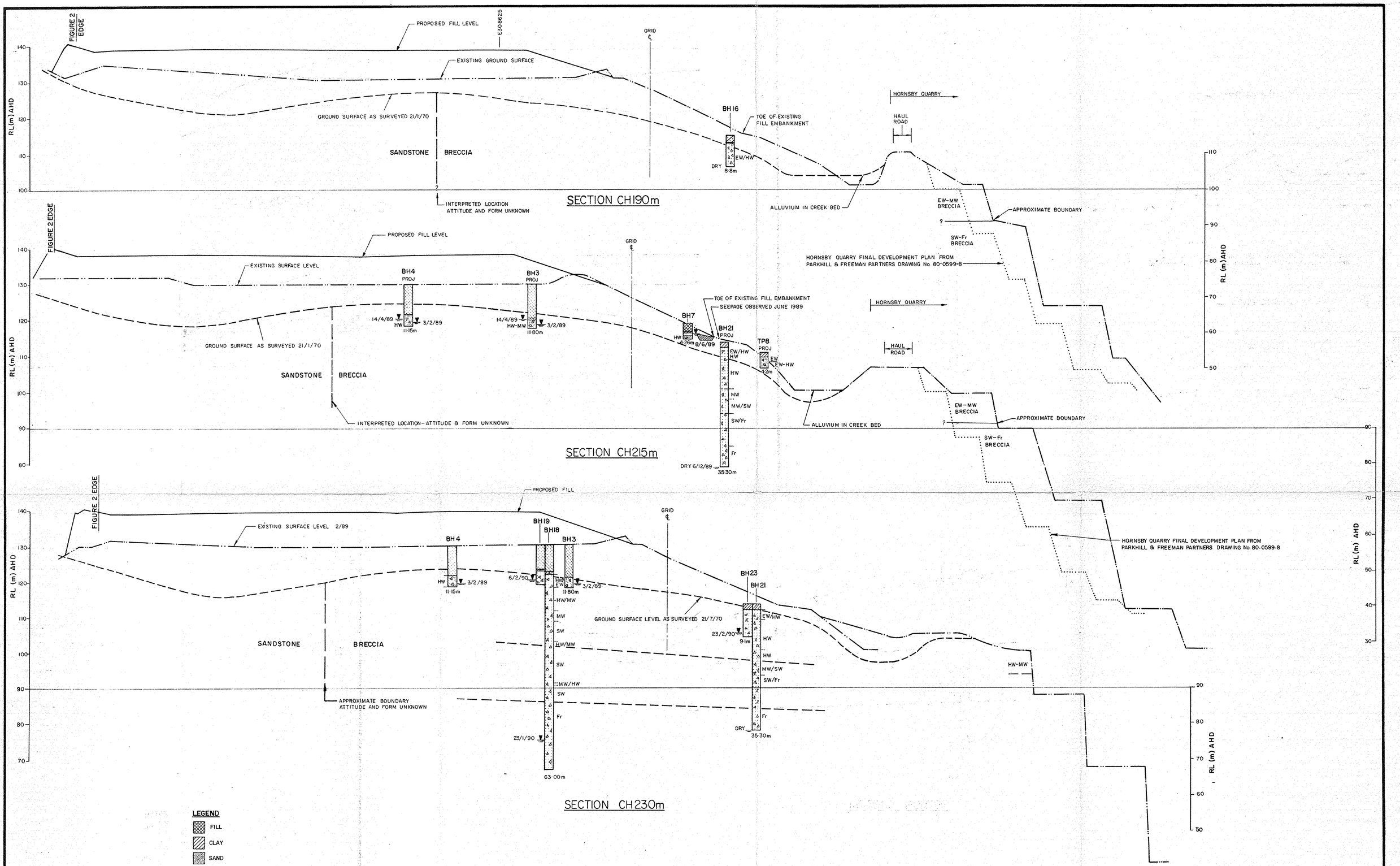
drawn	PLV/ML
approved	PJV
date	18-7-90
scale	1:500 H&V

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
STABILITY OF PROPOSED FILL
CH 110m & CH 150m

COFFEY

FIGURE 2

job no S8463/3



LEGEND

- FILL
- CLAY
- SAND
- SANDSTONE
- VOLCANIC BRECCIA
- 14/4/89 ▽ WATER LEVEL & DATE OF MEASUREMENT

EW EXTREMELY WEATHERED
HW HIGHLY WEATHERED
MW MODERATELY WEATHERED
SW SLIGHTLY WEATHERED
Fr FRESH

NOTE- THE GROUND SURFACE AS SURVEYED 21/7/70 HAS BEEN SCALED FROM AN IMPERIAL CONTOUR PLAN. SOME DISCREPANCIES BETWEEN THIS SURFACE & THE EXISTING GROUND SURFACE LEVELS ARE NOTED IN AREAS WHERE NO FILL HAS BEEN PLACED. THESE DISCREPANCIES ARE PROBABLY DUE TO SCALING & CONVERSION DIFFICULTIES. THEREFORE, THE 1970 GROUND SURFACE LEVELS PROVIDE INDICATIVE PROFILES ONLY.

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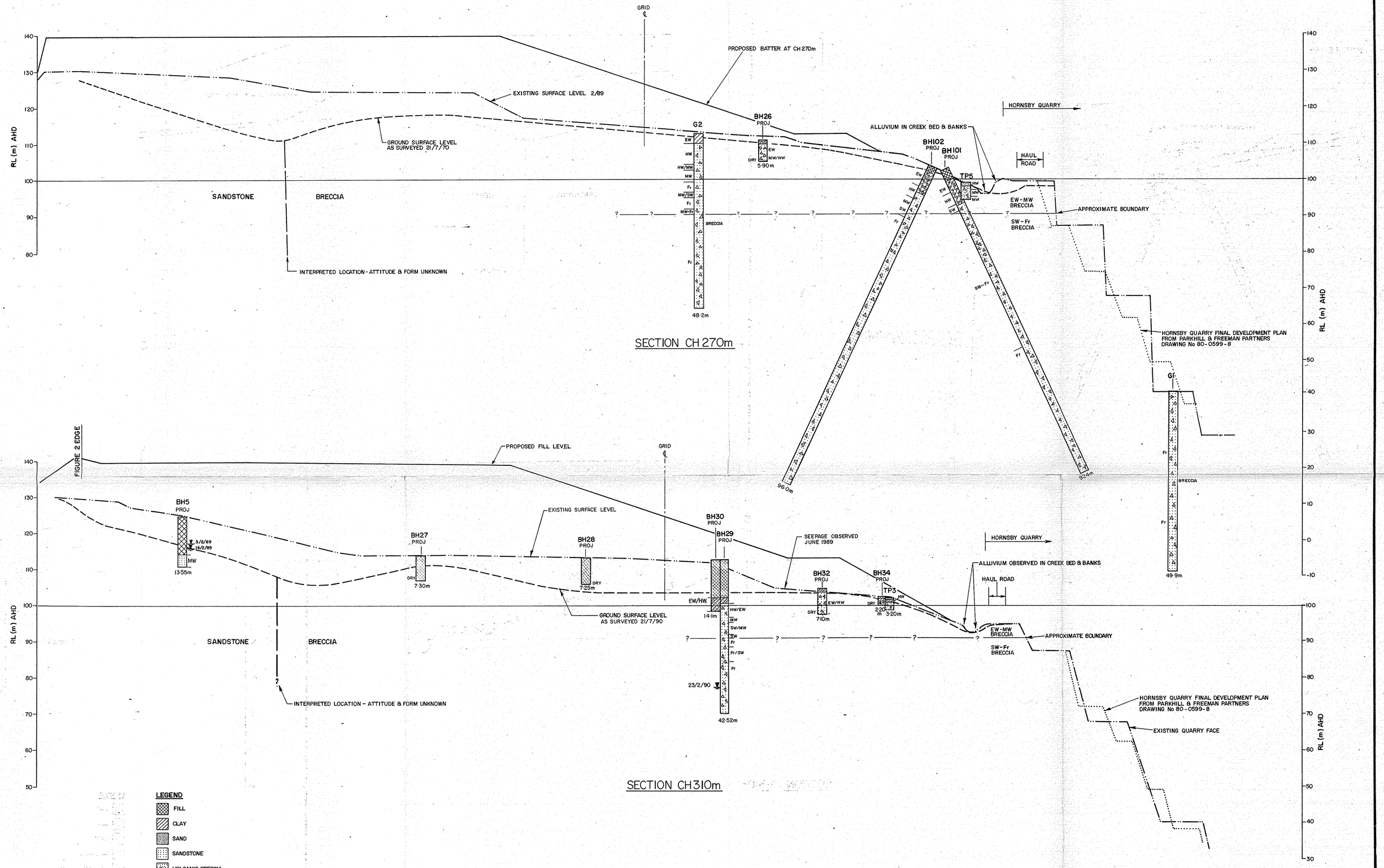
drawn	PLV/ML
approved	PLV
date	18-7-90
scale	1:500 H&V

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
STABILITY OF PROPOSED FILL
CH 190m, CH215m & CH230m

COFFEY

FIGURE 3

job no S8463/3



NOTE- THE GROUND SURFACE AS SURVEYED 21/7/70 HAS BEEN SCALED FROM AN IMPERIAL CONTOUR PLAN. SOME DISCREPANCIES BETWEEN THIS SURFACE & THE EXISTING GROUND SURFACE LEVELS ARE NOTED IN AREAS WHERE NO FILL HAS BEEN PLACED. THESE DISCREPANCIES ARE PROBABLY DUE TO SCALING & CONVERSION DIFFICULTIES. THEREFORE, THE 1970 GROUND SURFACE LEVELS PROVIDE INDICATIVE PROFILES ONLY.

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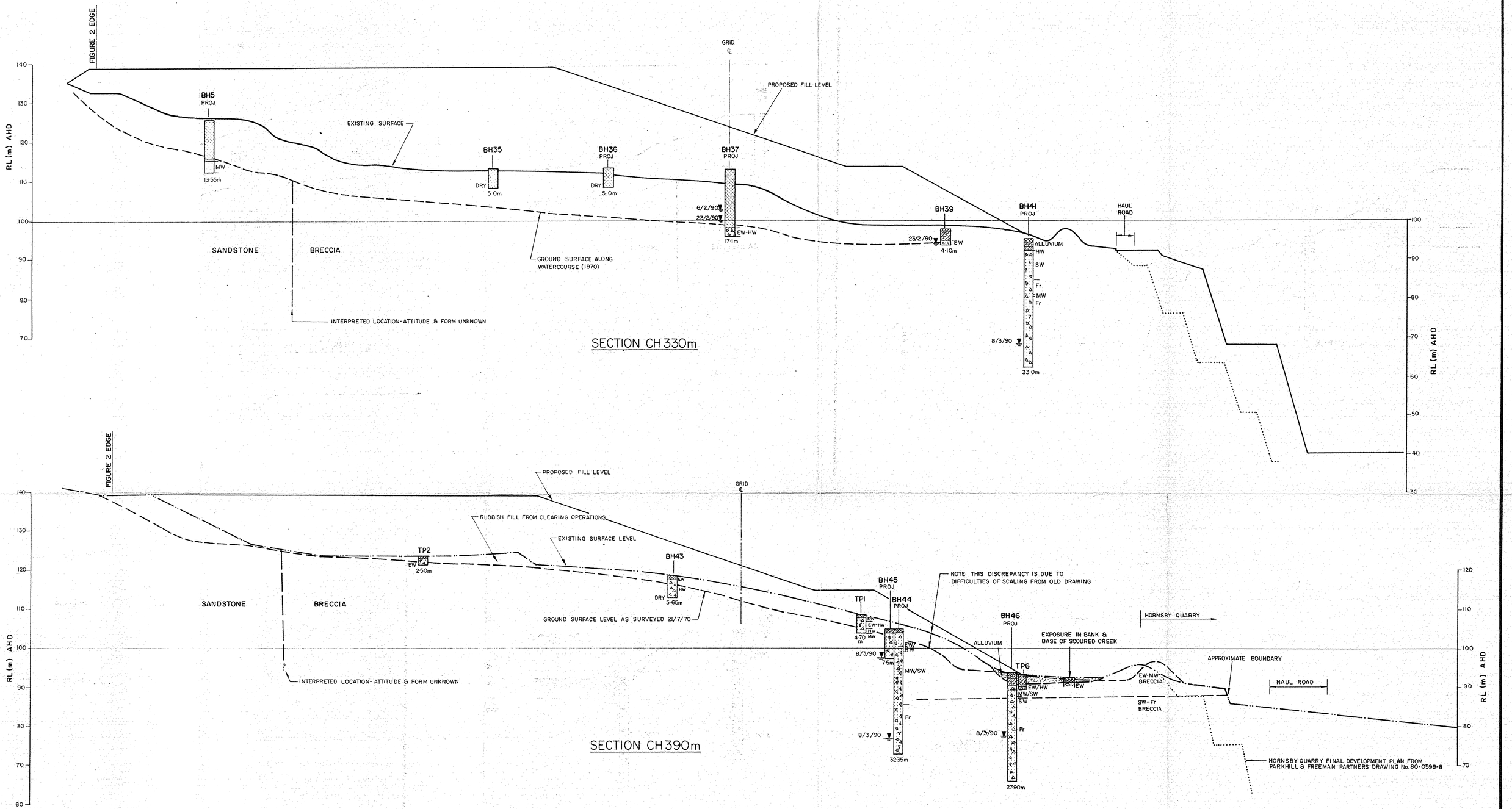
drawn:	PLV/ML
approved:	PLV
date:	18-7-90
scale:	1:500 H&V

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
STABILITY OF PROPOSED FILL
CH 270m & CH 310m

COFFEY

FIGURE 4

job no: S8463/3



LEGEND

- FILL
- CLAY
- SAND
- SANDSTONE
- VOLCANIC BRECCIA
- 14/4/89 ▼ WATER LEVEL & DATE OF MEASUREMENT

EW EXTREMELY WEATHERED
HW HIGHLY WEATHERED
MW MODERATELY WEATHERED
SW SLIGHTLY WEATHERED
Fr FRESH

NOTE- THE GROUND SURFACE AS SURVEYED 21/7/70 HAS BEEN SCALED FROM AN IMPERIAL CONTOUR PLAN. SOME DISCREPANCIES BETWEEN THIS SURFACE & THE EXISTING GROUND SURFACE LEVELS ARE NOTED IN AREAS WHERE NO FILL HAS BEEN PLACED. THESE DISCREPANCIES ARE PROBABLY DUE TO SCALING & CONVERSION DIFFICULTIES. THEREFORE, THE 1970 GROUND SURFACE LEVELS PROVIDE INDICATIVE PROFILES ONLY.

Coffey & Partners Pty. Ltd. Consulting Engineers in the geotechnical sciences INCORPORATED IN QUEENSLAND

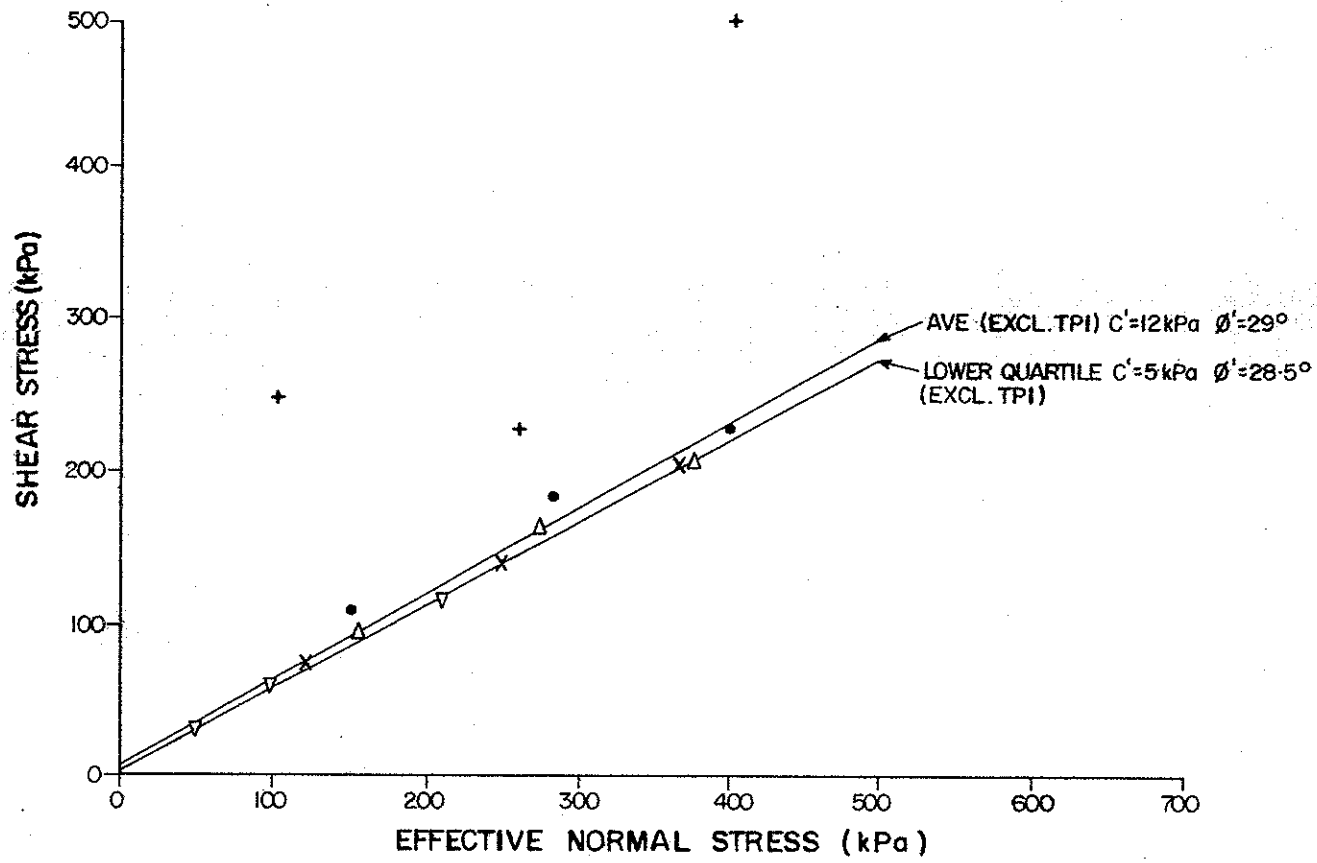
drawn	PLV/ML
approved	PLV
date	18-7-90
scale	1:500 H&V

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
STABILITY OF PROPOSED FILL
CH330m & CH390m

COFFEY

FIGURE 5

job no S8463/3



LEGEND

•	BH16	0·8 - 1·15m	TRIAXIAL
Δ	BH26	0·7 - 1·0m	TRIAXIAL
∇	BH6	1·5 - 1·85m	TRIAXIAL
X	BH41	2·3 - 2·6m	TRIAXIAL
+	TP1	0·4m	SHEARBOX

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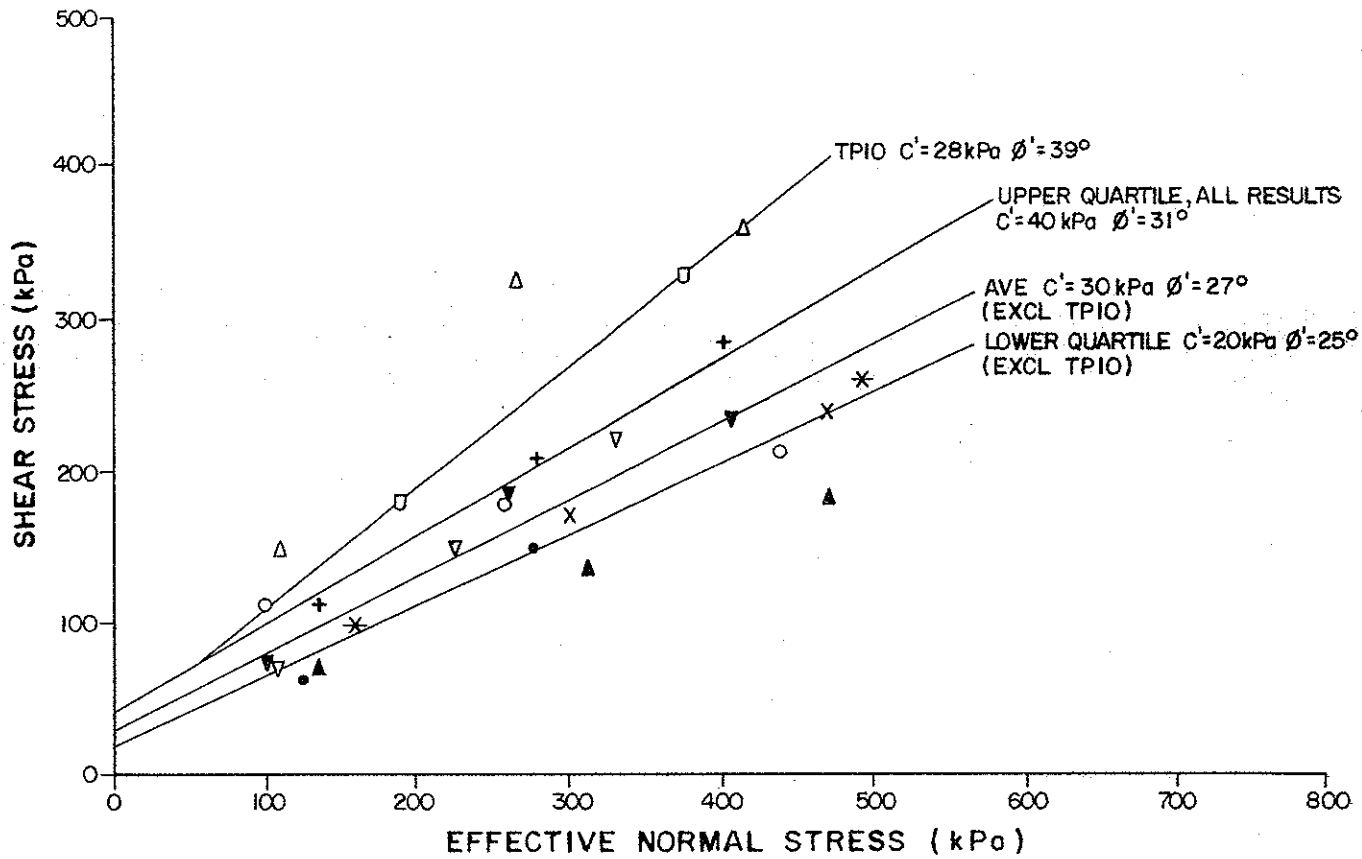
drawn	CPT/SW
approved	PLV
date	18-7-90
scale	

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SUMMARY OF EFFECTIVE STRENGTH DATA
RESIDUAL SOIL

COFFEY

FIGURE 6

job no: S8463/3



LEGEND

▲	BH33 0·7-0·95m	TRIAXIAL
+	BH45 0·8-1·15m	TRIAXIAL
▽	BH46 2·4-2·7m	TRIAXIAL
□	TPIO 1·0-1·3m	DIRECT SHEAR (DRY) (EW/HW)
•	TPII-1 1·2-1·5m	DIRECT SHEAR (WET)
✳	TPII-2 1·2-1·5m	DIRECT SHEAR (WET)
X	TPII-3 1·2-1·5m	DIRECT SHEAR (WET)
▼	TPI 0·8m	SAT DIRECT SHEAR
△	TPI 0·9m	SAT DIRECT SHEAR
○	TPI 1·3m	SAT DIRECT SHEAR

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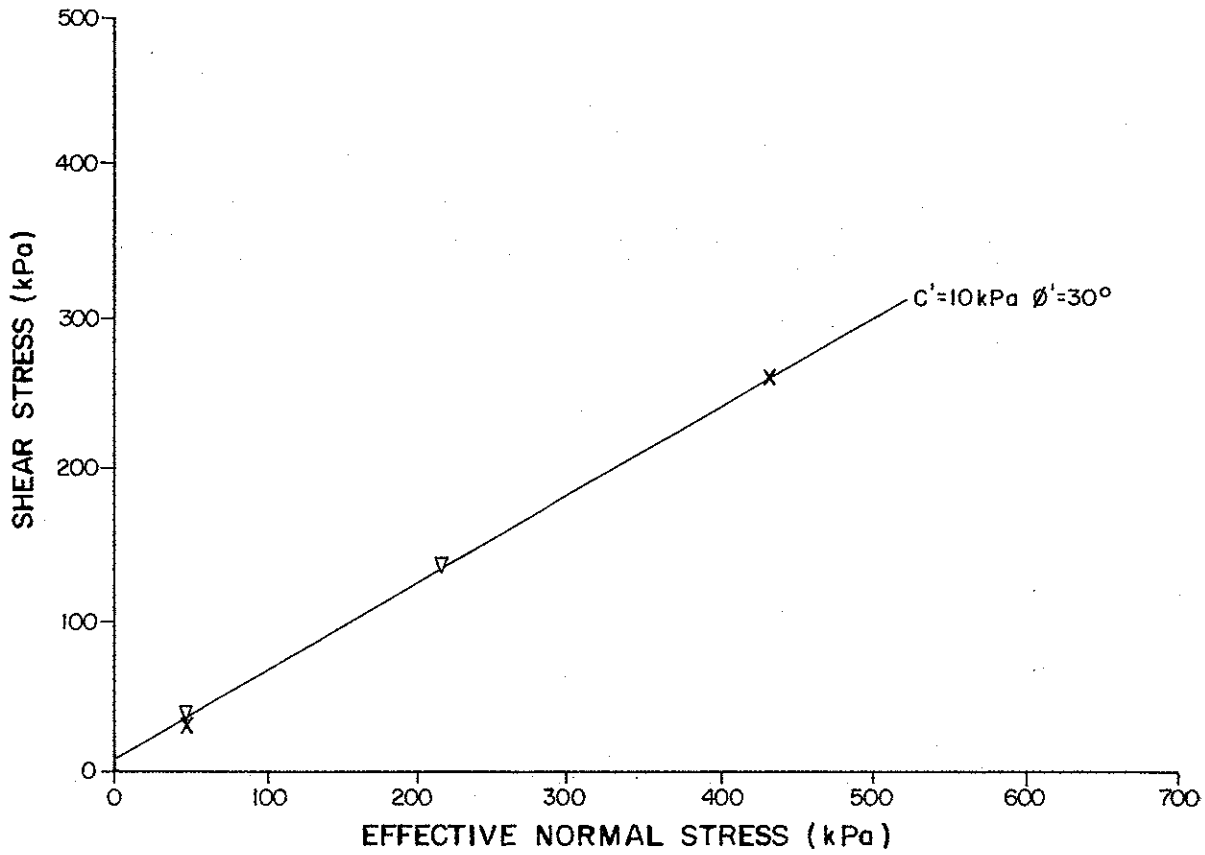
drawn	CPT/SW
approved	PLV
date	18-7-90
scale	

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SUMMARY OF EFFECTIVE STRENGTH DATA
EW BRECCIA

COFFEY

FIGURE 7

job no: S8463/3



LEGEND

X SAMPLE 1 - SE OF FIELD SAT DIRECT SHEAR

▽ SAMPLE 2- STOCKPILE SAT DIRECT SHEAR

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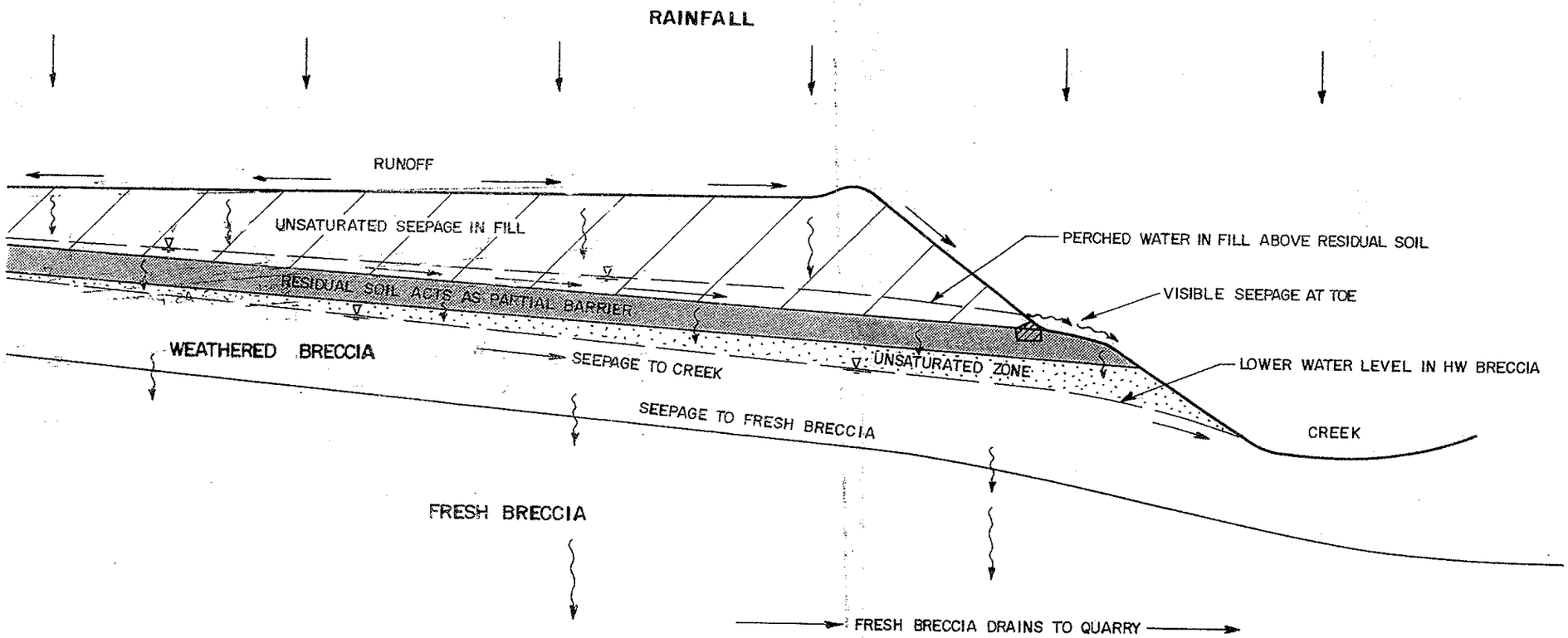
drawn	CPT/SW
approved	PLV
date	18-7-90
scale	

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SUMMARY OF EFFECTIVE STRENGTH DATA
FILL

COFFEY

FIGURE 8

job no: S8463/3



revision	description	drawn	approved	date

scale (metres)

Coffey & Partners Pty Ltd Consulting Engineers in the geotechnical sciences

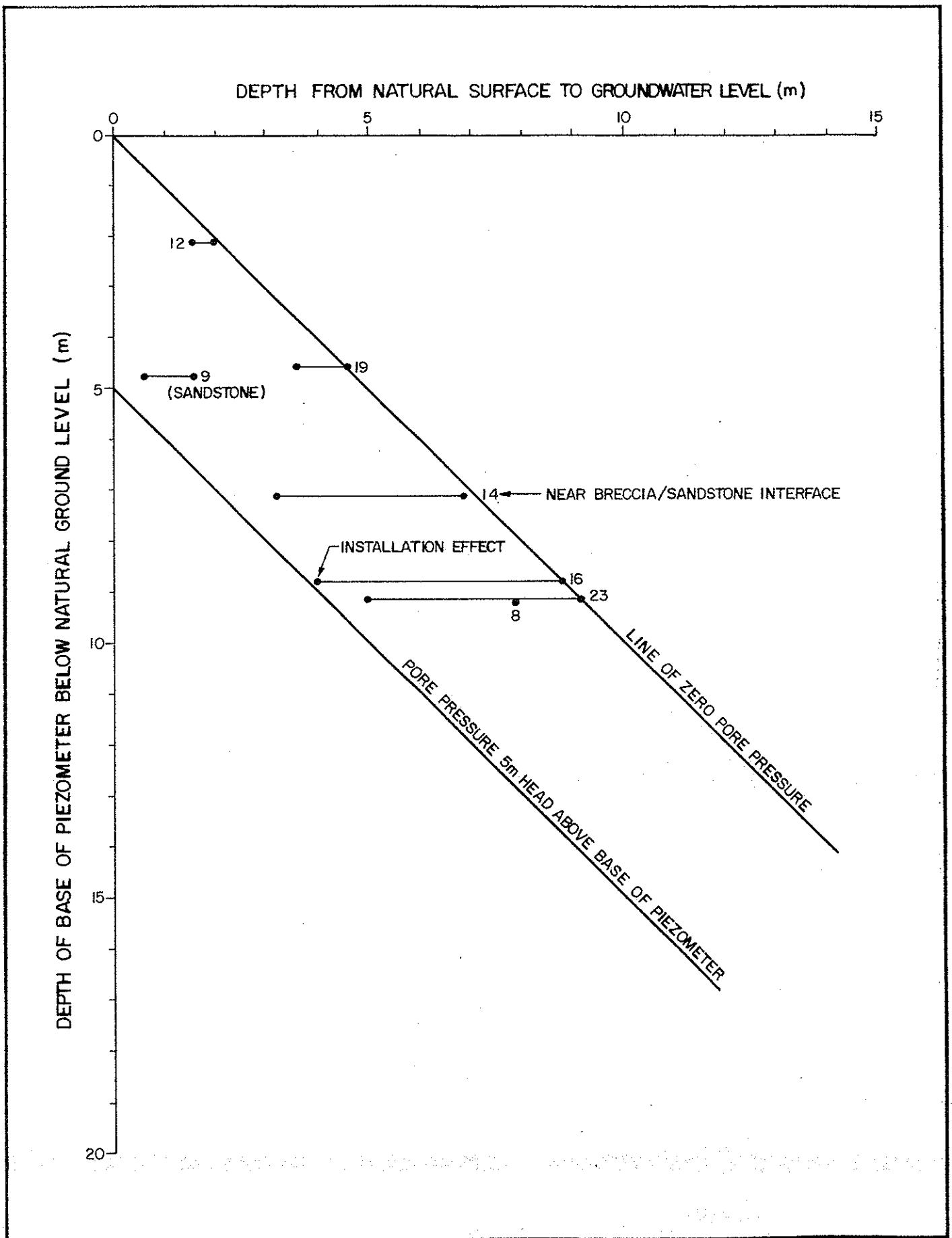
drawn	CPT/SW
checked	RJV
date	18-7-90

HORNSBY SHIRE COUNCIL
OLD MANS VALLEY
SOUTH END GROUNDWATER FLOW PATTERN

COFFEY

FIGURE 9

job no S8463/3



Coffey & Partners Pty Ltd Consulting Engineers in the geotechnical sciences

drawn	CPT/SW
approved	RLV
date	18-7-90
scale	

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SOUTH END - PIEZOMETER READINGS IN EW & HW ROCK

COFFEY

FIGURE 10

job no: S8463/3

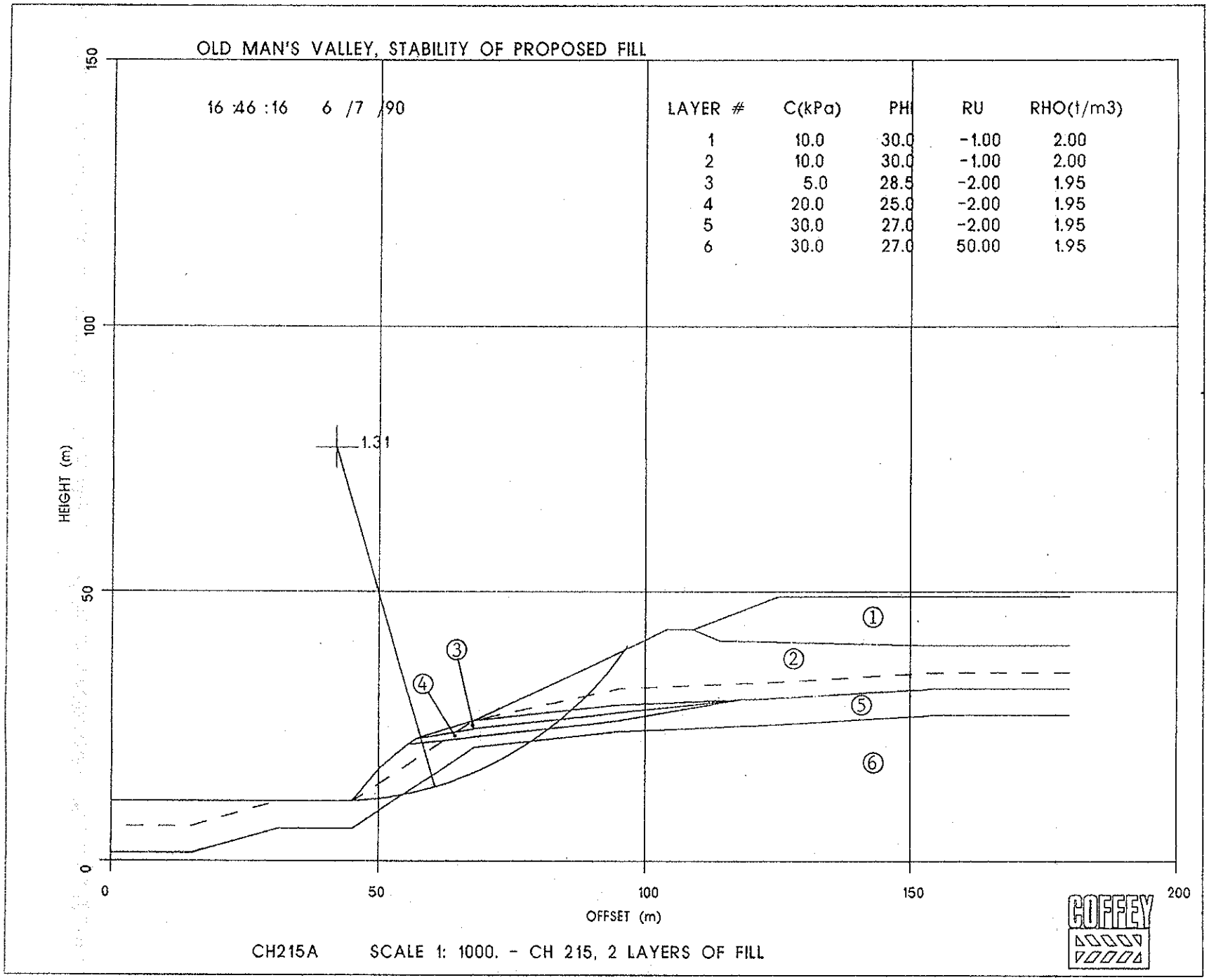
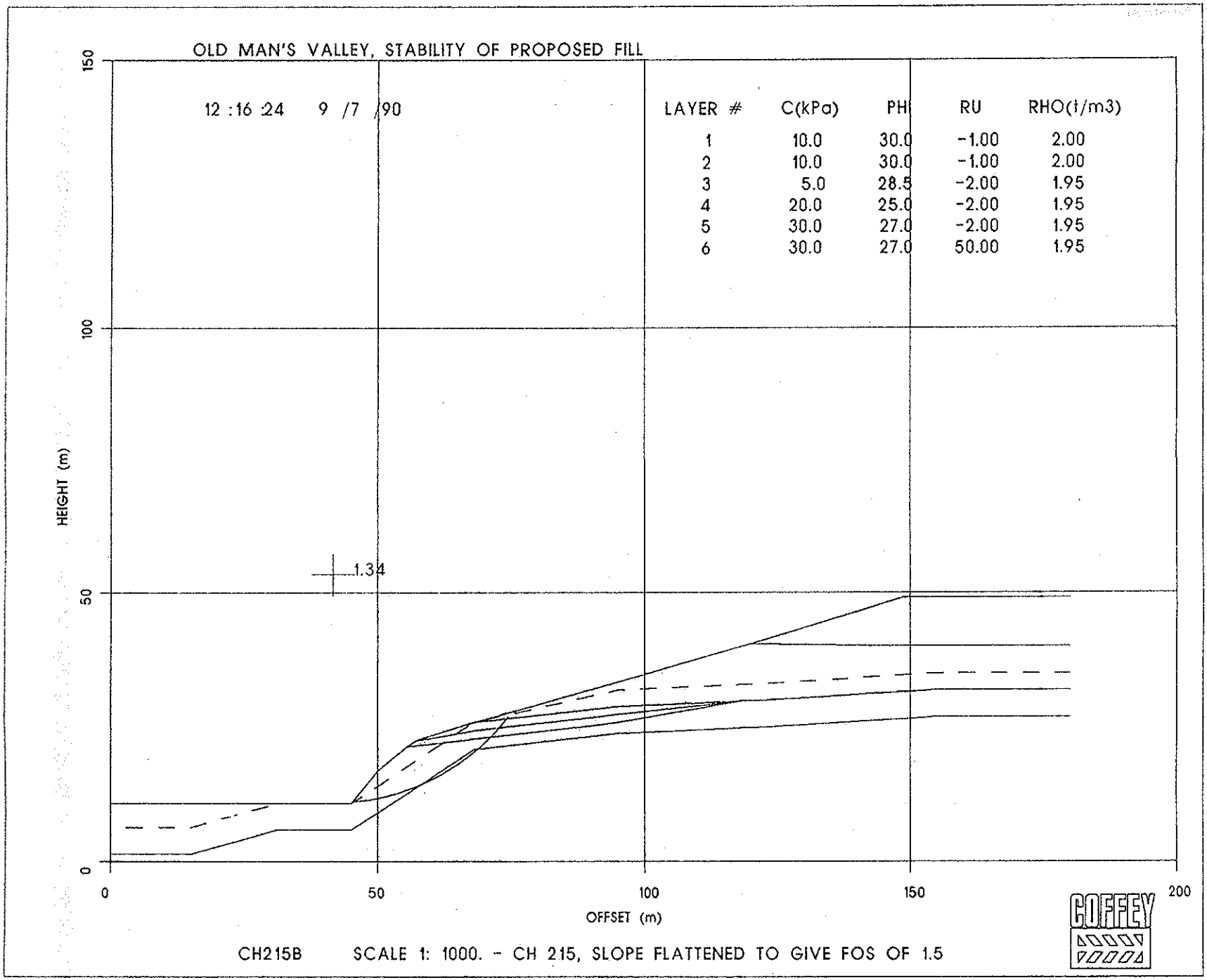

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL
16 :46 :16 6 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 10.0 30.0 -1.00 2.00
3 5.0 28.5 -2.00 1.95
4 20.0 25.0 -2.00 1.95
5 30.0 27.0 -2.00 1.95
6 30.0 27.0 50.00 1.95
1.31
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
CH215A SCALE 1: 1000. - CH 215, 2 LAYERS OF FILL
COFFEY

FIGURE 11



CH215B SCALE 1: 1000. - CH 215, SLOPE FLATTENED TO GIVE FOS OF 1.5

FIGURE 12

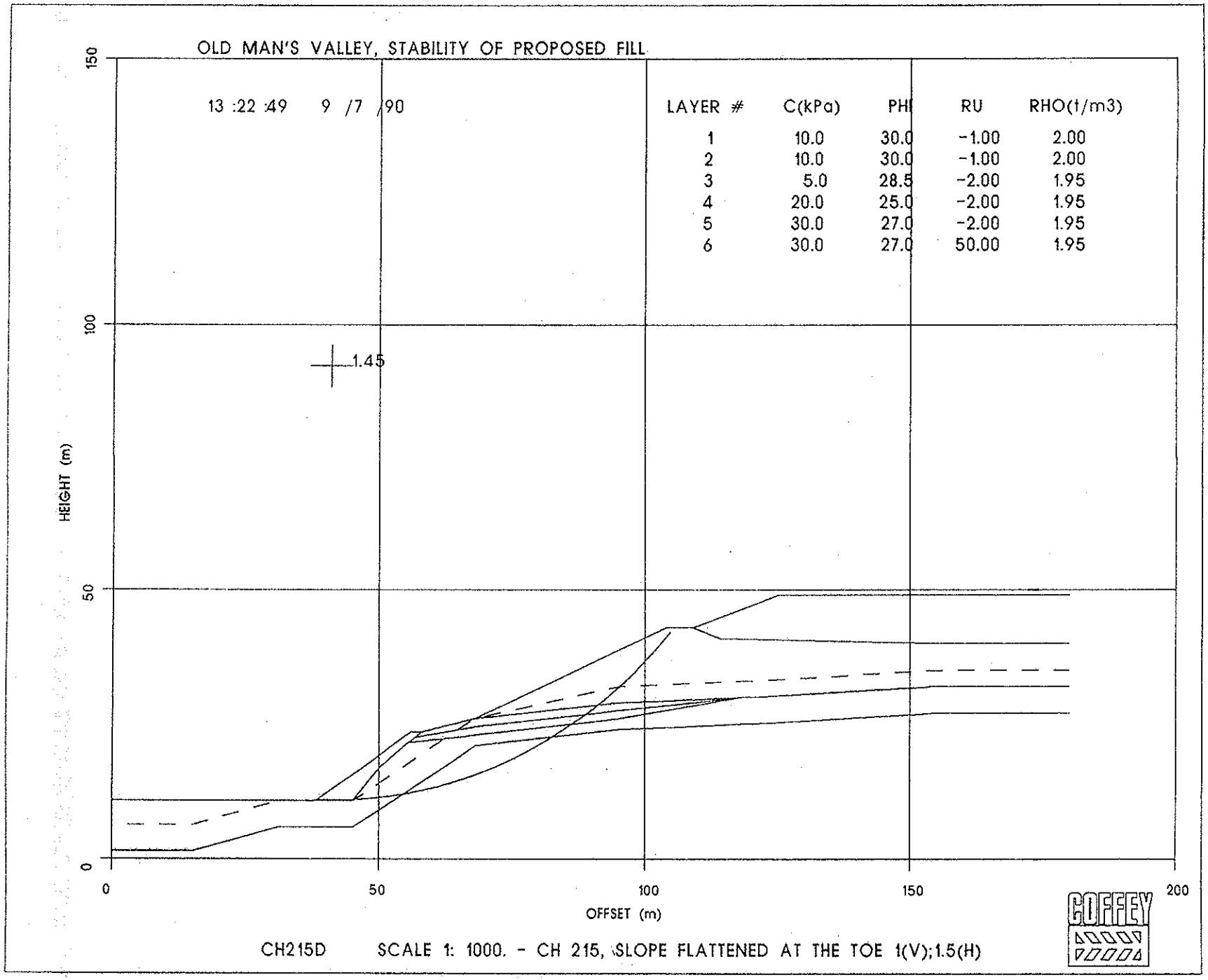
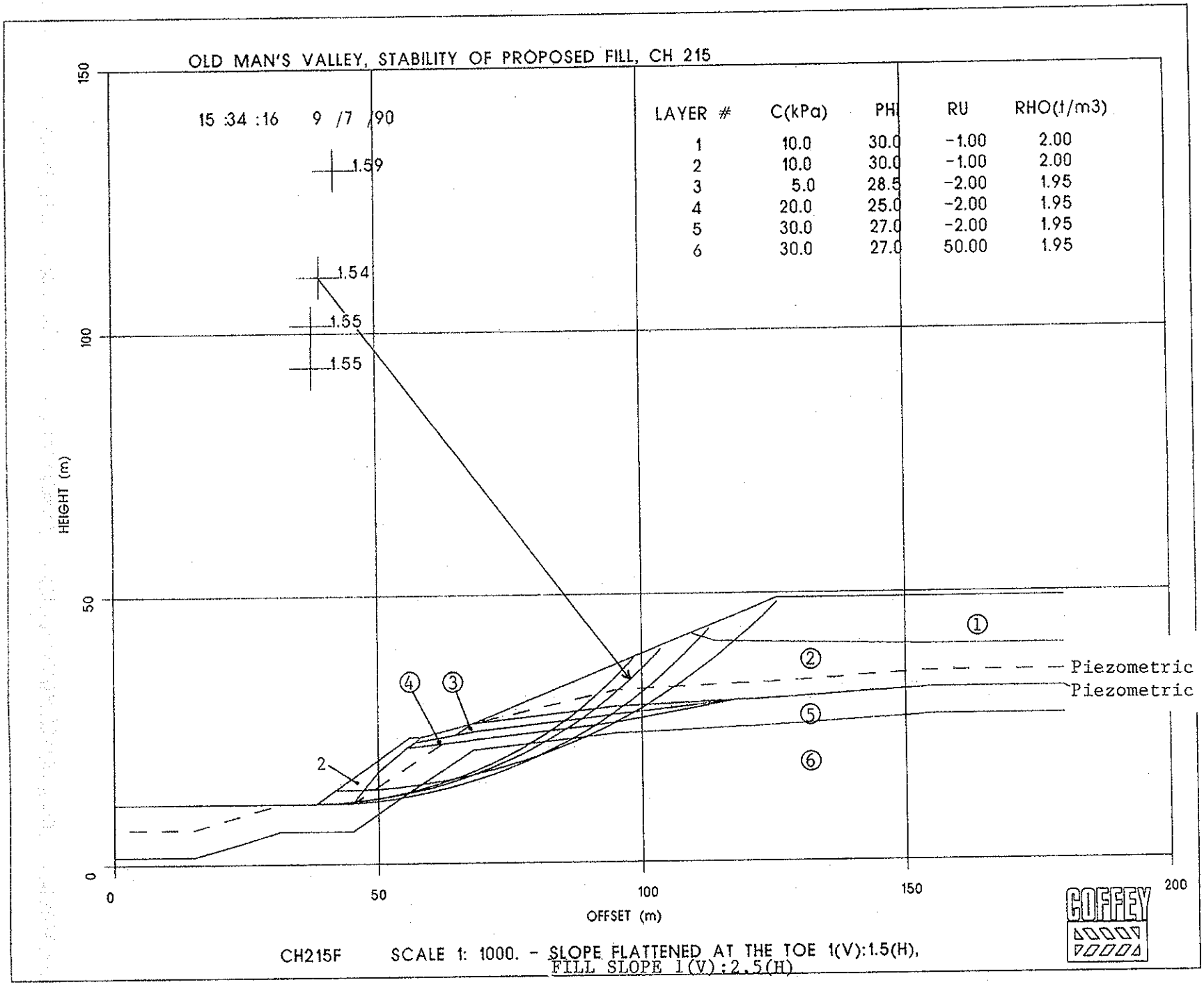
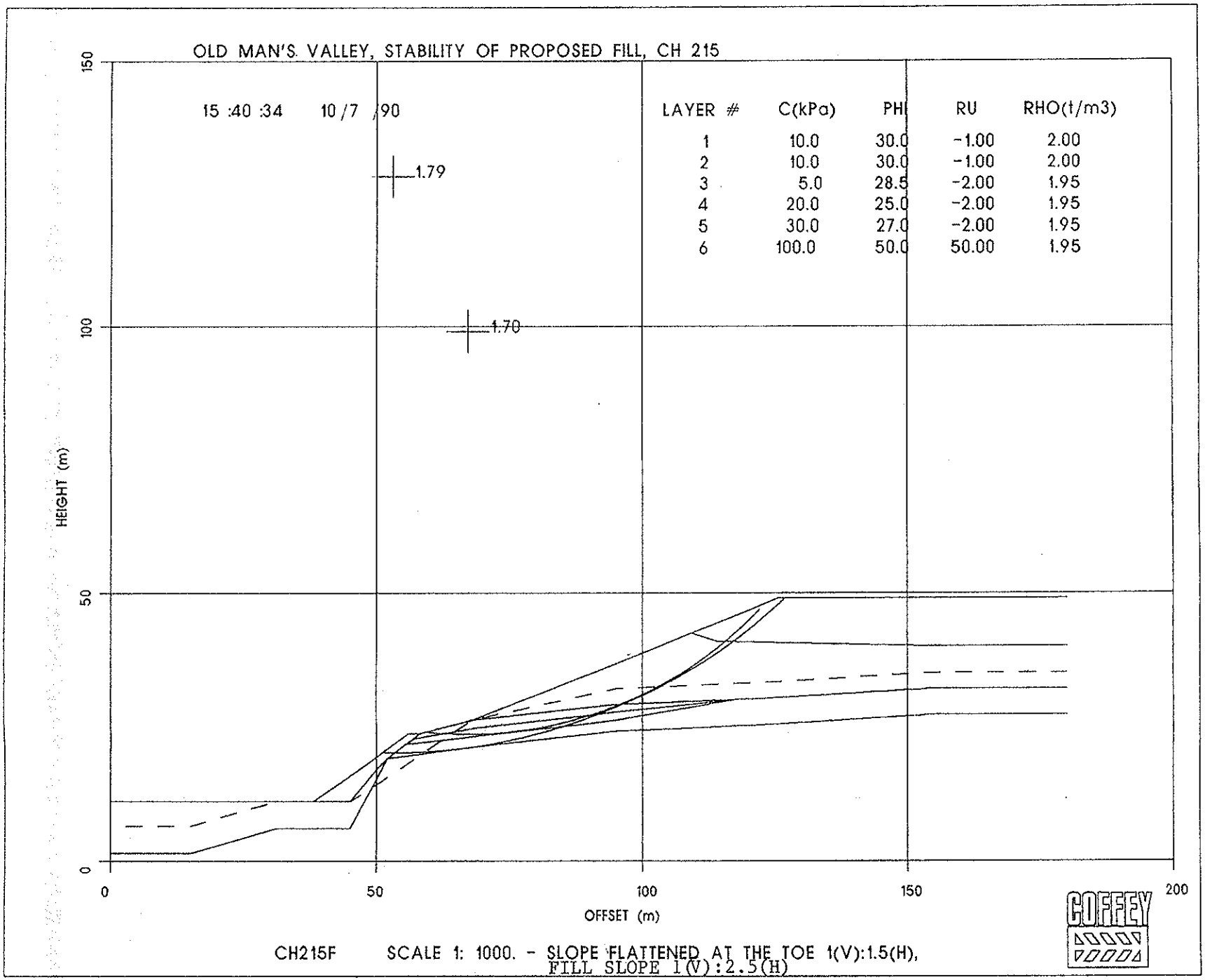

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL
13 :22 :49 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 10.0 30.0 -1.00 2.00
3 5.0 28.5 -2.00 1.95
4 20.0 25.0 -2.00 1.95
5 30.0 27.0 -2.00 1.95
6 30.0 27.0 50.00 1.95
1.45
HEIGHT (m)
0
50
100
150
0
50
100
150
200
OFFSET (m)
CH215D SCALE 1: 1000. - CH 215, SLOPE FLATTENED AT THE TOE 1(V):1.5(H)
COFFEY

FIGURE 13



CH215F SCALE 1: 1000. - SLOPE FLATTENED AT THE TOE 1(V):1.5(H), FILL SLOPE 1(V):2.5(H)

FIGURE 14



CH215F SCALE 1: 1000. - SLOPE FLATTENED AT THE TOE 1(V):1.5(H), FILL SLOPE 1(V):2.5(H)

FIGURE 15

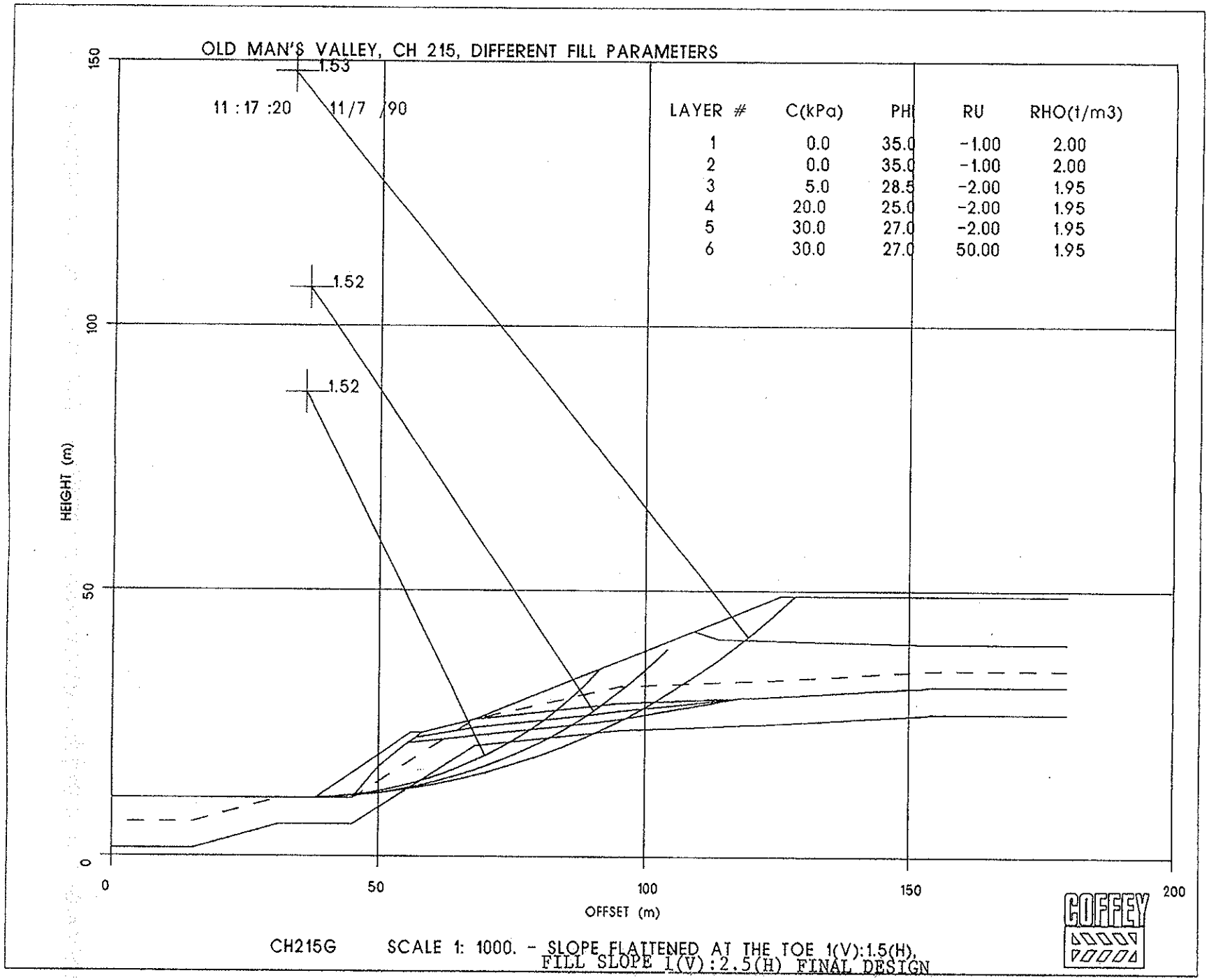

OLD MAN'S VALLEY, CH 215, DIFFERENT FILL PARAMETERS
1.53
11 : 17 :20
11/7 /90
1.52
1.52
LAYER # C(kPa) PH RU RHO(t/m3)
1 0.0 35.0 -1.00 2.00
2 0.0 35.0 -1.00 2.00
3 5.0 28.5 -2.00 1.95
4 20.0 25.0 -2.00 1.95
5 30.0 27.0 -2.00 1.95
6 30.0 27.0 50.00 1.95
HEIGHT (m)
0
50
100
150
0
50
100
150
200
OFFSET (m)
CH215G SCALE 1: 1000. - SLOPE FLATTENED AT THE TOE 1(V):1.5(H),
FILL SLOPE 1(V):2.5(H) FINAL DESIGN
COFFEY

FIGURE 16

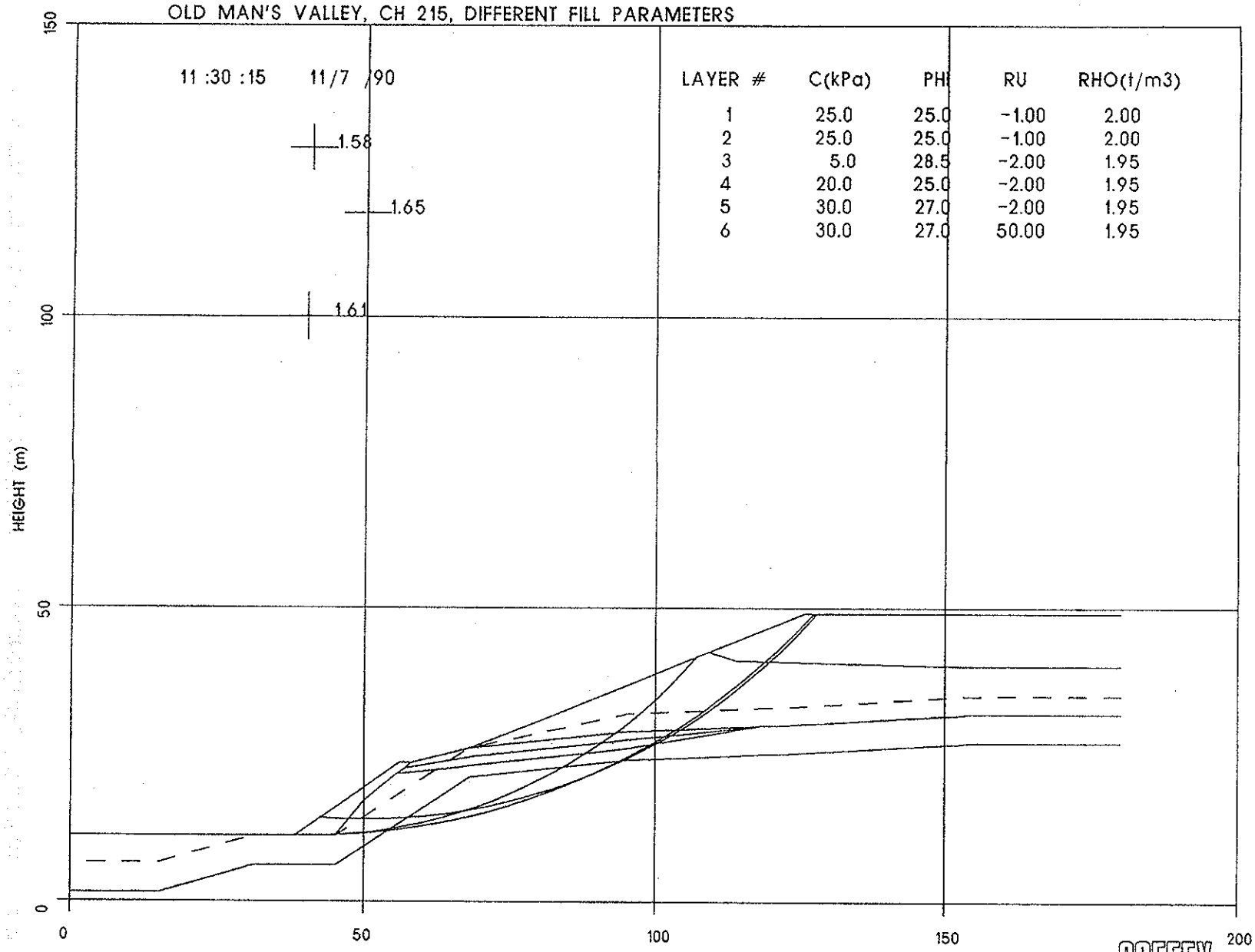


FIGURE 17

CH215G SCALE 1: 1000. - SLOPE FLATTENED AT THE TOE 1(V):1.5(H), FILL SLOPE 1(V):2.5(H) FINAL DESIGN

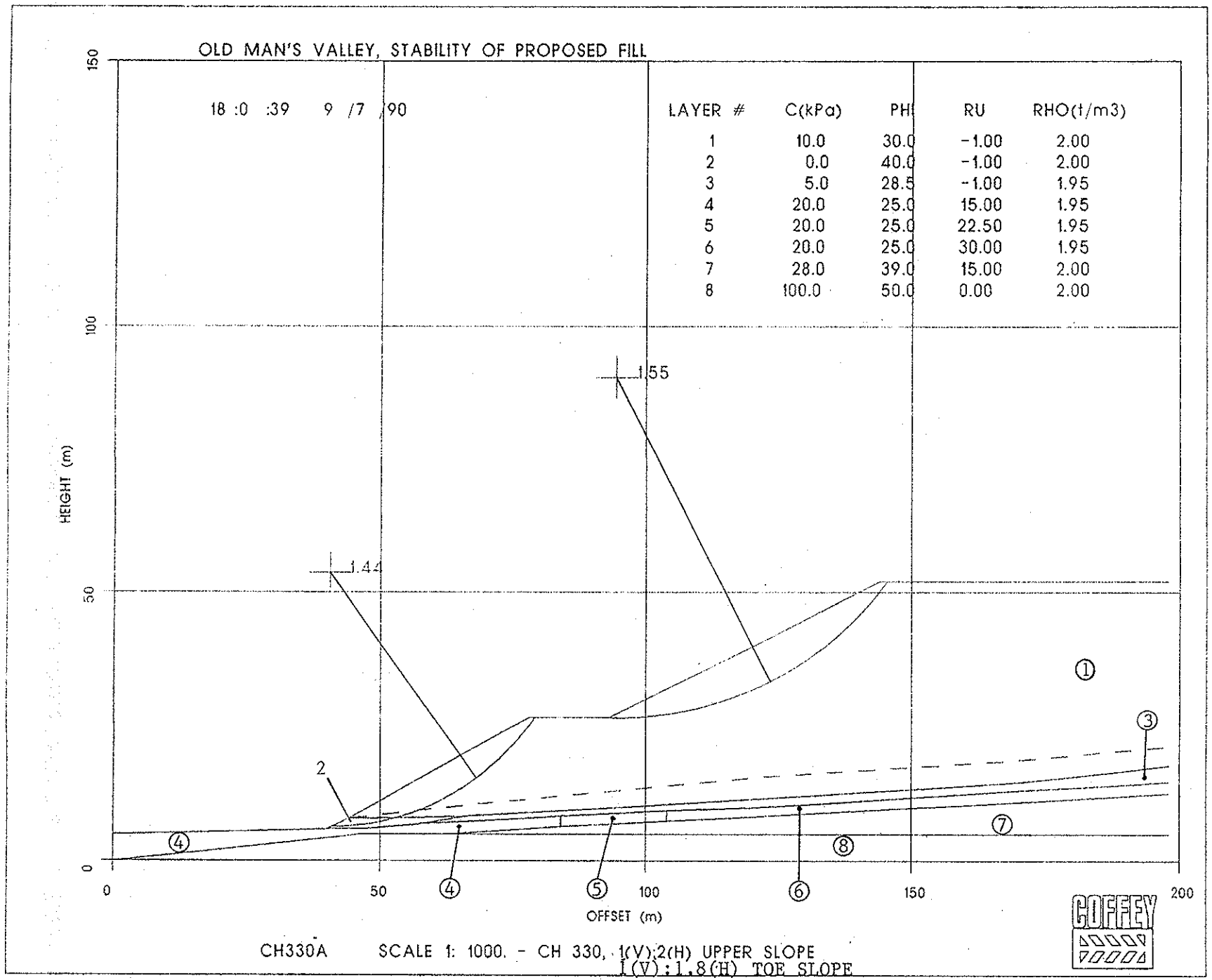

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL
18 :0 :39 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 15.00 1.95
5 20.0 25.0 22.50 1.95
6 20.0 25.0 30.00 1.95
7 28.0 39.0 15.00 2.00
8 100.0 50.0 0.00 2.00
1.55
1.44
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
CH330A SCALE 1: 1000. - CH 330, 1(V):2(H) UPPER SLOPE
1(V):1.8(H) TOE SLOPE
COFFEY

FIGURE 18

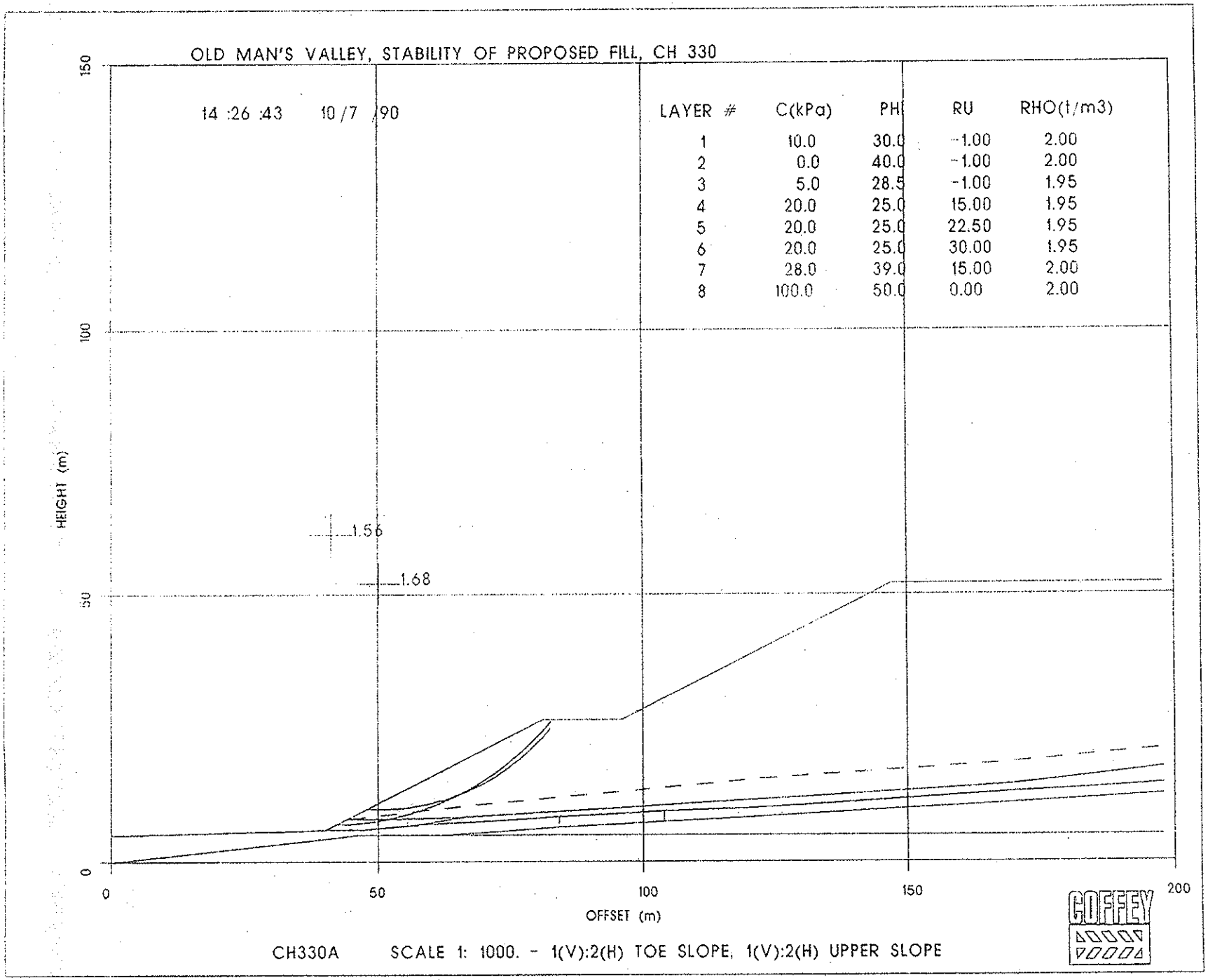

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL, CH 330
14 :26 :43 10 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 15.00 1.95
5 20.0 25.0 22.50 1.95
6 20.0 25.0 30.00 1.95
7 28.0 39.0 15.00 2.00
8 100.0 50.0 0.00 2.00
1.56
1.68
HEIGHT (m)
0
50
100
150
0
50
100
150
200
OFFSET (m)
COFFEY
CH330A SCALE 1: 1000. - 1(V):2(H) TOE SLOPE, 1(V):2(H) UPPER SLOPE

FIGURE 19

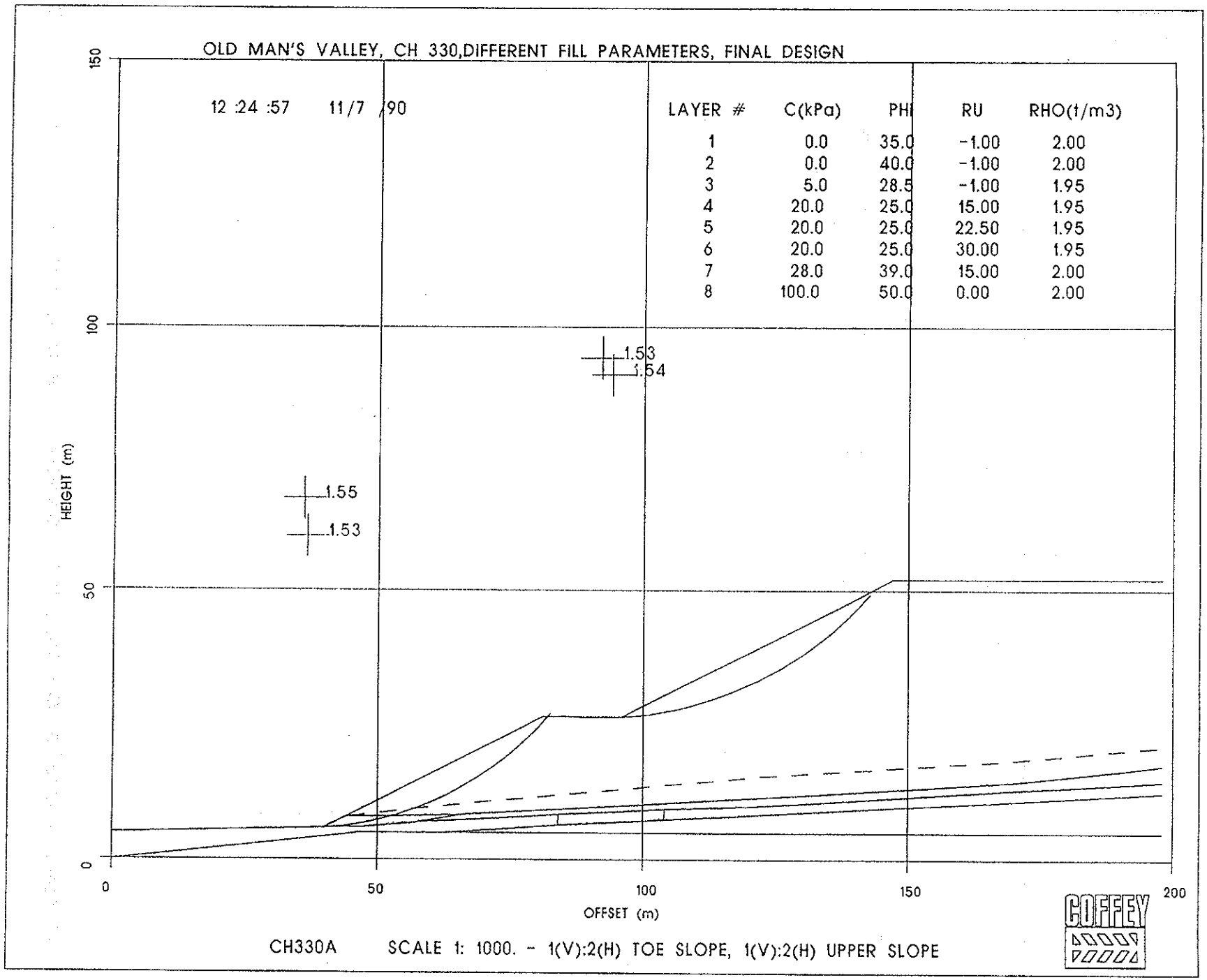

OLD MAN'S VALLEY, CH 330,DIFFERENT FILL PARAMETERS, FINAL DESIGN
12 :24 :57 11/7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 0.0 35.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 15.00 1.95
5 20.0 25.0 22.50 1.95
6 20.0 25.0 30.00 1.95
7 28.0 39.0 15.00 2.00
8 100.0 50.0 0.00 2.00
1.53
1.54
1.55
1.53
HEIGHT (m)
0
50
100
150
0
50
100
150
200
OFFSET (m)
CH330A SCALE 1: 1000. - 1(V):2(H) TOE SLOPE, 1(V):2(H) UPPER SLOPE
COFFEY

FIGURE 20

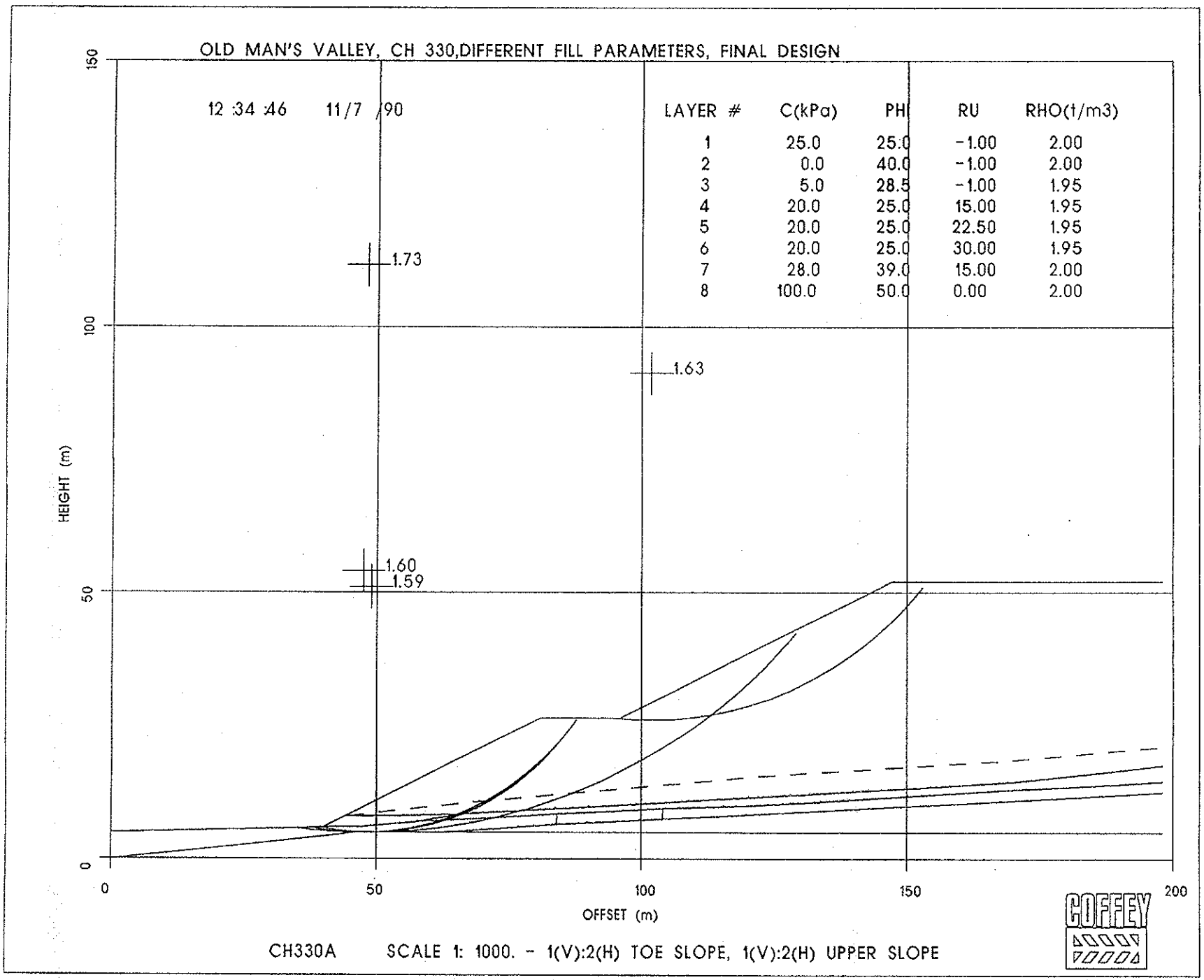

OLD MAN'S VALLEY, CH 330,DIFFERENT FILL PARAMETERS, FINAL DESIGN
12 :34 :46 11/7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 25.0 25.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 15.00 1.95
5 20.0 25.0 22.50 1.95
6 20.0 25.0 30.00 1.95
7 28.0 39.0 15.00 2.00
8 100.0 50.0 0.00 2.00
1.73
1.63
1.60
1.59
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
CH330A SCALE 1: 1000. - 1(V):2(H) TOE SLOPE, 1(V):2(H) UPPER SLOPE
COFFEY

FIGURE 21

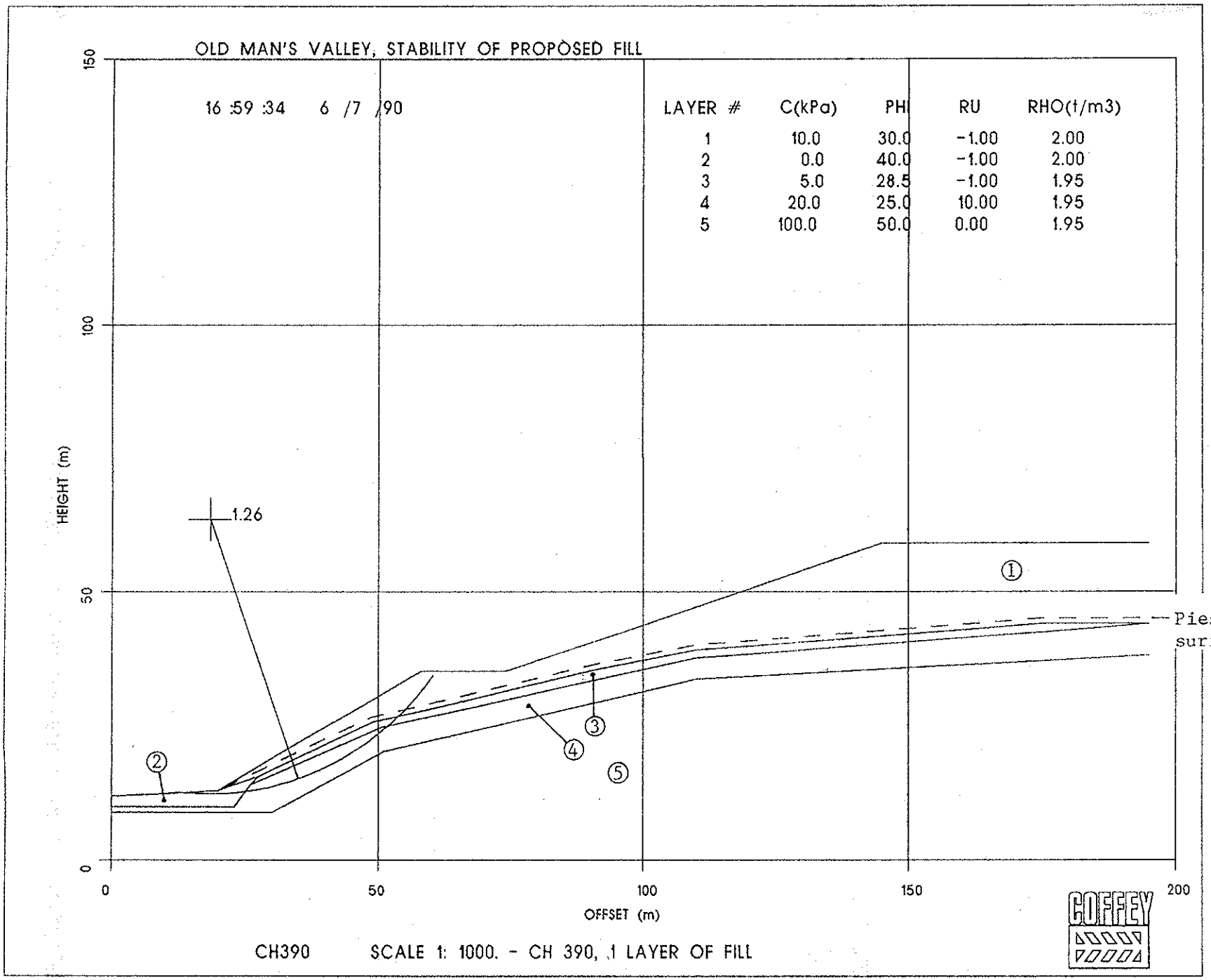
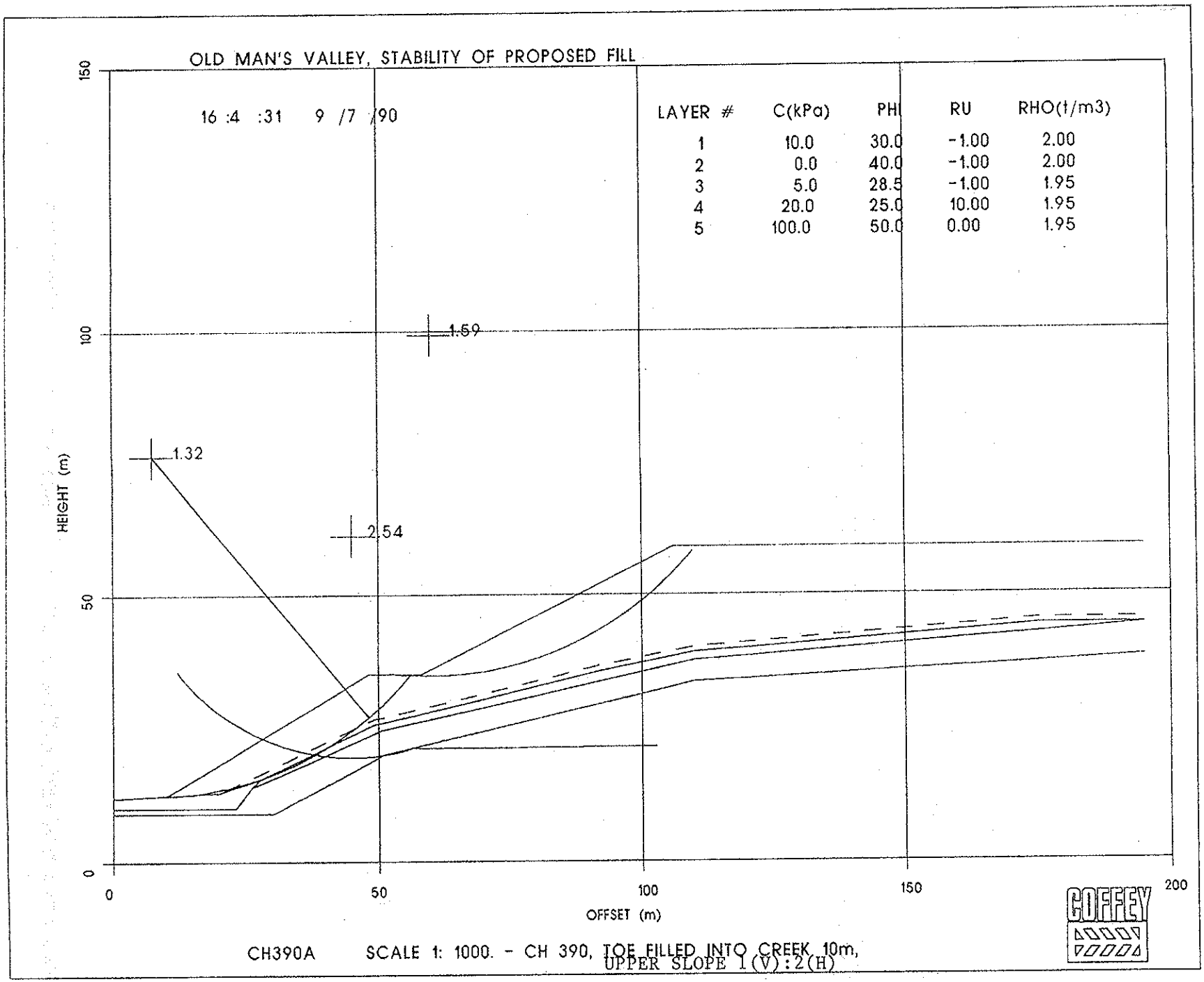
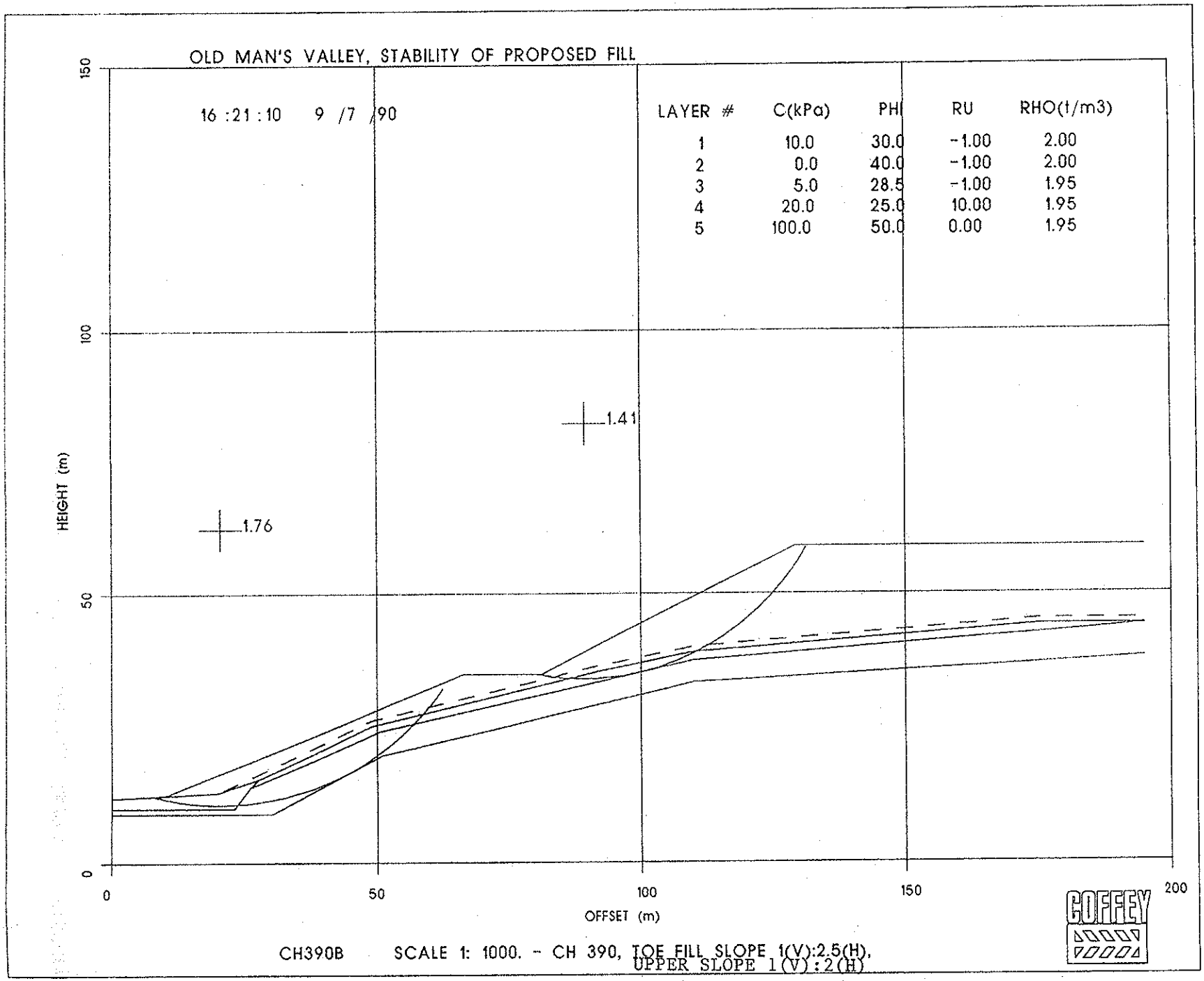

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL
16 :59 :34 6 /7 /90
LAYER # C(kPa) PH RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
1.26
①
②
③
④
⑤
Piezometric surface-layers 1,2 & 3
CH390 SCALE 1: 1000. - CH 390, 1 LAYER OF FILL
COFFEY

FIGURE 22



CH390A SCALE 1: 1000. - CH 390, TOE FILLED INTO CREEK 10m, UPPER SLOPE 1(V):2(H)

FIGURE 23



CH390B SCALE 1: 1000. - CH 390, TOE FILL SLOPE 1(V):2.5(H), UPPER SLOPE 1(V):2(H)

FIGURE 24

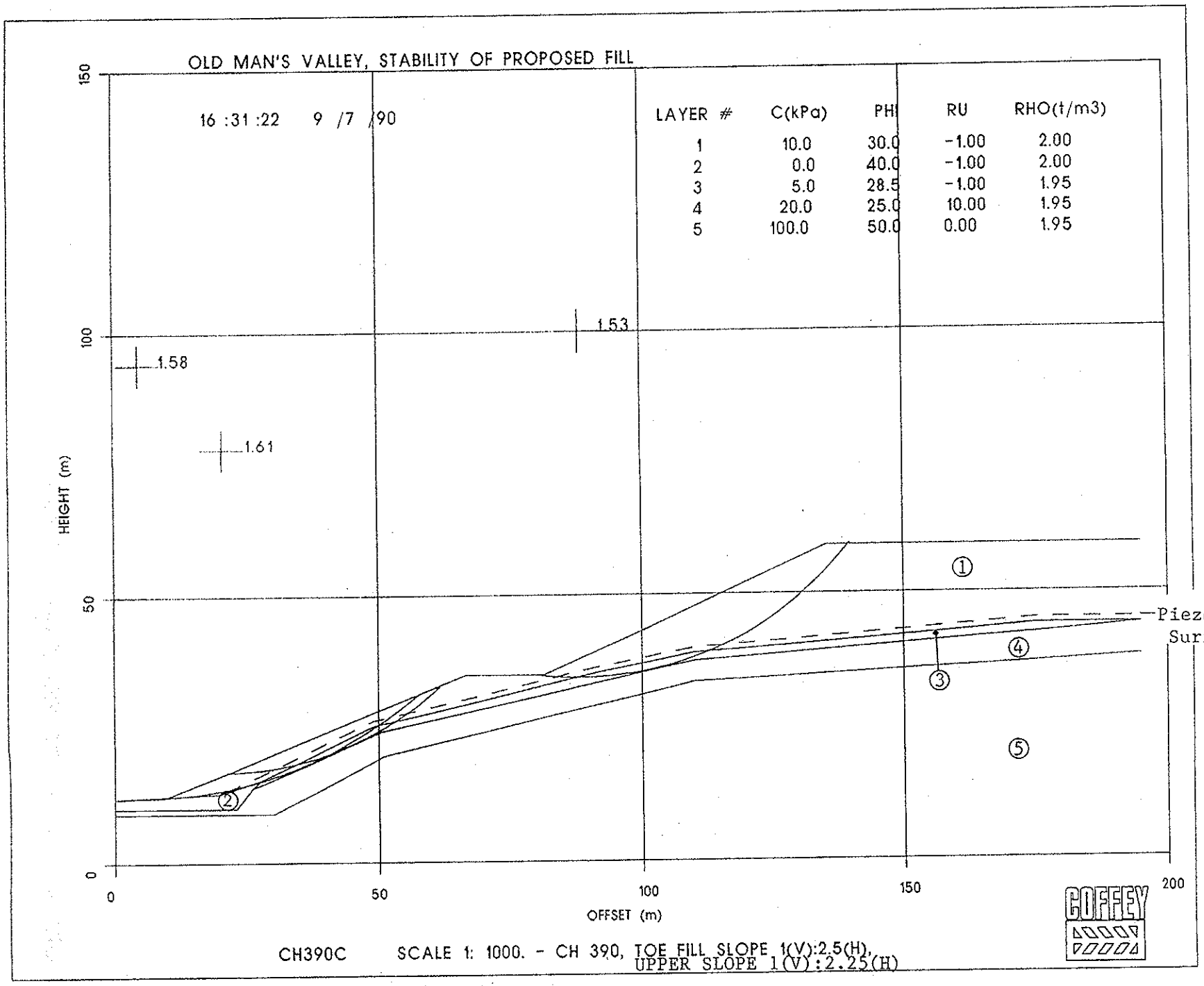

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL
16 :31 :22 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
1.53
1.58
1.61
HEIGHT (m)
OFFSET (m)
Piezometric Surface
CH390C SCALE 1: 1000. - CH 390, TOE FILL SLOPE 1(V):2.5(H), UPPER SLOPE 1(V):2.25(H)
COFFEY

FIGURE 25

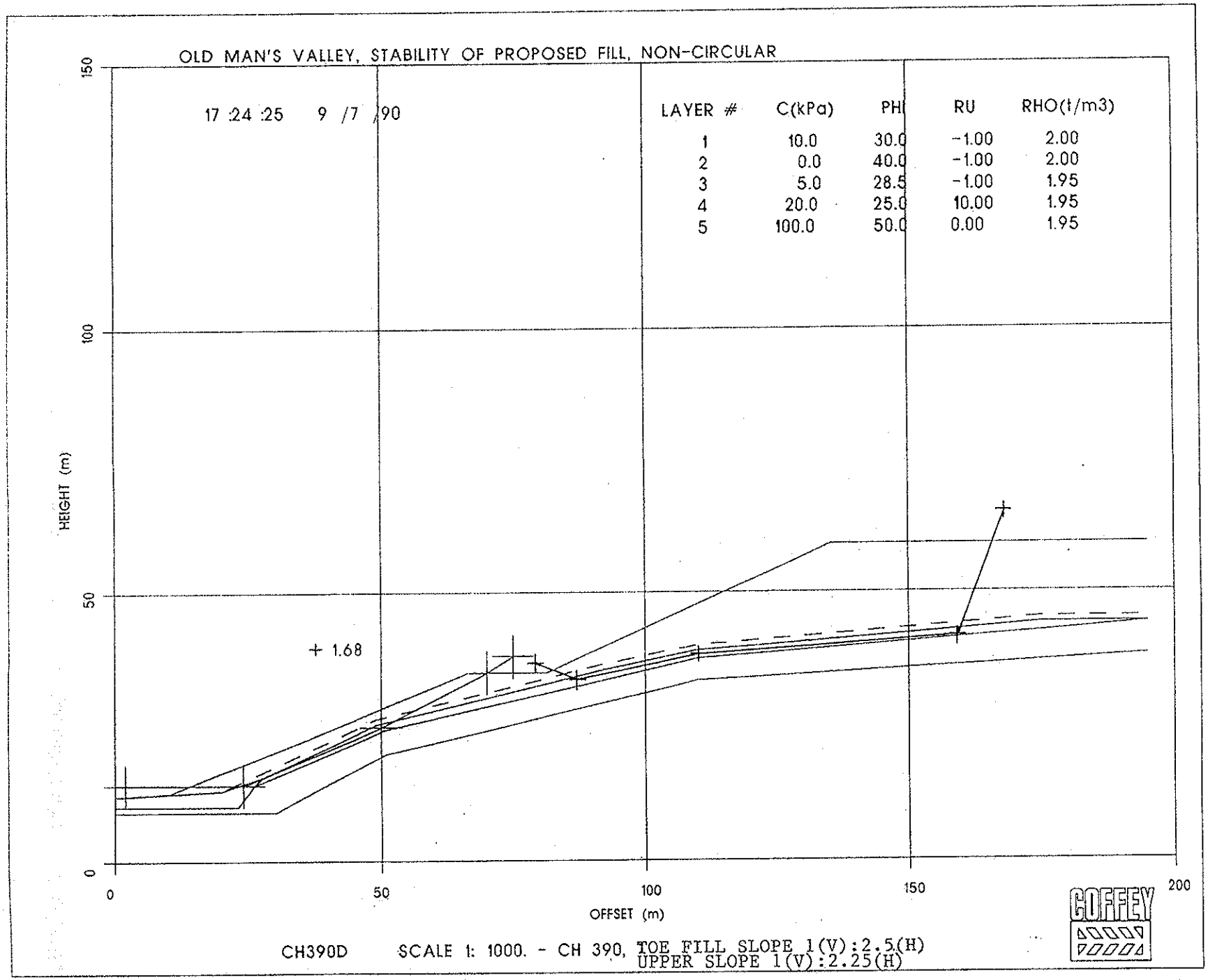

OLD MAN'S VALLEY, STABILITY OF PROPOSED FILL, NON-CIRCULAR
17 :24 :25 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
+ 1.68
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
COFFEY
CH390D SCALE 1: 1000. - CH 390, TOE FILL SLOPE 1(V):2.5(H)
UPPER SLOPE 1(V):2.25(H)

FIGURE 26

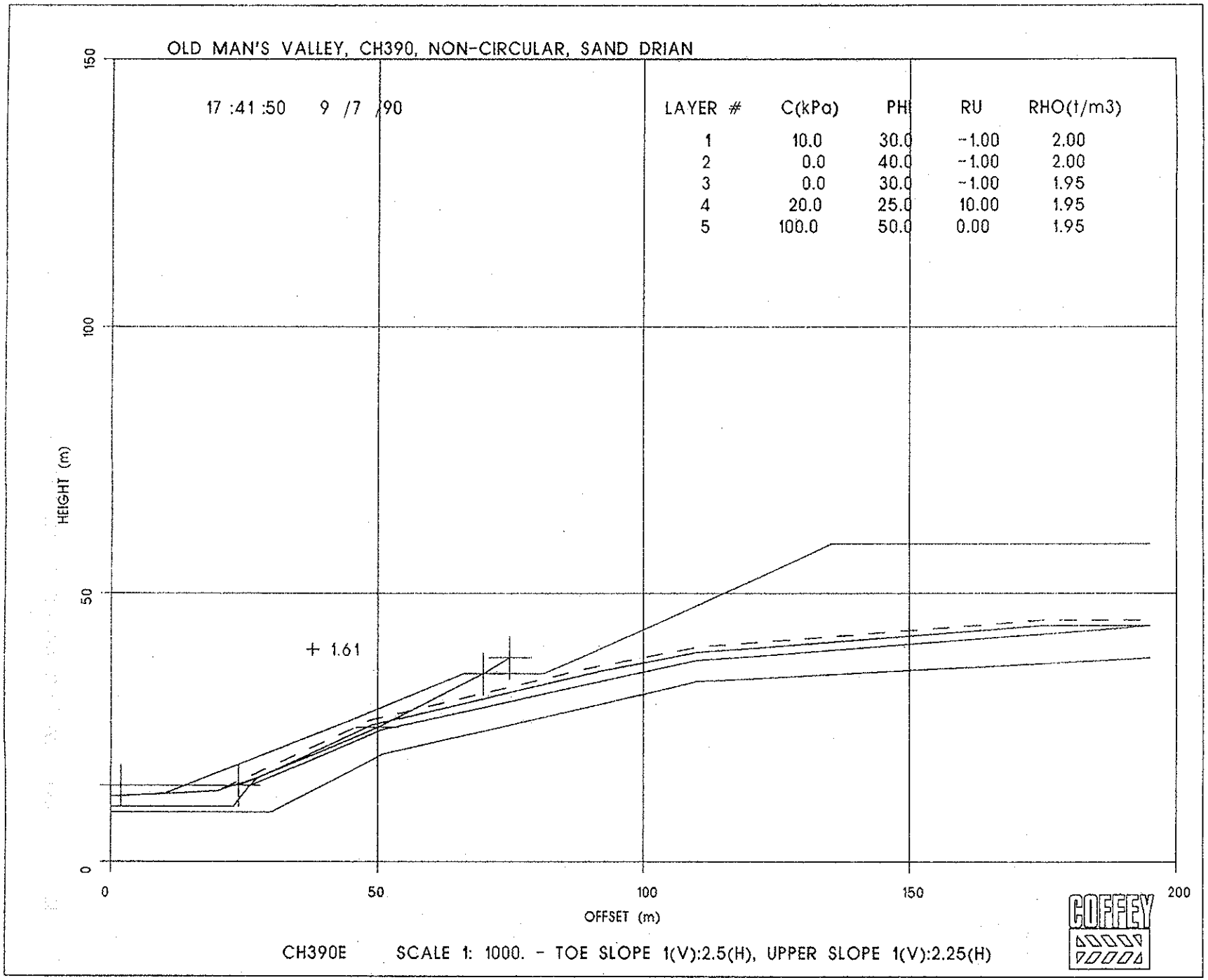

OLD MAN'S VALLEY, CH390, NON-CIRCULAR, SAND DRIAN
17 :41 :50 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 0.0 30.0 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
+ 1.61
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
COFFEY
CH390E SCALE 1: 1000. - TOE SLOPE 1(V):2.5(H), UPPER SLOPE 1(V):2.25(H)

FIGURE 27

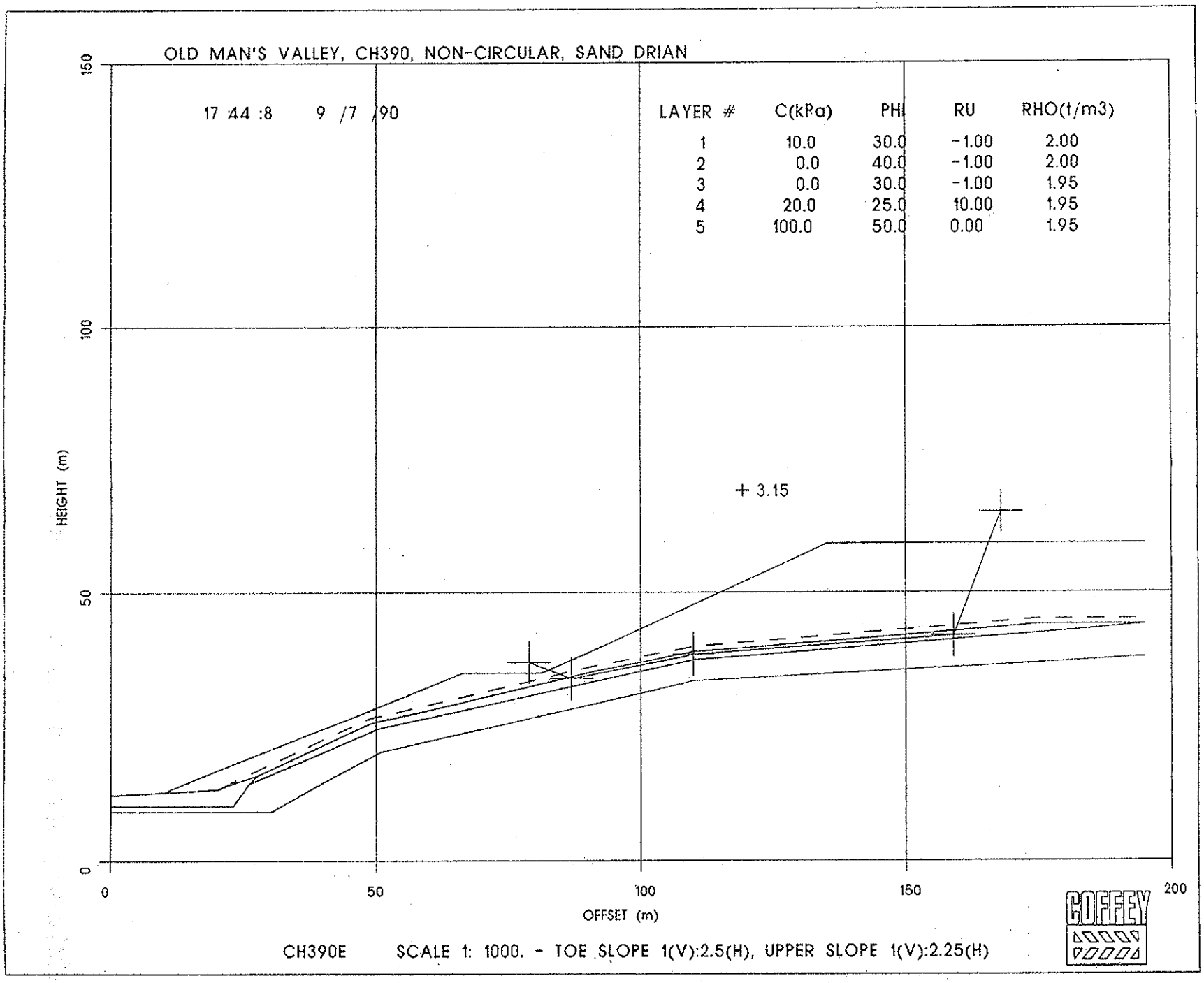

OLD MAN'S VALLEY, CH390, NON-CIRCULAR, SAND DRIAN
17 :44 :8 9 /7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 10.0 30.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 0.0 30.0 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
+ 3.15
HEIGHT (m)
0
50
100
150
0
50
100
150
200
OFFSET (m)
COFFEY
CH390E SCALE 1: 1000. - TOE SLOPE 1(V):2.5(H), UPPER SLOPE 1(V):2.25(H)

FIGURE 28

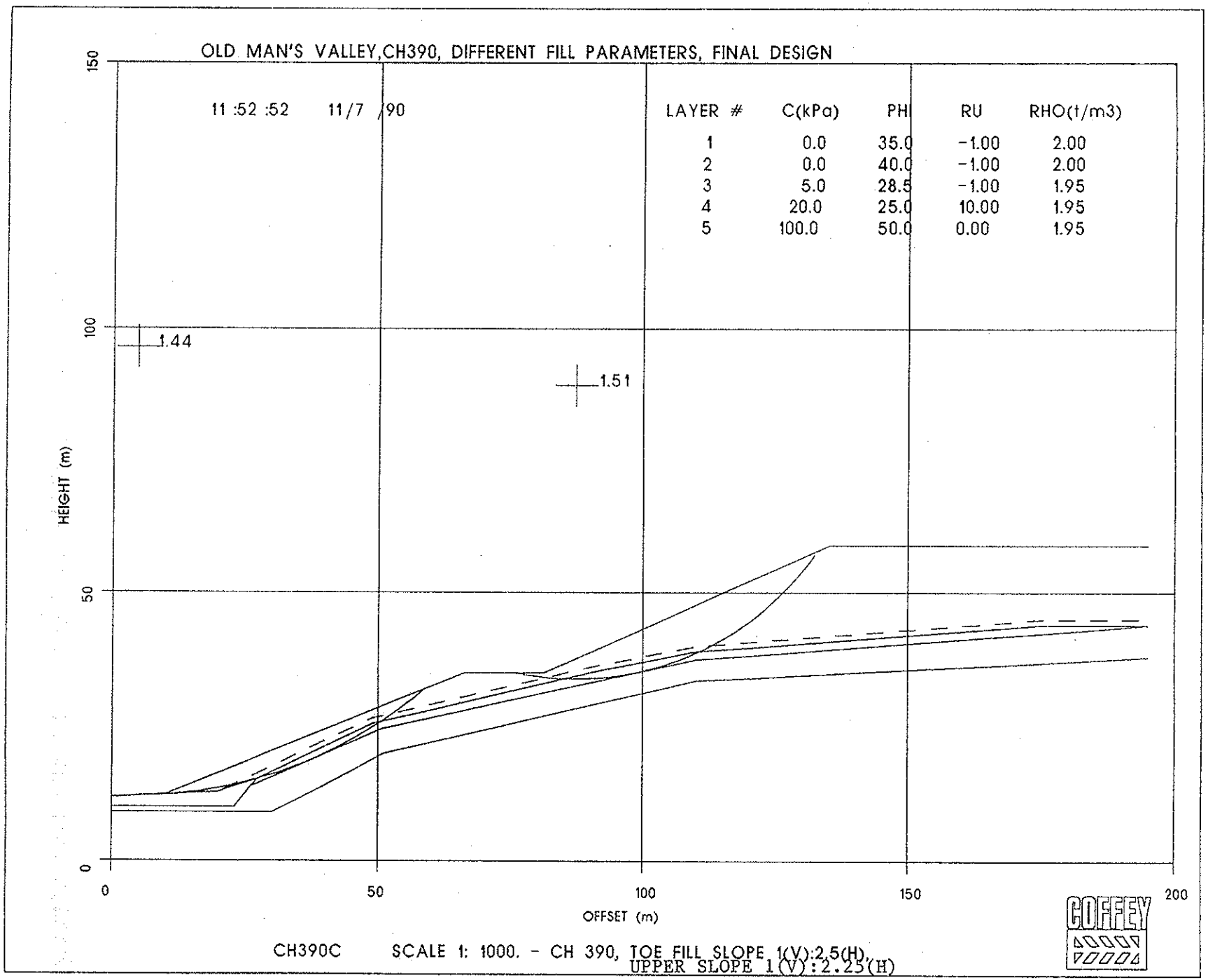

OLD MAN'S VALLEY,CH390, DIFFERENT FILL PARAMETERS, FINAL DESIGN
11 :52 :52 11/7 /90
LAYER # C(kPa) PH RU RHO(t/m3)
1 0.0 35.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
1.44
1.51
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
CH390C SCALE 1: 1000. - CH 390, TOE FILL SLOPE 1(V):2.5(H), UPPER SLOPE 1(V):2.25(H)
COFFEY

FIGURE 29

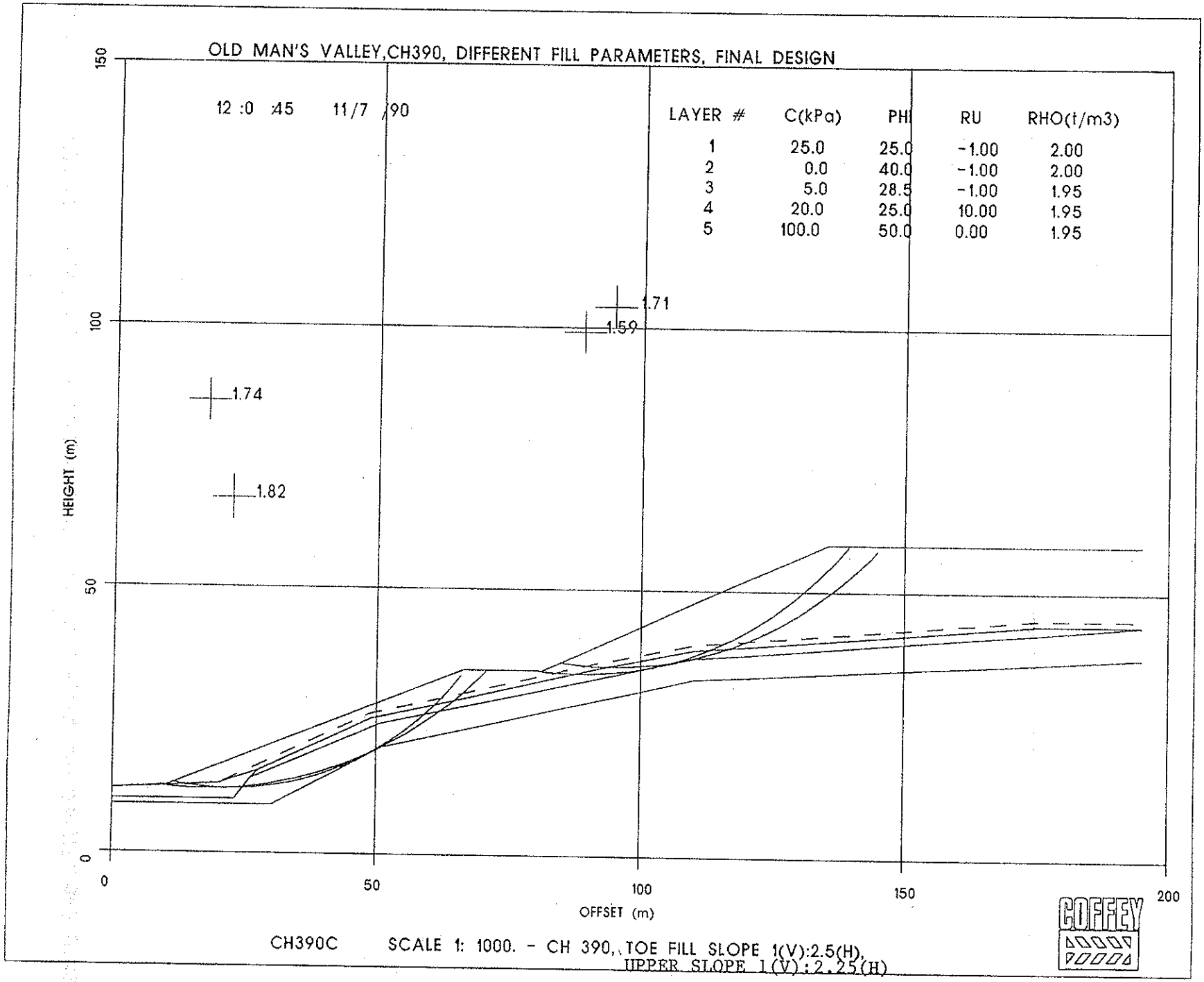
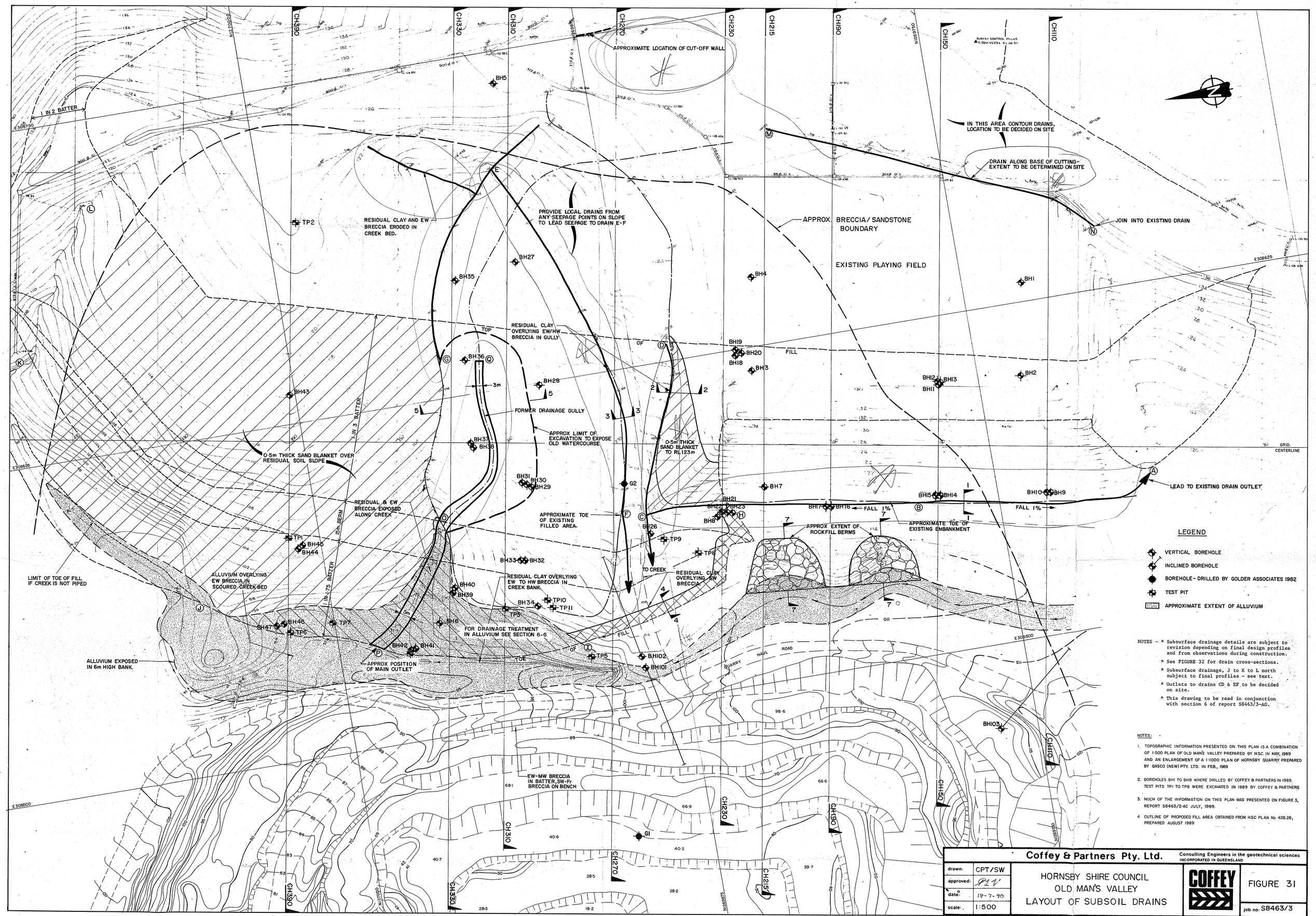

OLD MAN'S VALLEY,CH390, DIFFERENT FILL PARAMETERS, FINAL DESIGN
12 :0 :45 11/7 /90
LAYER # C(kPa) PHI RU RHO(t/m3)
1 25.0 25.0 -1.00 2.00
2 0.0 40.0 -1.00 2.00
3 5.0 28.5 -1.00 1.95
4 20.0 25.0 10.00 1.95
5 100.0 50.0 0.00 1.95
1.71
1.59
1.74
1.82
HEIGHT (m)
OFFSET (m)
0
50
100
150
200
CH390C SCALE 1: 1000. - CH 390, TOE FILL SLOPE 1(V):2.5(H),
UPPER SLOPE 1(V):2.25(H)
COFFEY

FIGURE 30



LEGEND

- VERTICAL BOREHOLE
- INCLINED BOREHOLE
- BOREHOLE - DRILLED BY GOLDER ASSOCIATES 1982
- TEST PIT
- APPROXIMATE EXTENT OF ALLUVIUM

NOTES – * Subsurface drainage details are subject to revision depending on final design profiles and from observations during construction.

* See FIGURE 32 for drain cross-sections.
* Subsurface drainage, J to K to L north subject to final profiles – see text.
* Outlets to drains CD & EF to be decided on site.
* This drawing to be read in conjunction with section 6 of report S8463/3-AG.

NOTES:

1. TOPOGRAPHIC INFORMATION PRESENTED ON THIS PLAN IS A COMBINATION OF 1:500 PLAN OF OLD MAN'S VALLEY PREPARED BY H.S.C. IN MAY, 1989 AND AN ENLARGEMENT OF A 1:1000 PLAN OF HORNSBY QUARRY PREPARED BY QASCO (NSW) PTY. LTD. IN FEB., 1989
2. BOREHOLES BH1 TO BH8 WHERE DRILLED BY COFFEY & PARTNERS IN 1989. TEST PITS TP1 TO TP8 WERE EXCAVATED IN 1989 BY COFFEY & PARTNERS
3. MUCH OF THE INFORMATION ON THIS PLAN WAS PRESENTED ON FIGURE 3, REPORT S8463/2-AC JULY, 1989.
4. OUTLINE OF PROPOSED FILL AREA OBTAINED FROM H.S.C. PLAN No 428.28, PREPARED AUGUST 1989

Coffey & Partners Pty. Ltd. Consulting Engineers in the geotechnical sciences INCORPORATED IN QUEENSLAND

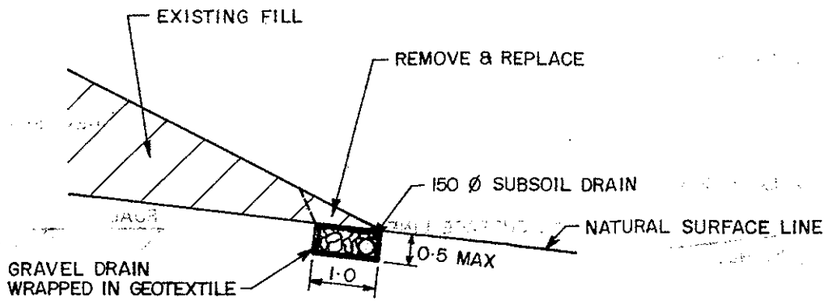
drawn:	CPT/SW
approved:	
date:	18-7-90
scale:	1:500

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
LAYOUT OF SUBSOIL DRAINS

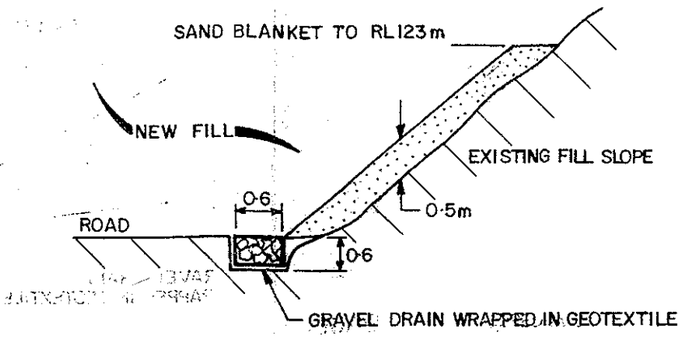
COFFEY

FIGURE 31

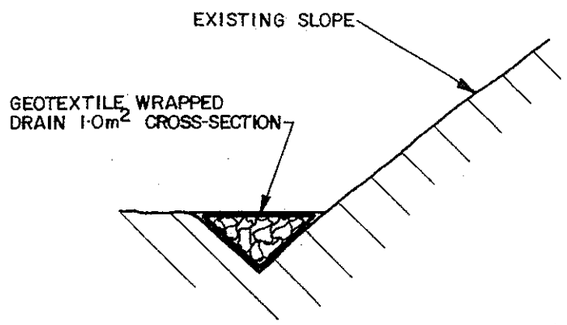
job no: S8463/3



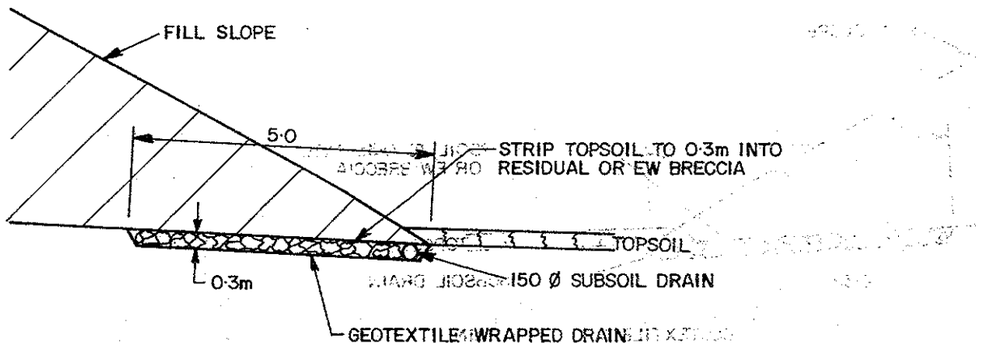
SECTION 1-1
(H TO A ON FIG 31)
TO BE CONSTRUCTED IN
LENGTHS NOT MORE THAN 5m



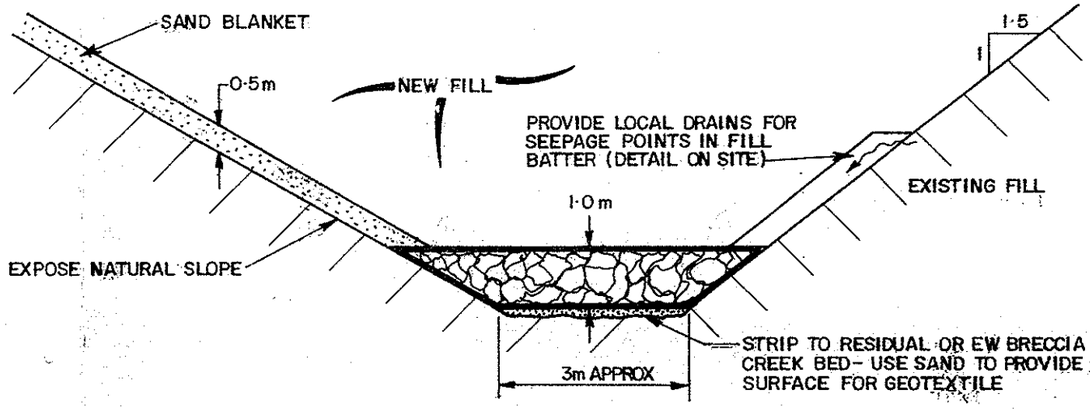
SECTION 2-2
(D TO C ON FIG 31)



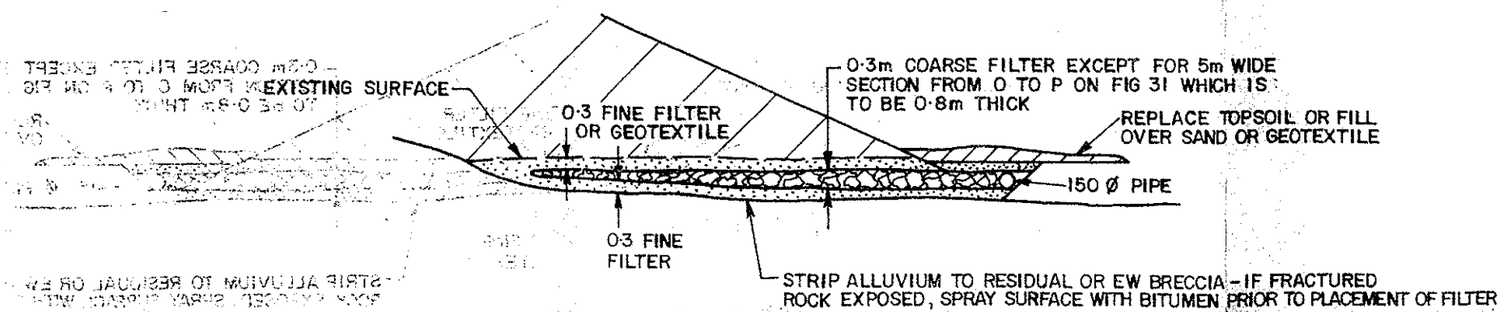
SECTION 3-3
(E TO F ON FIG 31)



SECTION 4-4
(H TO I ON FIG 31)



SECTION 5-5
(O TO Q ON FIG 31)



SECTION 6-6
(ALLUVIAL AREA)

NOTES - * For locations see FIGURE 31.
* Drawing to be read in conjunction with text of report S8463/3-AC.
* Sand for blanket drains to approximate fine filter grading in FIGURE 34 and shall have not more than 5% finer than 0.076mm.
* For grading of fine and coarse filters see FIGURE 34.
* Drainage gravel inside geotextile drains to be 20mm maximum size with not greater than 5% finer than 4.75mm.

1 0 1 2 3 4 5
scale (metres)

revision	description	drawn	approved	date

Coffey & Partners Pty Ltd Consulting Engineers in the geotechnical sciences
Incorporated in Queensland

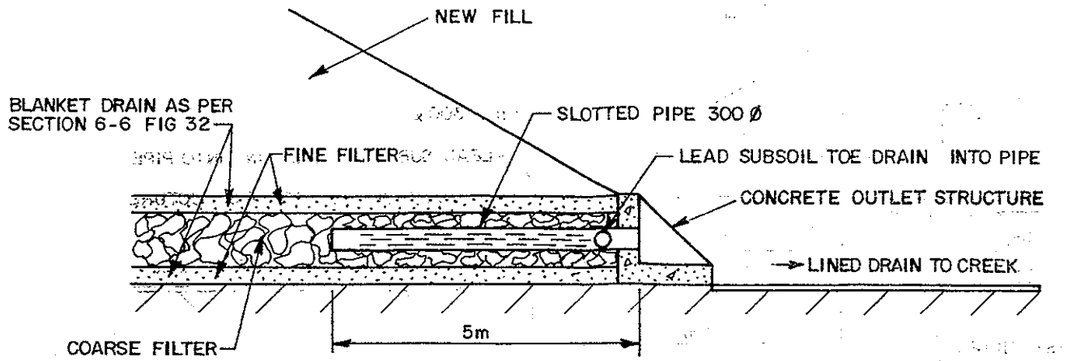
drawn	CPT/SW
checked	PJV
date	18-7-90

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SECTIONS THROUGH SUB-SURFACE DRAINS

COFFEY

FIGURE 32

job no S8463/3

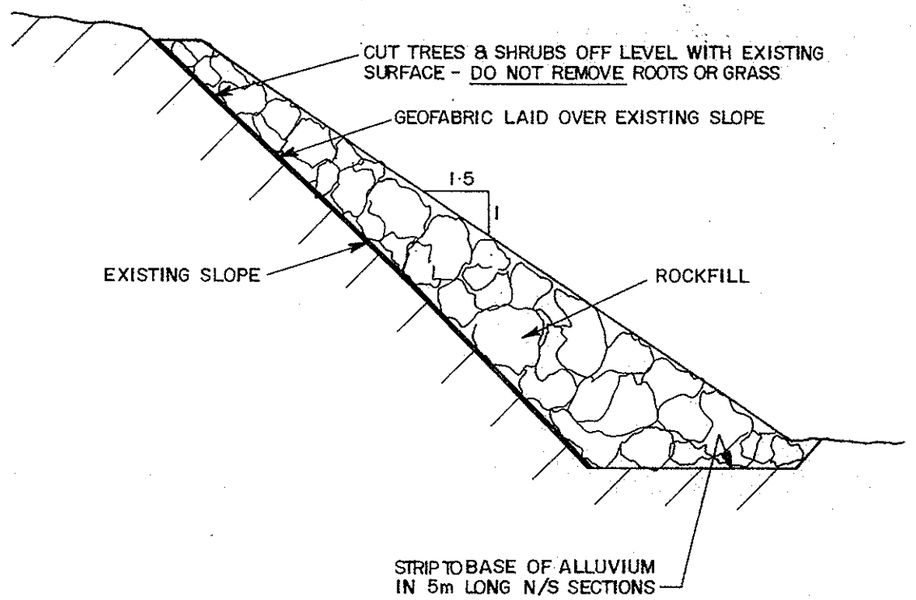


OUTLET AT "P"

(SEE FIGURE 31)
NOTE - LOCATION TO BE DECIDED AFTER STRIPPING
(SCALE 1:100)

OUTLET FOR OTHER PIPES - eg EF & DC

(SCALE 1:100)



SECTION 7-7

(SCALE 1:200)

scale (metres)

revision	description	drawn	approved	date

Coffey & Partners Pty Ltd Consulting Engineers in the geotechnical sciences Incorporated in Queensland

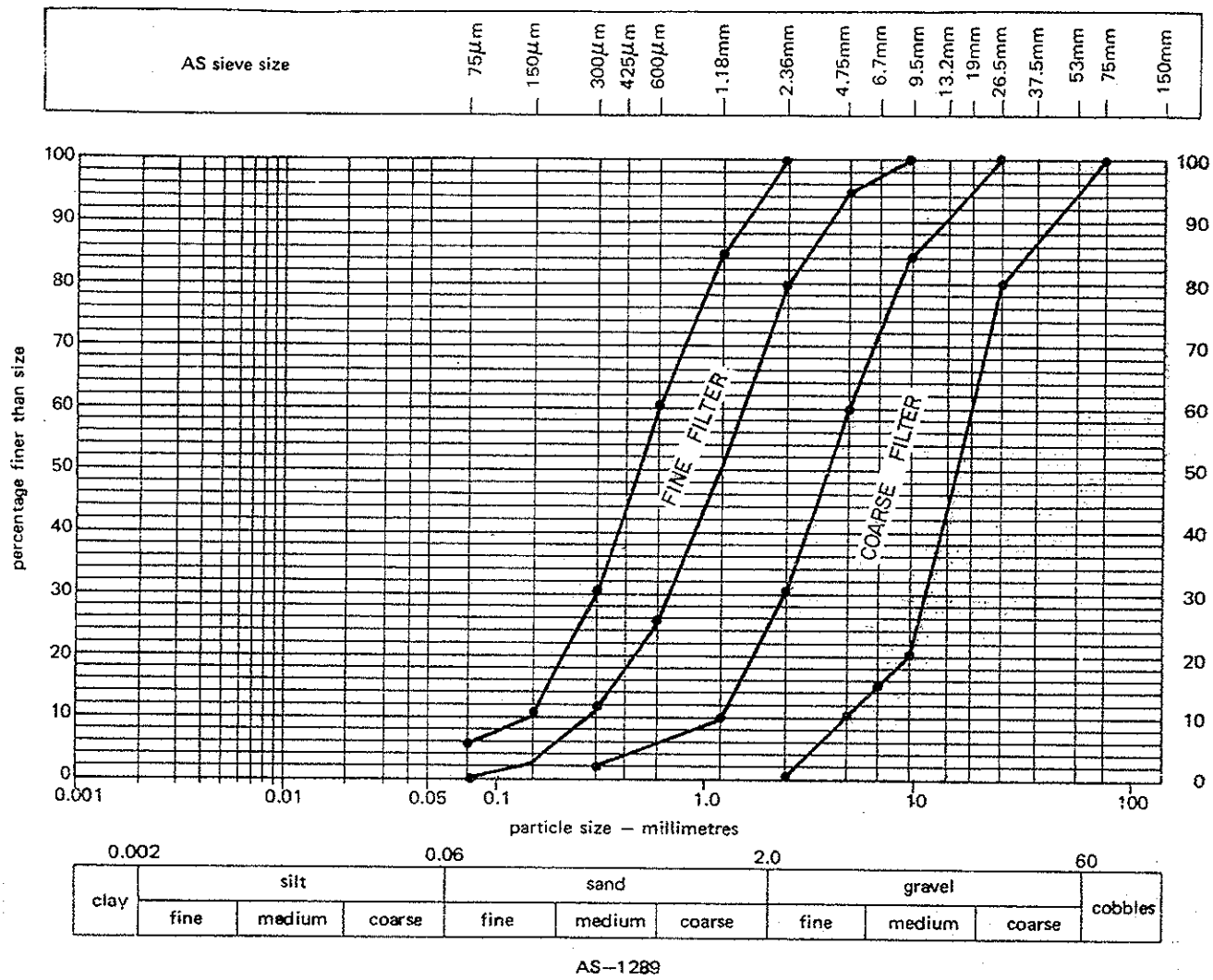
drawn	CPT/SW
checked	RJV
date	18-7-90

HORNSBY SHIRE COUNCIL
OLD MAN'S VALLEY
SUBSOIL DRAIN OUTLET STRUCTURES & ROCKFILL BERM

COFFEY

FIGURE 33

job no S8463/3



Graded filters, sand blanket material and gravel for geofabric drains shall conform to the requirements for concrete aggregate AS2758.1 except that grading shall be as shown above.

Coffey & Partners Pty Ltd Consulting Engineers in the geotechnical sciences			
drawn	CPT/SW	HORNSBY SHIRE COUNCIL OLD MAN'S VALLEY GRADED FILTERS	FIGURE 34
approved			
date	18-7-90		
scale			job no S8463/3