

**GFSH-2, PHASE 1, GEOTECHNICAL  
INVESTIGATIONS: VARIOUS PORTIONS  
OF THE FARM NOOITGEDACHT 534-JQ  
LOCATED SOUTH OF N14 FREEWAY  
(LION PRIDE EXTENSION).**

**IR1737.1**

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**NOVEMBER 2021**

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Your reference

Our reference  
**IR1737.1**

Date  
**6<sup>TH</sup> NOVEMBER 2021**

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## **EXECUTIVE SUMMARY**

This GFSH-2 phase1 report presents and comments on the results and observations of near surface soil geotechnical investigations carried out on various portions of the farm Nooitgedacht 543-JQ: South of the N14 freeway (Lion Pride Extension).

The site is located on Halfway House granite and related soil derivatives. The site is mantled by colluvium and alluvium in the flood plain of the stream that traverses the central site area from south to north.

The Soil Map presented in this report sub-divides the site into (preliminary) Site Class sub-areas in terms of the NHBRC Manual and the Code of Practice. A broad overview of the assumptions made and analytical processes adopted for these classifications is provided. The terrain slopes gently (approximately at 2%) from the western sector of the site (1 437m AMSL) and the eastern sector of the site (1 437m AMSL) to the low lying areas along the stream (1 404m AMSL).

The presence of open-textured (potentially collapsible) and active (potentially swelling/ shrinking) near surface soils is discussed in detail.

Although well developed pedocretes mantle the residual granite (varying refusal depths) over some sections of the site, the thickness of the pedocretes are known to vary and to be completely absent in some areas. Therefore, geotechnical inspection (at GFSH-2 Phase 2 Stage) will be a crucial design requirement in refining and finalising the individual Soil Site classifications for housing foundation design.

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**EXECUTIVE SUMMARY**

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## 1. INTRODUCTION

This report presents and comments on the preliminary results and observations of the GFSH-2 Phase 1 geotechnical investigations carried out on various portions of the farm Nooitgedacht 543-JQ: South of the N14 freeway (Lion Pride Extension).

This report documents the terms of reference, available data used in this study, investigation procedures, geology and geohydrology, and the classification procedure adopted in order to provide the 'Soil Map' for this site in terms of the NHBRC guidelines for single storey masonry structures.

## 2. TERMS OF REFERENCE

Intraconsult presented budget and technical proposals in letter reference IR1737.1p, dated 30<sup>th</sup> August 2021. Intraconsult were requested to commence with work on the 30<sup>th</sup> September 2021.

## 3. INFORMATION USED IN THIS STUDY

The following information has been used in the investigation and assessment of this site:

- NHBRC Home Building Manual, dated 2015 (ISBN: 978-0-620-68292-3).
- SAIEG and SAICE: "Guidelines for Urban Engineering Geological Investigations."
- Soil Survey for Engineering; Brink, Partridge and Williams (1982).
- Geological Map, 1: 50 000 Scale Series: issued by the Geological Survey of South Africa (Council for Geoscience): East Rand 2628.
- Generic Specification GFSH-2, National Department of Housing Specification, September 2002.

## 4. SITE DESCRIPTION

The site area of approximately 41ha comprises of various portions of the farm Nooitgedacht 543-JQ, located south of the N14 freeway in the CoJ, Gauteng Province. Figure 1 shows the site location.

It is assumed that potentially developable lands will exclude those areas located below the food line of the stream situated in the central part of site and running from the northern boundary to the southern boundary.

The site is centred at roughly 27°55'17" E and 25°59'24" S directly south of the N14. The terrain slopes gently (approximately at 2%) from the western sector of the site (1 437m AMSL) and the eastern sector of the site (1 437m AMSL) to the low lying areas along the stream (1 404m AMSL).

## 5. NATURE OF INVESTIGATIONS

These investigations have involved the following:

### 5.1 Desk Study

A desk study has been carried out to review data collected in earlier studies on the site.

### 5.2 Field Inspections

Field inspections were completed during the early stages of these investigations in order to develop a clearer perspective of current site conditions. The object of these field inspections was to evaluate access, geomorphology and near surface features across the site.

### 5.3 Trial Holes

Where access was possible, trial holes were opened across the site using a 75kW backhoe machine. Each trial hole was entered and inspected by an engineering geologist who also described the soil profiles using the visual and tactile procedures advocated by Jennings et al (1973). Detailed descriptions of the trial hole profiles from this investigation are given in Appendix 1 and their positions shown on Drawing IR1737.1 at the end of this report.

### 5.4 Soil Sampling and Testing

For accurate classification and identification purposes, particle size distributions and Atterberg Limit tests are being carried out currently on samples recovered from the various soil unit horizons uncovered during these investigations. Select soil unit samples were also currently being tested for moisture content, soil chemistry and CP200 'collapse'.

## 6. SITE GEOLOGY AND SHALLOW GROUNDWATER CONDITIONS

### 6.1 General

The site is located on halfway house granite and related soil derivatives. The site is mantled by colluvium and alluvium in the flood plain of the stream.

### 6.2 Soil Profile

Detailed descriptions of the soil profiles uncovered during these investigations are provided in Appendix 1 of this report.

#### **Soil horizons generally characterizing the site include:**

**Colluvium:** Typically, silty sands usually open-textured.

**Pebble Marker:** Abundant sub-rounded quartzite and granite gravels with silty sands.

**Pedocretes:** Isolated occurrences as cemented honeycomb ferricrete. The latter cause the 75kW backhoe to refuse well within the excavation depth range of the machine.

**Residual Granite:** Residual soils consisting generally of silty sand silts, with some ferruginisation in places. Varying percentages of gravels, cobbles and boulders are present. Refusal occurred on soft rock granite.

### 6.3 Permeability

With relatively flat to gentle gradients over much of the developable site area, and near surface soils that may be highly porous, rainfall infiltration is relatively rapid. However, low lying areas next to the spruit consist of clayey materials of very low permeability. The high degree of ferruginisation recorded in the higher sections of the near- surface profiles indicate that seasonal "perched" groundwater conditions should be anticipated in the wet season, particularly after periods of heavy rain. Perched conditions may develop on the granite bedrock interface, residual granite, clays and ferricrete horizons.

## 7. GEOTECHNICAL EVALUATION

This Geotechnical evaluation is based on our interpretation of field scouting, the ground contour information, geology, the rock and soil profiles and the laboratory test results of this and earlier geotechnical investigations across this site.

### 7.1 Engineering and Materials Characteristics

- **Evaluation of the Collapse Potential of soils within 1.0 m from natural ground level.**

The visual and tactile soil profiling of the layers of potentially 'collapsible' soils uncovered in the open test holes indicate 'moderate trouble' to 'trouble' class soils..

- **Evaluation of the activity (swell/shrink) of soils within 3,0m from natural ground level.**

Colloidal substances in soils possess a large surface area and are known to expand on absorption of water and to contract on drying out. Webb (1959) showed that it is the surface area of colloids that causes swell/shrink of soils (and not necessarily) their expanding – lattice clay minerals. Weston (1980) utilised weighted liquid limit tests to provide an empirical equation to index potential soil behaviour. Analyses carried out on the weighted liquid limit laboratory test results from samples of the soil units uncovered in the trial holes across this site indicate slight potential 'swell/shrink' soil behaviour over seasonal time. These results and analysis are discussed more fully in Section 8 below.

- **Evaluation of the potentially compressible soils within 1.0m from natural ground surface.**

Field profile inspections of the soil units and their distribution across the site indicates that medium and long-term compressibility is unlikely to exceed the swell/shrink values given for (light) residential structures on this site once the open-textured nature of the soils has been removed.

However, detailed geotechnical foundation investigations will be required for any proposed heavier multi storey structures.

- **Evaluation of surficial materials for roads construction:**

Disturbed samples of the soils encountered in the opened trial holes across this site were subjected to particle size and Atterberg Limit tests. These test results are summarised in Table 2. Our evaluation of these natural insitu materials for potential use in township roads sub-grade design is provided as follows:

Soil Unit	Group Classification	General rating as sub-grade	Grading Modulus	Workability Rating
Colluvium	A-2-6	good	1.24	good
Pebble Marker	A-2-4 toA-2-7	good to fair	1.29 to 2.45	good to excellent
Res.Granite	A-7-6 toA-2	poor to good	0.90– 1.51	fair to good

Estimates of CBR values ( at 95% Mod. AASHTO) for the soil units can be computed from the grading modulus and PI data as follows:-

TH	Soil Unit	Grading Modulus	PI	Estimated CBR
4	Colluvium	1.24	15	15
17	Colluvium	1.25	.17	15
4	Pebble Marker	1.82	20	18
17	Pebble Marker	1.29	23	12
4	Res. Granite	1.51	13	20
5	Res.Granite	1.12	12	18
11	Res.Granite	1.63	11	25
17	Res.Granite	0.93	19	13
19	Res.Granite	1.16	23	12

- **Evaluation of surficial materials for possible use for pipe bedding: (SABS 1200 DB & LB)**
  - (i) Select Granular Bedding – i.e. naturally occurring non-cohesive singularly graded gravel-soils between 0.6 and 19.0 mm are not available on this site and will need to be imported.
  - (ii) Select Fill – the laboratory tests results indicate that natural soils with a PI less than 6 are not available on this site..
  - (iii) General fill: materials recovered from trench excavation works may be considered for General Fill purposes after removal of any larger cobble and boulder size fractions.



- **Evaluation of Potential aggressiveness of interparticulate groundwaters:**

Disturbed samples of the transported and residual soils encountered in opened trial holes across this site were subjected to chemical tests. The test results are provided in Table 2. Our assessment of these values is as follows:

Soil Unit	pH	Comment	Resistivity Ohm.m	Potential Corrosivity*
Colluvium	6.9	neutral	156	generally not
Pebble Marker	6.9	neutral	160	generally not
Res. Granite	6.9	neutral	199	generally not

\* potential corrosivity – ref Messrs ARMCO 1977

- **Dumping of refuse:** Dumped refuse and building rubble has been noted on this site and should be anticipated as a general hazard potentially influencing development in these (small) sectors.

- **Evaluation of Potential erosion and piping (dispersive soils) when soils are subjected to a hydraulic gradient.**

Sodium - based clay minerals are susceptible to erosion or piping in the insitu soil profile. The electrical conductivity of the soil paste provides an indicator of the salinity and potential dispersive behaviour. The conductivity results are provided in Table 2. Our assessment of these values is as follows:

Soil Unit	Conductivity Sm	Dispersive Characteristics*
Colluvium	0.007	non-associated
Pebble Marker	0.007	non-associated
Res. Granite	0.009	non-associated

Note: conductivities in excess of 0.5 Sm may be associated with dispersion

## 7.2 Erosion

The fine nature of many of the soil units encountered during investigations is such that after removal of natural cover they will present a potential erosion problem during periods of heavy rain and also dust removal by high winds in the dry season.

## 7.3 Earthworks classifications for service trenches

Some of the excavated trial holes uncovered excavation 'intermediate' and 'medium hard rock' classes of materials in the lower sections of the ground surface (0.0m) to minus 1.5m profile across this site. The material 'refusal depths' and types are summarised in Table 1.

Our evaluation of these refusal depths is that generally materials below the soils could be removed by higher classes of excavators.

## 7.4 Permeability

The shallow soils uncovered across the site have been subjected to weathering, erosion, pedogenic and other processes in the geological past.

The shallow (soil) portion of the profile consists of layers of transported materials, unweathered and completely weathered insitu material, and poorly to well developed pedogenic soils. This range of materials with a variety of physical properties can significantly impact on spatial permeability values. The following table is provided for the purposes of estimating the potential saturated hydraulic conductivities of the USCS soil groups profiled (and tested) in the investigations.

USCS Soil Groups	Hydraulic conductivity m/s after Badenhorst, 1998
SC	$10^{-10} - 10^{-6}$
CL	$10^{-10} - 10^{-5}$
CH	$10^{-13} - 10^{-6}$

Note: Although laboratory tests are more objective as a means of obtaining geotechnical data, estimated hydraulic conductivities from systematically described soil profiles may be more accurate. This is because of the large variations in hydrogeological properties within the many of the USCS soils groups.

## 8. SITE CLASSIFICATION

### 8.1 Impact of Geotechnical Character of the Site on Housing Developments

The procedures utilized in this report for the *broad* geotechnical zonation of the site are derived from the modification and integration of various classification systems and follow the SAIEG's "Guidelines for Urban Geological Investigations" with appropriate adaptations.

Based on the geological, geohydrological, hydrological, geomorphological and soils information gathered during geotechnical investigations, sites may be divided into three primary Geotechnical Sub-Areas. These Sub-Areas broadly reflect the development potential of sites and delineate Sub-Areas of similar characteristics such as wet areas and terrain (see also Table 3 in the GFSH-2 Generic Specification).

Geotechnical Sub-Area	Definition
1 "Most favourable"	The geotechnical conditions are such that urban development can take place without any special precautionary/remedial measures for geotechnical conditions.
2 "Intermediate" (prefix "2" on the NHBC Soil Map)	Geotechnical conditions are such that the area may be developed for urban use but appropriate remedial and/or precautionary measures are required in the context of the geotechnical constraints.
3 "Least favourable" (prefix "3" on the NHBC Soil Map)	Geotechnical conditions are such that urban development is not recommended.

Based on our evaluation of the available geotechnical data, the site area has been delineated into these Primary Geotechnical Sub-Areas.

These primary Sub-Areas are shown on Drawing IR1737.1 (See also the GFSH-2 Phase 1 commentary at the end of Section 8.2 below).

## 8.2 Site Classification (In terms of the NHBRC Guidelines for single storey masonry structures)

For the purposes of this report the broad geotechnical characteristics of the primary geotechnical Sub-Areas are further described in terms of several 'geotechnical category designations' in terms of the NHBRC Guidelines as defined below:

GEOTECHNICAL CATEGORY AND SITE CLASS DESIGNATION	GEOTECHNICAL CHARACTERISTICS
Inundated areas w	Wet area, drainage line, seepage zone.
Active soils (heave/shrink)	Expected range of total movement at surface:
H	<7.5 mm
H1	7.5 – 15 mm
H2	15 – 30 mm
H3	>30 mm

GEOTECHNICAL CATEGORY AND SITE CLASS DESIGNATION	GEOTECHNICAL CHARACTERISTICS
Collapsible soils	Expected range of total movement at surface:
C	<5 mm
C1	5 – 10 mm
C2	>10 mm
Compressible soils	Expected range of total movement at surface:
S	<10 mm
S1	10 – 20mm
S2	>20mm
Excavation E	Abandoned borrow areas, dump rock, waste sites, exploration pits or adits, and uncontrolled fill, erosion gully
P	Dolomite area
R	Rock
R1	Outcrop
R2	Scattered outcrop
R3	Sub-outcrop (i.e. 0.1 – 1.5 m profile)

These designations are added to the selected Primary Geotechnical Sub-Areas in order to describe the generalized geotechnical conditions that lead to that particular characterization.

*The 'H', 'C' and 'S' designations tabulated in the NHBRC Guidelines imply that a quantitative approach is required when analysing each open trial hole profile and before allocating it to a selected (soil) Site Class Sub-Area. A broad overview of the assumptions made and the analytical processes adopted regarding potential in-service soil behaviour beneath shallow foundations is presented below. Most importantly, potential soil behaviour in the Trial Holes has been evaluated and characterised when abstractly subjected to loading and moisture conditions beneath a structure where bearing pressures do not exceed 50 kPa and rest on 0.5m wide strip footings (see NHBRC Guidelines). In practical terms and for stress related behaviour (the 'C' and 'S' Flags) only the top 1 metre of profiled materials has been considered, while for the moisture-related behaviour (the 'H' Flag) only the top 3 metres.*

(i) **Soils uncovered that can change in volume with changes in moisture conditions – potentially active soils (i.e., NHBC Site Class H/H1/H2/H3)**

Seasonal variations in the moisture condition of any colloidal size particles in soils can induce volume changes which could translate into vertical 'movement' under the foundations of houses placed on these particular soil profiles.

In an attempt to quantify these movements for this report, our experience with similar soils, together with Weston's empirical swell equation, has been adapted to provide an indication of the swell difference between the projected 'driest' and 'wettest' moisture conditions anticipated in the field, see Footnote<sup>1</sup>.

The laboratory testing of soil samples taken across the site provides mean liquid limit (whole) values for the various soil units. These values, together with the weighted potential volume changes (swell difference between the presumed 'driest' and 'wettest' field moisture conditions) are tabulated below:

SOIL UNIT	L.L.  WHOLE VALUES (mean)	MOISTURE CONTENT %		SWELL DIFF. VOL. CHANGE %
		'DRIEST'	'WETTEST'	
Colluvium	17.5	7.0	14.0	<0.1
Pebble Marker	16.0	6.4	12.8	<0.1
Res. Granite	20.2	3.1	6.2	0.2

(ii) **Soils uncovered that could rapidly reduce in volume when loaded and wetted – potential 'collapsible' soils (i.e. NHBC Site Classes C/C1/C2).**

'Loose' and open textured soils have been uncovered in a number of the trial holes opened across this site. The 'loose' nature of these materials and their collapse potential have been checked using the methodology suggested by Darwell and Denness. The laboratory index properties used are summarised in Table 2 and evaluated below:

TP No	Soil Unit	>0.85	<0.85
04	Colluvium	yes	
17	Colluvium	yes	

For the purpose of this report a 1 per cent collapse/reduction in profile has been made in the assessment of the indicated metastable (>0.85) colluvium and residual granite profiled in the open trial holes.

Footnote 1: Weston's swell per cent =  $0,000411L^{+4,17} \times p^{0,388} \times W_i^{2,33}$   
 where L = Liquid Limit (whole) (ie. Liquid Limit x % passing 425 microns)  
 P = overburden pressure (10kPa adopted for this report)  
 W<sub>i</sub> = initial moisture content.

From CSIR research experience (for 'red' soils), the 'driest' field moisture condition has been taken as 0,4 L, and the 'wettest' field moisture condition as 0,8 L. For the 'dark grey' and 'black' soils 'driest' and 'wettest' conditions have been taken at 0,2L and 0,7L respectively.

Once analysed according to the assumptions made and the data provided, the individual trial hole designations have been transferred onto the site plan provided and reviewed in conjunction with other geotechnical information including the (solid) geology, engineering judgment and the results of field scouting.

Our Soils Map (Drawing IR1737.1) has been compiled reflecting this total conceptual Site Class Sub-Area characterization.

For (light) residential structures provided in this site area, the following outline commentary in Section 9 is provided for the Site Classes provisionally given for this site:

## 9. CONCLUSIONS

These investigations have confirmed that potentially problematic soils mantle the bedrock over large sections of the site area. The occurrence of these soils and their anticipated in-service behaviour has been analysed and broad preliminary zonation provided on the Soil Map, Drawing IR1737.1 with the zones defined below:

SUB-AREA DESIGNATIONS SHOWN ON THE SOIL MAP	COMMENTARY
2(R3) [H/C/S]	Anticipate sectors of pockets of difficult excavation conditions in the 0.0 to 1.5m profile (and below).
2 (H-H1/C2/S)	Anticipate potentially active H to H1soils and also potentially collapsible C2 soils in the 0.0 to 3.0 m profile
2 [H/C-C1/S]	Anticipate potentially collapsible C-C1 soils in the 0.0 to 3.0m profile.
2 /3 EW	Open trench (filled with water at the time of these investigations).
3W	(Assumed to be) below the 1:100 year floodline

Possible foundation solutions for structures are further complicated by the possible presence of 'hard' and 'soft' materials immediately beneath individual building footprints as a consequence of local rock sub-outcrop (R3). In such circumstances, differential settlement/movement is equal to total movement due to variable bedrock depth on the lava. The individual erf 'Sub-Area' designations will need to be confirmed during the GFSH-2, Phase 2 Implementation Stage Investigations, before foundation designs are finalised as required by the NHBRC.

## 10. RECOMMENDATIONS

The following notes are intended as general recommendations/guidance for the development of this site based upon the near surface data and observations recorded in this report:

### 10.1 Foundation designs

Foundation designs, building procedures and precautionary measures are all based on single-storey structures with bearing pressures not exceeding 50KPa.

#### Sub-areas with designated 2 (R3) [H/C/S] and 2 (H/C-C1/S)

Normal construction with light reinforced strip footings and light reinforcement in masonry if residual movements are <7.5 mm, or construction type is appropriate to residual movements.

The engineered platforms for the light reinforced strip footings should be constructed to the required founding level as follows:

- Remove all excavatable material to a refusal depth on honeycomb ferricrete/soft rock to a maximum depth of 1m below required foundation depth and beyond the perimeter of the structure. Final excavation depth to be inspected and approved by Resident Engineer.
- Rip and compact the excavated floor area to 95% of Modified AASHTO maximum dry density at optimum moisture content.
- Backfill in maximum 150mm thick layers with imported G5-quality material; each layer is to be compacted to at least 95% of Modified AASHTO maximum dry density at optimum moisture content.
- Ensure freeboard of at least 150mm, i.e. top of floor slab to top of natural ground level, as required in the NHBC Guidelines.

Site drainage and service and plumbing precautions are to apply. Avoid water ponding or water ingress into the subsurface near the building.

#### Sub-areas with designated 2 [H-H1/C2/S).

Due to the thicknesses of potentially highly active soil materials, it is recommended that the structures be placed on concrete reinforced raft foundations.

The engineered platforms for the raft foundations should be constructed to the required founding level as follows:

- Remove soil materials to the required depth below foundation level so as to accommodate the beams of the rafts. Final excavation depth to be inspected and approved by Resident Engineer.

- Rip and compact the excavated floor area to 95% of Modified AASHTO maximum dry density at optimum moisture content.
- Backfill in maximum 150mm thick layers with imported G5-quality material; each layer is to be compacted to at least 95% of Modified AASHTO maximum dry density at optimum moisture content, up to 300mm above natural ground level, before placing of reinforced concrete raft foundation.
- Ensure freeboard of at least 150mm, i.e. top of floor slab to top of natural ground level, as required in the NHBRC Guidelines.

Site drainage and service and plumbing precautions are to apply. Avoid water ponding or water ingress into the subsurface near the building.

## **10.2 Road Construction and Installation of underground services**

SABS 1200 D 'intermediate' and 'medium hard rock' should be anticipated in sections of the site. See Table 1.

In view of the variable near surface soil conditions, it is recommended that the township road pavement designs should follow future centre line surveys once the roads layouts have been finalised. The following notes are provided for project budgetary purposes: Our process follows the TRH 4 CATALOGUE document which is based on the experiences of the behaviour of pavement types throughout Southern Africa. The CATALOGUE assumes that all subgrades are brought to equal support standards. Our analyses of the laboratory test results and experience suggests that all the insitu subgrade soils on this site can be prepared by ripping and recompacting in 150mm thicknesses. Once the Road Category has been agreed, the pavement design can then follow from the CATALOGUE. ( for example, and assuming a Road Category 'D' for these township roads, we would recommend a pavement comprising 150mm G2 road base topped with 25mm sand and 80 CB this being a true 'flexible' pavement for the near surface soil conditions uncovered).

## **10.3 Seismic activity**

This site lies within the areas that could be impacted by ex-mining induced earth tremors. Figures obtained from the UP Natural Hazard Centre and Council for Geoscience find the expected PHA (10% probability within 50 years) for the area to be 100-200 cm/s<sup>2</sup>. Cognisance should be taken in the design of structures. The Competent person should consult SANS 11936 (2012 or its successor in title) and the NHBRC Manual to obtain guidance on the rational design of foundations and structure.

## **10.4 Drainage**

The general directions of drainage across site fall towards the small spruit from both higher ground sections in the east and the west. As careful storm water controls are mandatory to the safe and secure development of the site, storm water management plans should be closely linked to the planning of this development.

It is generally accepted good practice to avoid any accumulation of surface waters near to buildings by appropriate surface drainage design.

### **10.5 General Recommendations**

Preliminary Sub-Area site boundaries for this site are shown on the Soil Map IR1737.1 and are based upon our interpretation of the data recorded in this report. It is recommended that all layout plans for this development are revised on an ongoing basis and finally certified by the geotechnical specialist. While every effort has been made to determine overall ground conditions on this site, poorer sub areas may have been missed.

For this reason, it is further recommended that a competent specialist is always invited to inspect opened workings during the development of this site in order to confirm the findings described in this report.

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**NOVEMBER 2021**



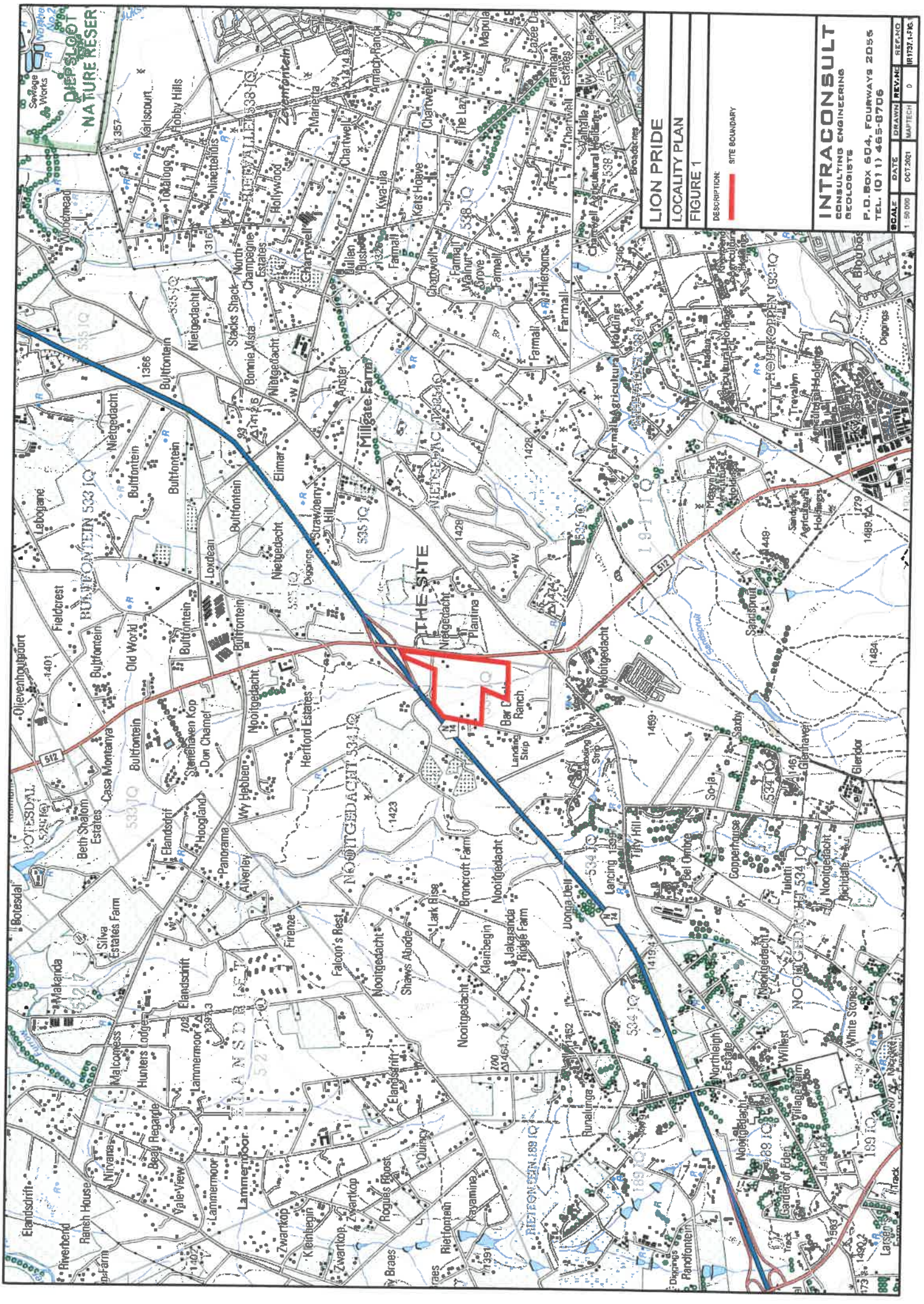
# FIGURES

LOCALITY PLAN

GEOLOGY PLAN

FIGURE 1

FIGURE 2



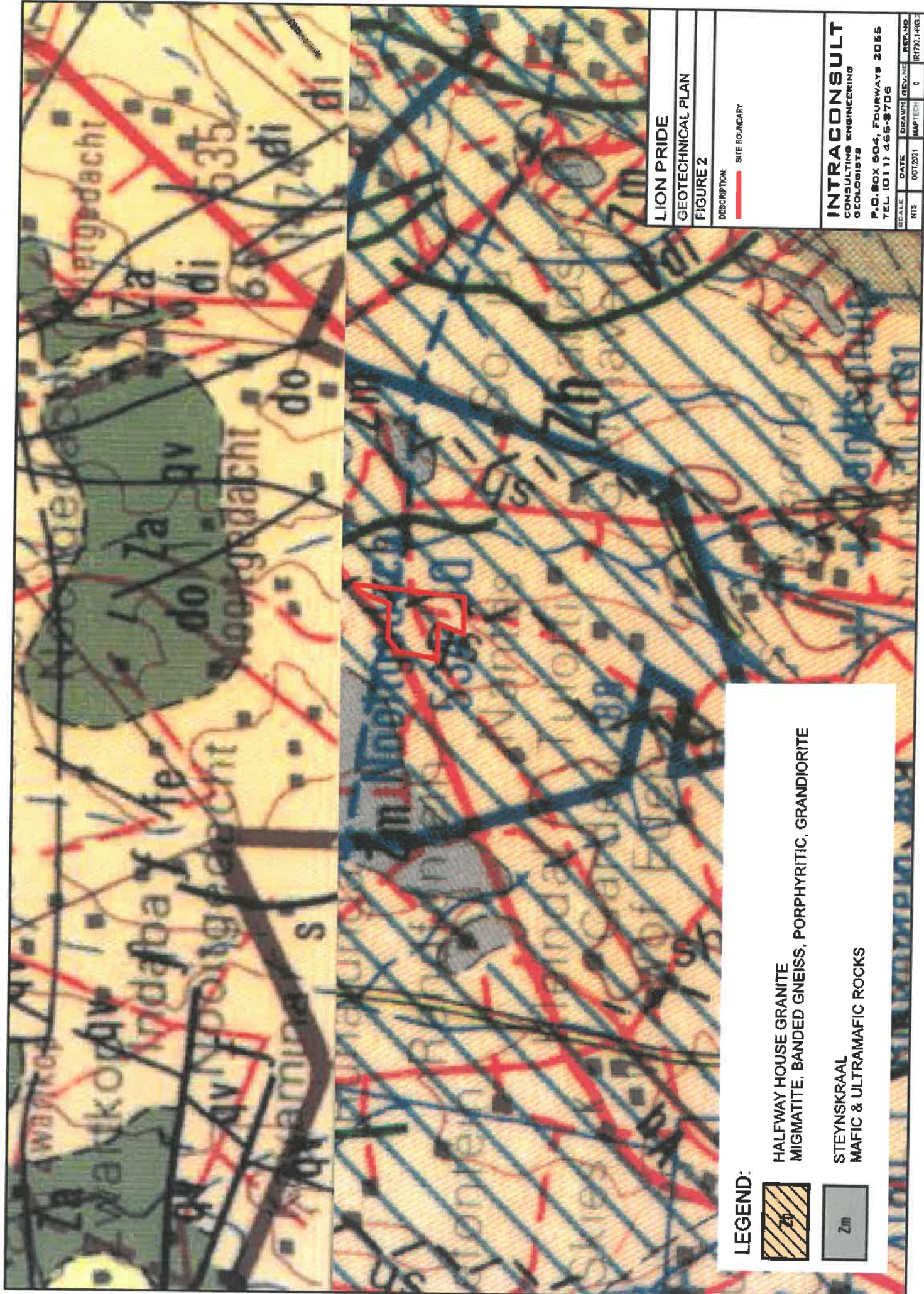
**LION PRIDE**  
**LOCALITY PLAN**  
**FIGURE 1**

DESCRIPTION: SITE BOUNDARY

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SCALE	DATE	DRAWN	REVISED	RECORD
1:50,000	OCT.2001	MAPTECH	0	INTS.1-1P6





**LEGEND:**



HALFWAY HOUSE GRANITE

MIGMATITE, BANDED GNEISS, PORPHYRITIC, GRANDIORITE



STEYNSKRAAL  
MAFIC & ULTRAMAFIC ROCKS

LION PRIDE

GEOTECHNICAL PLAN

FIGURE 2

DESCRIPTION:

— SITE BOUNDARY

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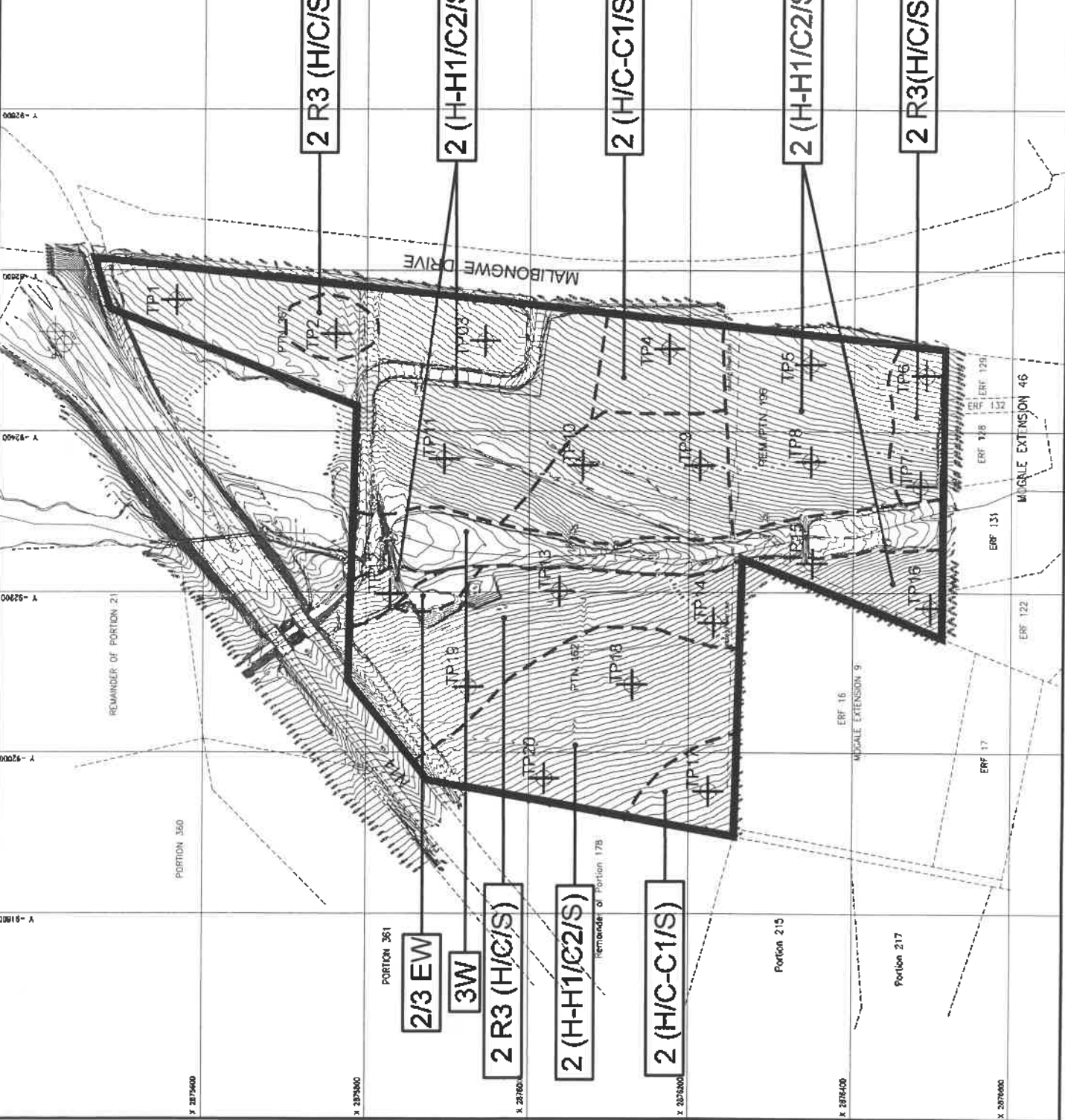
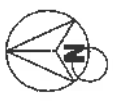
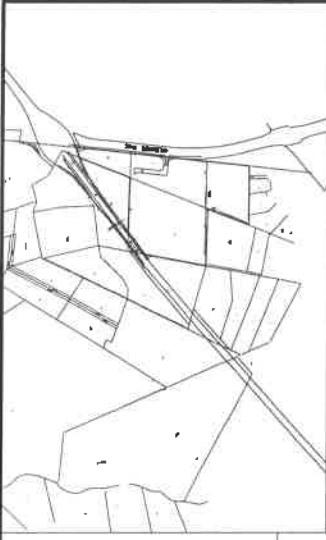
SCALE	DATE	DRAWN	REV. NO.	RES. NO.
NTS	OCT/2021	MAP TECH	0	R1797-1416

# DRAWING

SOIL MAP

IR1737.1





LION PRIDE

TEST PIT POSITIONS AND SOIL MAP (NHBRG) (AT NATURAL GROUND GRADIENTS)

- DESCRIPTION
- SITE BOUNDARY
- GROUND CONTOURS
- TEST PIT POSITION AND NUMBER
- PRELIMINARY SOIL SITE CLASS

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SCALE	DATE	DRAWN	REVISED	RECORD
1:750	OCT2001	MAPTECH	0	IR1737.1

# TABLES

SUMMARIES OF REFUSAL AND GROUNDWATER  
DETAILS FROM TRIAL HOLES

TABLE 1

SUMMARIES OF LABORATORY TEST RESULTS

TABLE 2

TABLE 1:

## SUMMARY OF REFUSAL AND GROUNDWATER AND DETAILS FROM TRAIL HOLES

IR:1737.1

Test Pit No	Depth (m)	Depth of Groundwater Perched/Seepage (m)	Depth to the base of (m)		Hard rock Excavation from (m)	Boulder Encountered in Profile	Material at base of Test Pit
			Soft Excavation	Intermediate Excavation			
TP1	2.1		2.1	>2.1			SOFT ROCK GRANITE
TP2	1.4		1.4	>1.4			SOFT ROCK GRANITE
TP3	2.3		2.3	>2.3			SOFT ROCK GRANITE
TP4	1.7		1.7	>1.7			SOFT ROCK GRANITE
TP5	2.8		2.8	>2.8			SOFT ROCK GRANITE
TP6	0.4		0.4	>0.4			SOFT ROCK GRANITE
TP7	0.7		0.7	>0.7			SOFT ROCK GRANITE
TP8	2.4		2.4	>2.4			SOFT ROCK GRANITE
TP9	0.9		0.9	>0.9			SOFT ROCK GRANITE
TP10	1.6		1.6	>1.6			SOFT ROCK GRANITE
TP11	2.7		2.7	>2.7			SOFT ROCK GRANITE
TP12	2.0		2.0	>2.0			SOFT ROCK GRANITE
TP13	1.6		1.6	>1.6			SOFT ROCK GRANITE
TP14	1.5		1.5	>1.5			SOFT ROCK GRANITE
TP15	2.1		2.1	>2.1			SOFT ROCK GRANITE
TP16	0.2		0.2	>0.2			SOFT ROCK GRANITE
TP17	2.8		2.8	>2.8			HONEYCOMB FERRICRETE
TP18	2.8		2.8	>2.8			SOFT ROCK GRANITE
TP19	1.4		1.4	>1.4			SOFT ROCK GRANITE
TP20	3.0		3.0	>3.0			SOFT ROCK GRANITE

PROJECT NO.: Lion Pride

JOB NO.: IR 1737.1

TABLE 2 : SUMMARIES OF LABORATORY TEST RESULTS (DISTURBED/UNDISTURBED SAMPLES)

TH No	Depth (m)	Soil Unit	LL	PI (-425)	LS (%)	GM	75 (%)	PI <sub>w</sub>	LL <sub>w</sub>	425 (%)	002 (%)	pH	Reading (µS/cm)	Cond. (S/m)	Resistivity (Ohm.m)	PRA	UCS
TP04	0.0-0.4	Colluvium	29	15	6	1.24	29	9	17	58	9	6.5	50	0.0050	200	A-2-6(1)	SC
TP17	0.0-1.0	Colluvium	34	17	7.5	1.25	30	9	18	54	12	7.3	90	0.0090	111.111	A-2-6(1)	SC
TP04	0.4-0.65	Pebble Marker	37	20	9	1.82	24	8	14	38	11	6.6	40	0.0040	250	A-2-6(1)	SC
TP11	0.0-0.8	Pebble Marker	22	8	2.5	2.45	8	1	4	17	2					A-2-4(0)	GP-GC
TP17	1.0-1.4	Pebble Marker	48	23	10	1.29	44	12	26	54	24	7.2	130	0.0130	76.923	A-7-6(6)	SC
TP19	0.0-0.3	Pebble Marker	47	23	10	1.67	30	10	20	42	13					A-2-7(2)	SC
TP04	0.9-1.7	Residual Granite	37	13	6	1.51	30	6	16	43	10	6.5	30	0.0030	333.333	A-2-6(1)	SC
TP05	0.4-2.8	Residual Granite	34	12	5.5	1.12	35	7	19	57	8					A-2-6(0)	SC
TP08	0.5-1.0	Residual Granite	32	13	5.5	1.65	29	5	13	42	10					A-2-6(0)	SC
TP08	1.0-2.4	Residual Granite	43	22	9.5	0.85	52	15	29	67	21					A-7-6(8)	CL
TP11	0.8-1.5	Residual Granite	26	11	5.5	1.63	30	5	11	41	6					A-2-6(0)	SC
TP11	1.5-2.7	Residual Granite	52	25	10.5	1.67	32	10	20	39	6					A-2-7(3)	SC
TP17	1.4-2.2	Residual Granite	42	19	9	0.93	49	13	28	66	19	7.4	150	0.0150	66.667	A-7-6(6)	SC
TP19	0.3-1.1	Residual Granite	45	23	10	1.16	44	13	26	58	18					A-7-6(5)	SC

**KEY**

LL : Liquid limit

PI(-425) : Plasticity Index of sample fine portion

LS : Linear Shrinkage

425 (%) : Percentage passing 425

USC : Unified Soil Classification

LL<sub>w</sub> : Liquid Limit of whole sample (LL x passing 425)

002 (%) : Percentage passing 2µ.m

SP : Slightly Plastic

GM : Grading Modulus

PI<sub>w</sub> : Plasticity Index of whole sample (PI x passing 425)

NMC : Natural moisture content

PRA : Public Roads Administration Classification

Resistivity : Ohm.m

Cond. : Conductivity Sm

D85/D15 : Ratio of particle diameter corresponding to 85% and 15%

NP : None Plastic



Lion Pride

JOB NO.: IR1737.1

TABLE 2 : SUMMARIES OF LABORATORY TEST RESULTS (DISTURBED/UNDISTURBED SAMPLES)

TP No	Depth (m)	Soil Unit	ORC	e <sub>0</sub>	W <sub>i</sub> (%)	W <sub>f</sub> (%)	P <sub>d</sub> (kg/m <sup>3</sup> )	G <sub>s</sub>	P <sub>b</sub> (kg/m <sup>3</sup> )	S <sub>i</sub>	S <sub>f</sub>	CP <sub>200</sub>	C <sub>r</sub>	CP <sub>200</sub> Classification
TP05	1.5	Colluvium		0.67	14.1	19.4	1587	2.650		56	102	5.01		Trouble
TP17	0.8	Colluvium		0.614	11.3	19.5	1642	2.650		49	95	1.38		Moderate Trouble
TP19	0.9	Residual Granite		0.898	12.1	24	1396	2.650		36	101	8.07		Trouble

**KEY**

ORC : Estimated Overconsolidation Pressure (kPa)

e<sub>0</sub> : Initial Void Ratio

W<sub>i</sub> (%) : Initial Moisture Content

W<sub>f</sub> (%) : Final Moisture Content

S<sub>i</sub> : Initial Degree of Saturation

S<sub>f</sub> : Final Degree of Saturation

P<sub>d</sub> (kg/m<sup>3</sup>)

P<sub>b</sub> (kg/m<sup>3</sup>)

G<sub>s</sub>

P<sub>c</sub>

CP<sub>200</sub>

C<sub>r</sub>

: Initial Dry Density

: Bulk Density

: Specific Gravity (relative density)

: Estimated Preconsolidation Pressure

: % Collapse Potential @ 200kPa Applied Load

: Recompression Index

# APPENDICES

TRIAL HOLE PROFILES

APPENDIX 1

LABORATORY TEST RESULTS

APPENDIX 2

**APPENDIX 1**  
**TRIAL HOLE PROFILES**

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP01

Sheet 1 of 1

Job Number IR1737.1

Scale	.°°.°°. .°°.°°. .°°.°°.	0.0-0.3m: Orange brown and white abundant (60%) sub-rounded quartzite and granites GRAVELS loosely packed in a silty sand matrix, Overall consistency is medium dense; PEBBLE MARKER.
0.5	+++ +++ +++ +++ +++ +++	0.3-2.1m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++ +++ +++ +++	
1.5	+++ +++ +++ +++ +++ +++	
2.0	+++ +++ +++ +++ +++ +++	
	+++	+2.1 m: Refusal on soft rock GRANITE.
2.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875565

Y-COORD: 092563

Hole No. TP01

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP02

Sheet 1 of 1

Job Number IR1737.1

Scale	//////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	////// °.°°	0.2-0.4m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
	+++ +++ +++ +++	0.4-0.8m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
	+++ +++ +++ +++ +++	0.8-1.4m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0		
1.5	+++	+1.4m: Refusal on soft rock GRANITE
2.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
2.5		
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875762

Y-COORD: 092521

Hole No. TP02

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP03

Sheet 1 of 1

Job Number IR1737.1

Scale	////// //////	0.0-0.2m: Slightly moist light brown medium DENSE slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.° +++ +++ +++ +++	0.2-0.4m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER. 0.4-0.8m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++ +++ +++ +++ +++	0.8-2.3m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++ +++ +++ +++ +++ +++	
2.0	+++ +++ +++ +++ +++ +++ +++ +++	
2.5	+++	+2.3m: Refusal on soft rock GRANITE
3.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875945

Y-COORD: 092512

Hole No. TP03

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP04

Sheet 1 of 1

Job Number IR1737.1

Scale		0.0-0.4m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	 	0.4-0.65m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
1.0	 	0.65-0.9m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	 	0.9-1.7m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
2.0		+1.7m: Refusal on soft rock GRANITE
2.5		<b>Notes:</b> No samples taken between 0m to 0.4m, 0.4m to 0.65m and 0.9m to 1.7m Stable sidewalls No groundwater intercepted
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876175

Y-COORD: 092502

Hole No. TP04

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP05

Sheet 1 of 1

Job Number IR1737.1

Scale	////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
	////	
0.5	.°°.°° .°°.°°	0.2-0.4m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
	+++	
	+++	
	+++	
	+++	0.4-2.8m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++	
	+++	
	+++	
	+++	
1.5	+++	
	+++	
	+++	
	+++	
	+++	
2.0	+++	
	+++	
	+++	
	+++	
2.5	+++	
	+++	
	+++	
	+++	
3.0		+2.8m: Refusal on soft rock GRANITE
3.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876347

Y-COORD: 092483

Hole No. TP05



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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP06

Sheet 1 of 1

Job Number IR1737.1

Scale

	////	0.0-0.1m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
	+++	0.1-0.4m: Light brownish grey highly weathered very soft rock GRANITE.
0.5		+0.4m: Refusal on soft rock GRANITE
1.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876491

Y-COORD: 092470

Hole No. TP06

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP07

Sheet 1 of 1

Job Number IR1737.1

Scale

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

/////  
/////  
/////  
/////  
/////

+++

0.0-0.5m: Slightly moist light brown medium dense slight  
pinhole silty SAND with few roots; COLLUVIUM.

+0.5m: Refusal on soft rock GRANITE

**Notes:**

No samples taken

Stable sidewalls

No groundwater intercepted

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876485

Y-COORD: 092333

Hole No. TP07

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP08

Sheet 1 of 1

Job Number IR1737.1

Scale	////// //////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.° .°.°.°	0.2-0.5m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
1.0	+++ +++ +++ +++ +++	0.5-1.0m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++ +++ +++ +++ +++ +++ +++	1.0-2.4m: Moist light grey mottled orange firm sandy CLAY; RESIDUAL GRANITE.
2.0	+++ +++ +++ +++ +++ +++ +++ +++ +++	
2.5	+++	+2.4m: Refusal on soft rock GRANITE
3.0		<b>Notes:</b> No samples taken between 0.5m to 1.0m, 1.0m to 2.4m Stable sidewalls No groundwater intercepted
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876348

Y-COORD: 092363

Hole No. TP08

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP09

Sheet 1 of 1

Job Number IR1737.1

	////// //////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.° .°.°.°	0.2-0.5m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
	+++ +++ +++ +++	0.5-0.9m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++	+0.9m: Refusal on soft rock GRANITE
1.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
2.0		
2.5		
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876213

Y-COORD: 092358

Hole No. TP09

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP10

Sheet 1 of 1

Job Number IR1737.1

Scale	//// //// ////	0.0-0.3m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.°	0.3-0.5m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
	+++ +++ +++	0.5-0.8m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++ +++ +++ +++ +++	0.8-1.6m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++	
2.0	+++	+1.6m: Refusal on soft rock GRANITE
2.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876068

Y-COORD: 092358

Hole No. TP10

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP11

Sheet 1 of 1

Job Number IR1737.1

Scale

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0



0.0-0.8m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.

0.8-1.5m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.

1.5-2.7m: Brown grey abundant (50%) GNEISSIC GRANITE gravels densely packed in a sandy silt matrix, overall consistency is dense; RESIDUAL GNEISSIC GRANITE.

+2.7m: Refusal on soft rock GRANITE

**Notes:**

*Small bag samples taken between 0m to 0.8m to 1.5m and 1.5m to 2.7m*

Stable sidewalls

No groundwater intercepted

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875895

Y-COORD: 092366

Hole No. TP11

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP12

Sheet 1 of 1

Job Number IR1737.1

Scale	//// ////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	+++ +++ +++ +++ +++ +++ +++	0.2-0.9m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++ +++ +++ +++ +++	0.9-2.0m: Moist light grey mottled orange firm sandy CLAY; RESIDUAL GRANITE.
1.5	+++ +++ +++ +++ +++ +++ +++	
2.0	+++ +++ +++ +++ +++ +++ +++	
2.5	+++	+2.0m: Refusal on soft rock GRANITE
3.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875829

Y-COORD: 092198

Hole No. TP12

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP13

Sheet 1 of 1

Job Number IR1737.1

Scale	////// //////	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.° .°.°.°	0.2-0.5: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
1.0	+++ +++ +++ +++ +++ +++ +++ +++ +++ +++ +++	0.5-1.6m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++	
2.0	+++	+1.6m: Refusal on soft rock GRANITE
2.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876039

Y-COORD: 092201

Hole No. TP13



**INTRACONSULT**

Consulting Engineers &amp; Geologists

Tel : (011) 469-0854

Fax : (011) 460-0961

**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP14

Sheet 1 of 1

Job Number IR1737.1

Scale	////// ////// ////// ////// //////	0.0-0.5m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	.°.°.° .°.°.° .°.°.°	0.5-0.8m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
1.0	+++ +++ +++ +++ +++ +++	0.8-1.5m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++	+1.5m: Refusal on soft rock GRANITE
2.0		
2.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876230

Y-COORD: 0921621

Hole No. TP14

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP15

Sheet 1 of 1

Job Number IR1737.1

Scale	//// //// ////	0.0-0.3m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
0.5	°.°.° °.°.° °.°.° °.°.°	0.3-0.7m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
1.0	+++ +++ +++ +++ +++	0.7-1.3m: Moist light grey mottled orange firm sandy CLAY; RESIDUAL GRANITE.
1.5	+++ +++ +++ +++ +++	1.3-2.1m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
2.0	+++ +++ +++	
2.5	+++	+2.1m: Refusal on soft rock GRANITE
3.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876350

Y-COORD: 092236

Hole No. TP15

**INTRACONSULT**

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP16

Sheet 1 of 1

Job Number IR1737.1

Scale

.°°.°°  
.°°.°°  
.°°.°°

0.0-0.2m: Orange brown and white abundant (60%) sub-  
rounded quartzite and granite GRAVELS loosely packed in a  
silty sand matrix, overall consistency is medium  
dense; PEBBLE MARKER.

0.5

+++

+0.2m: Refusal on soft rock GRANITE

1.0

**Notes:**

No samples taken

Stable sidewalls

No groundwater intercepted

1.5

2.0

2.5

3.0

3.5

4.0

Contractor:

Machine: JCB3CX

Drilled by:

Profilled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876498

Y-COORD: 092181

Hole No. TP16

**INTRACONSULT**

Consulting Engineers &amp; Geologists

Tel : (011) 469-0854




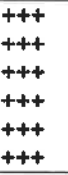

Fax : (011) 460-0961

**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP17

Sheet 1 of 1

Job Number IR1737.1

		0.0-1.0m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
1.5		1.0-1.4m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
2.0		1.4-2.2m: Slightly MOIST light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
2.5		2.2-2.8m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
3.0		+2.8m: Refusal on soft rock GRANITE
3.5		<b>Notes:</b> Small bag samples taken between 0m to 1.0m, 1.0m to 1.4m, 1.4m to 2.2m and undisturbed sample taken at 0.8m Stable sidewalls No groundwater intercepted
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD:2876224

Y-COORD: 091952

Hole No. TP17

**INTRACONSULT**

Consulting Engineers & Geologists  
 Tel : (011) 469-0854  
 Fax : (011) 460-0961

**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP18
Sheet 1 of 1
Job Number IR1737.1

Scale	///\	0.0-0.2m: Slightly moist light brown medium dense slight pinhole silty SAND with few roots; COLLUVIUM.
	///\	0.2-0.3m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
0.5	+++	0.3-2.8m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
	+++	
	+++	
1.0	+++	
	+++	
	+++	
	+++	
	+++	
	+++	
1.5	+++	
	+++	
	+++	
	+++	
	+++	
	+++	
2.0	+++	
	+++	
	+++	
	+++	
	+++	
	+++	
2.5	+++	
	+++	
	+++	
	+++	
	+++	
	+++	
3.0	+++	+2.8m: Refusal on soft rock GRANITE
3.5		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted
4.0		

Contractor: JCB3CX  
 Machine:  
 Drilled by:  
 Profiled by: J Meintjes  
 Type set by  
 Setup file:  
 Date: 30 09 2021

Elevation:  
 X-COORD: 2876130  
 Y-COORD: 092085

Hole No. TP18
---------------

**INTRACONSULT**

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**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP19

Sheet 1 of 1

Job Number IR1737.1

Scale

	.°°.°° .°°.°° .°°.°°	0.0-0.3m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
0.5	+++ +++ +++ +++ +++ +++ +++	0.3-1.1m: Slightly MOIST light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++	1.1-1.4m: Light orange mottled white and black very soft rock GRANITE.
1.5	+++	+1.4m: Refusal on soft rock GRANITE
2.0		<b>Notes:</b> Small bag samples taken between 0m to 0.3m, 0.3m to 1.1m, and undisturbed sample taken at 0.9m Stable sidewalls No groundwater intercepted
2.5		
3.0		
3.5		
4.0		

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2875925

Y-COORD: 092082

Hole No. TP19

**INTRACONSULT**

Consulting Engineers &amp; Geologists

Tel : (011) 469-0854


Fax : (011) 460-0961

**LANSERIA LION PRIDE EXTENSIONS**

Hole No: TP20

Sheet 1 of 1

Job Number IR1737.1

Scale		0.0-0.3m: Orange brown and white abundant (60%) sub-rounded quartzite and granite GRAVELS loosely packed in a silty sand matrix, overall consistency is medium dense; PEBBLE MARKER.
0.5	+++ +++ +++ +++ +++	0.3-0.9m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.0	+++ +++ +++ +++ +++	0.9-1.9m: Slightly moist light brown mottled orange brown medium dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
1.5	+++ +++ +++ +++ +++	
2.0	+++ +++ +++ +++ +++	1.9-3.0m: Slightly moist light brown mottled orange brown dense silty SAND with 20% highly weathered granite gravels; RESIDUAL GRANITE.
2.5	+++ +++ +++ +++ +++	
3.0	+++ +++	
3.5	+++	+3.0m: Refusal on soft rock GRANITE
4.0		<b>Notes:</b> No samples taken Stable sidewalls No groundwater intercepted

Contractor:

Machine: JCB3CX

Drilled by:

Profiled by: J Meintjes

Type set by:

Setup file:

Date: 30 09 2021

Elevation:

X-COORD: 2876020

Y-COORD: 091968

Hole No. TP20

**APPENDIX 2**  
**LABORATORY TEST RESULTS**



Client : INTRACONSULT CC  
 Address : P O BOX 604  
 : FOURWAYS  
 : 2055

Client Reference :  
 Order No. : IR1737.1

Attention :  
 Facsimile : 011 469 0961  
 E-mail : intrac@mweb.co.za

Date Received : 05/10/2021  
 Date Tested : 05/10/2021-26/10/2021  
 Date Reported : 28/10/2021

Project : Lion Pride  
 Project No. : 2021-B-1261

Report Status : Final  
 Page : 1 of 9

Herewith please find the test report(s) pertaining to the above project. All tests were conducted in accordance with prescribed test method(s). Information herein consists of the following:

Test(s) conducted / Item(s) measured	Qty.	Test Method(s)	Authorized By**	Page(s)
Sieve Analysis 0.075mm	14,000	SANS 3001 GR1	B Mvubu	2-8
Hydrometer Analysis	14,000	SANS 3001 GR3	S Pullen/ B Mvubu	2-8
Atterberg Limits <0.425mm	14,000	SANS 3001 GR10	B Mvubu	2-8
pH of Soil *	6,000	TMH1:A20	S Pullen	9
Conductivity of Saturated Soil Paste *	6,000	TMH1:A21T	S Pullen	9
Oedometer: Collapse Potential	3,000	BS 1377 Part 5	J Marques	3 Files; 9 Pages

Any test results contained in this report and marked with \* in the table above are "not SANAS accredited" and are not included in the schedule of accreditation for this laboratory.

Any information contained in this test report pertain only to the areas and/or samples tested. Documents may only be reproduced or published in their full context.

While every care is taken to ensure that all tests are carried out in accordance with recognised standards, neither Civilab (Proprietary) Limited nor its employees shall be liable in any way whatsoever for any error made in the execution or reporting of tests or any erroneous conclusions drawn therefrom or for any consequences thereof.

All interpretations, Interpolations, Opinions and/or Classifications contained in this report falls outside our scope of accreditation.

The following parameters, where applicable, were excluded from the classification procedure: Chemical modifications, Additional fines, Fractured Faces, Soluble Salts, pH, Conductivity, Coarse Sand Ratio, Durability (COLTO: G4-G9).

The following parameters, where applicable, were assumed: Rock types were assumed to be of an Arenaceous nature with Siliceous cementing material.

Unless otherwise requested or stated, all samples will be discarded after a period of 3 months.

This report is completely confidential between the parties (Civilab and Civilab's client) and shall not be disclosed to anybody else, unless agreed upon in writing or made publicly available by the client or required to make available by law.

Deviations in Test Methods: \_\_\_\_\_

Technical Signatory:	B Mvubu
Signature:	

\*\*All results are authorized electronically by approved managers and/or technical signatories.

**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	7/10/2021
Project No.	2021-B-1261	Laboratory Number:	S-21-5024
Field Sample Reference	TP17	Depth (m):	0,8

Test No.	1	
Test Type	Collapse Potential	
Remarks	Collapse Potential: 1.38%	

**Specimen-, Preparation- & Test Conditions**

Specimen Type	Undisturbed
Moulding Dry Density	
Moulding Moisture	
Testing Moisture	Soaked @ 200kPa

**Equipment Detail**

Machiene No.	OED1	
Ring	No.	11
	Mass (g)	90,3
	Height (mm)	19,53
	Diameter (mm)	76,34

**Specimen Parameters**

Stage	Initial	Final (Unloaded)	Initial	Final (Unloaded)
Relative density (S.G.)	2,650			
Moisture Content (%)	11,3	19,5		
Dry Density (kg/m <sup>3</sup> )	1642	1717		
Void Ratio, e	0,614	0,543		
Degree of Saturation (%)	49	95		

**Test Data**

Test 1										
Cycle	No.	1	2	3	4	5	6	7	8	
Total time	min	1308	4416	1665	1369	1129	466,6	948,6	4369	
Stress	kPa	10	50	100	200	200	400	100	10	
Strain	%	0,13	1,12	1,64	2,19	3,57	6,32	5,76	4,39	
Void Ratio	e	0,612	0,596	0,587	0,579	0,556	0,512	0,521	0,543	
Mv (1/MPa)		0,000	0,247	0,103	0,055		0,138	0,019	0,152	
t90	min									
Cv	m <sup>2</sup> /year									

Test 2										
Cycle	No.									
Total time	min									
Stress	kPa									
Strain	%									
Void Ratio	e									
Mv (1/MPa)										
t90	min									
Cv	m <sup>2</sup> /year									

The t90 values reported, if any, which are used to calculate the coefficient of consolidation at different loads are selected by the operator conducting the test and checked by the appropriate technical signatories. They may however not reflect an engineer's interpretation of the time settlement graphs and are by no means final.

**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested	7/10/2021
Project No.	2021-B-1261	Laboratory Number	S-21-5024
Field Sample Reference	TP17	Depth (m)	0,8

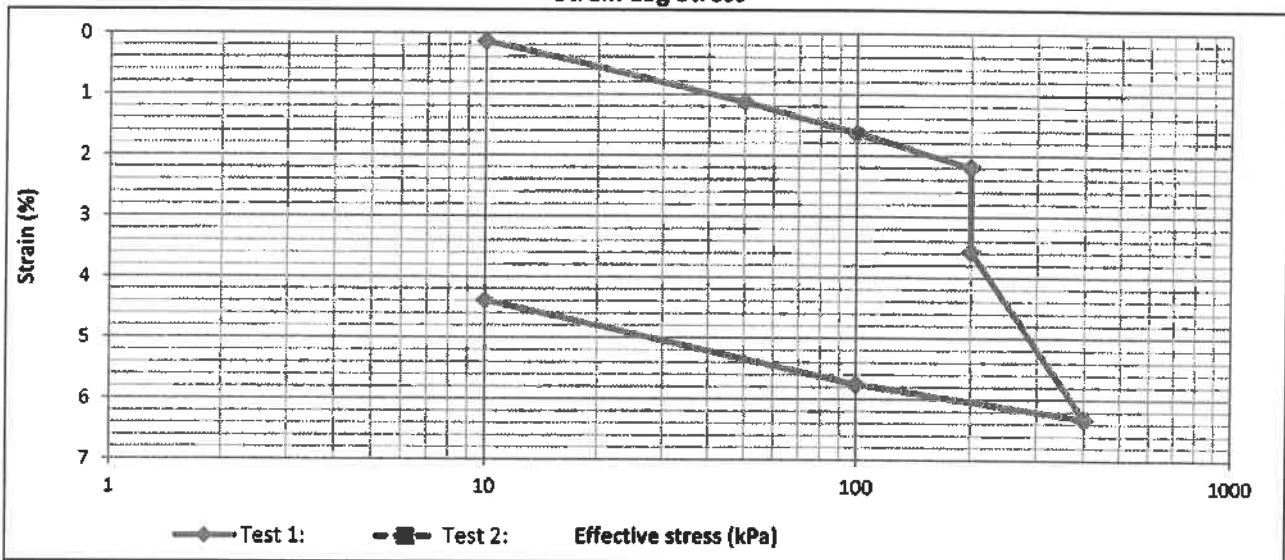
**Test 1: Specimen: Undisturbed , Testing Moisture: Soaked @ 200kPa**

Cycle	1	2	3	4	5	6	7	8
Stress (kPa)	10	50	100	200	200	400	100	10
Strain (%)	0,13	1,12	1,64	2,19	3,57	6,32	5,76	4,39
Void Ratio, e	0,612	0,596	0,587	0,579	0,556	0,512	0,521	0,543

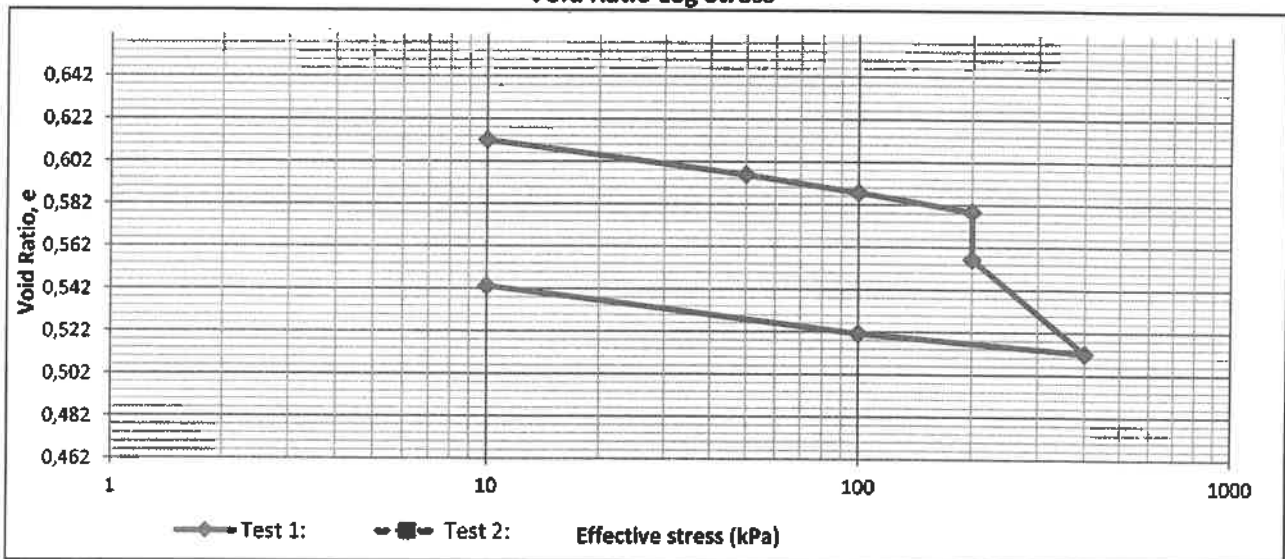
**Test 2:**

Cycle	1	2	3	4	5	6	7	8
Stress (kPa)								
Strain (%)								
Void Ratio, e								

**Strain Log Stress**



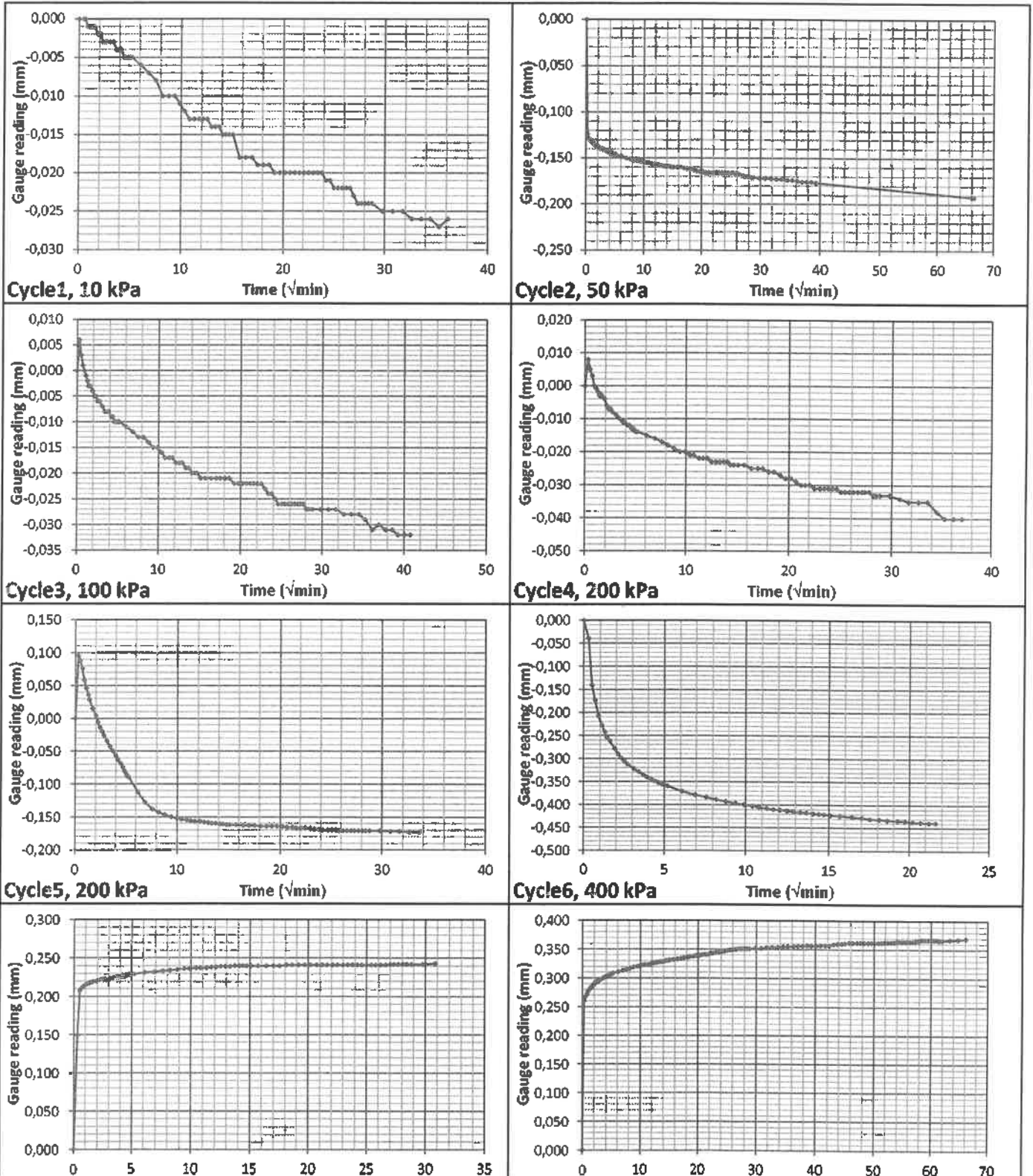
**Void Ratio Log Stress**



**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	7/10/2021
Project No.	2021-8-1261	Laboratory Number:	S-21-5024
Field Sample Reference	TP17	Depth (m):	0,8

**Test 1 - Consolidation vs Square Root Time**



**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	06/10/2021
Project No.	2021-B-1261	Laboratory Number:	S-21-5015
Field Sample Reference	TP05	Depth (m):	1,5

Test No.	1	
Test Type	Collapse Potential	
Remarks	Collapse Potential: 5.01%	

**Specimen-, Preparation- & Test Conditions**

Specimen Type	Undisturbed	
Moulding Dry Density		
Moulding Moisture		
Testing Moisture	Soaked @ 200kPa	

**Equipment Detail**

Machiene No.	OED18	
Ring	No.	P4
	Mass (g)	81,2
	Height (mm)	18,85
	Diameter (mm)	69,90

**Specimen Parameters**

Stage	Initial	Final (Unloaded)	Initial	Final (Unloaded)
Relative density (S.G.)	2,650			
Moisture Content (%)	14,1	19,4		
Dry Density (kg/m <sup>3</sup> )	1587	1761		
Void Ratio, e	0,670	0,505		
Degree of Saturation (%)	56	102		

**Test Data**

Test 1										
Cycle	No.	1	2	3	4	5	6	7	8	
Total time	min	6849	1607	1369	1608	948,6	4186	1429	207,4	
Stress	kPa	10	51	100	198	198	398	100	10	
Strain	%	2,04	2,75	3,10	3,70	8,71	11,79	11,34	9,87	
Void Ratio	e	0,636	0,624	0,618	0,608	0,524	0,473	0,480	0,505	
Mv (1/MPa)		0,000	0,173	0,071	0,061		0,154	0,015	0,163	
t90	min									
Cv	m <sup>2</sup> /year									

Test 2										
Cycle	No.									
Total time	min									
Stress	kPa									
Strain	%									
Void Ratio	e									
Mv (1/MPa)										
t90	min									
Cv	m <sup>2</sup> /year									

The t90 values reported, if any, which are used to calculate the coefficient of consolidation at different loads are selected by the operator conducting the test and checked by the appropriate technical signatories. They may however not reflect an engineer's interpretation of the time settlement graphs and are by no means final.

**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested	06/10/2021
Project No.	2021-B-1261	Laboratory Number	S-21-5015
Field Sample Reference	TP05	Depth (m)	1,5

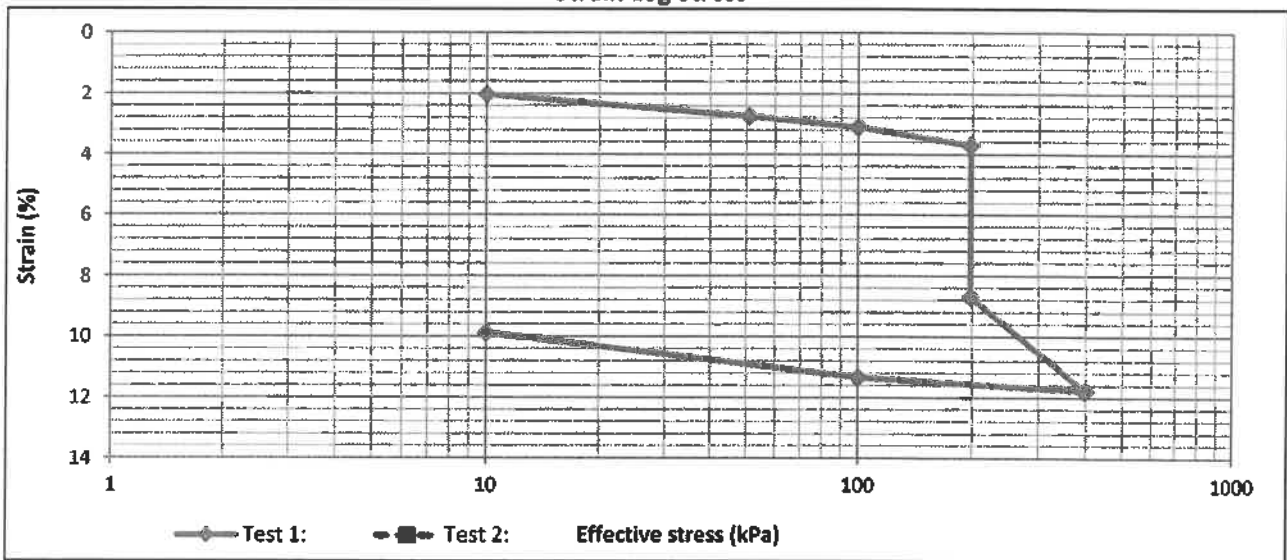
**Test 1: Specimen: Undisturbed , Testing Moisture: Soaked @ 200kPa**

Cycle	1	2	3	4	5	6	7	8											
Stress (kPa)	10	51	100	198	198	398	100	10											
Strain (%)	2,04	2,75	3,10	3,70	8,71	11,79	11,34	9,87											
Void Ratio, e	0,636	0,624	0,618	0,608	0,524	0,473	0,480	0,505											

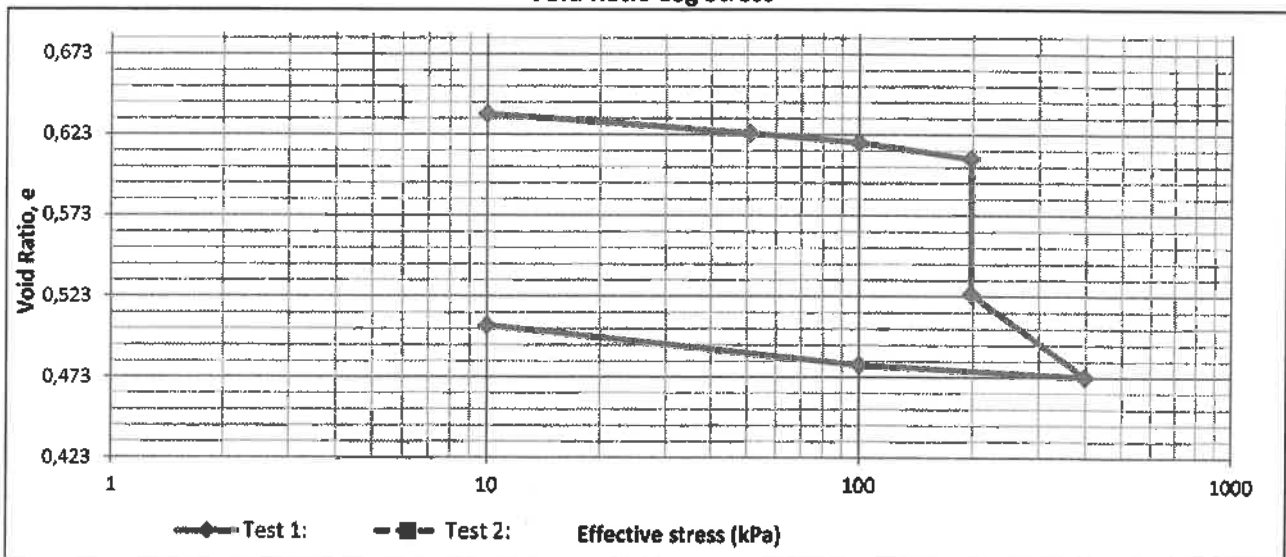
**Test 2:**

Cycle																			
Stress (kPa)																			
Strain (%)																			
Void Ratio, e																			

**Strain Log Stress**



**Void Ratio Log Stress**

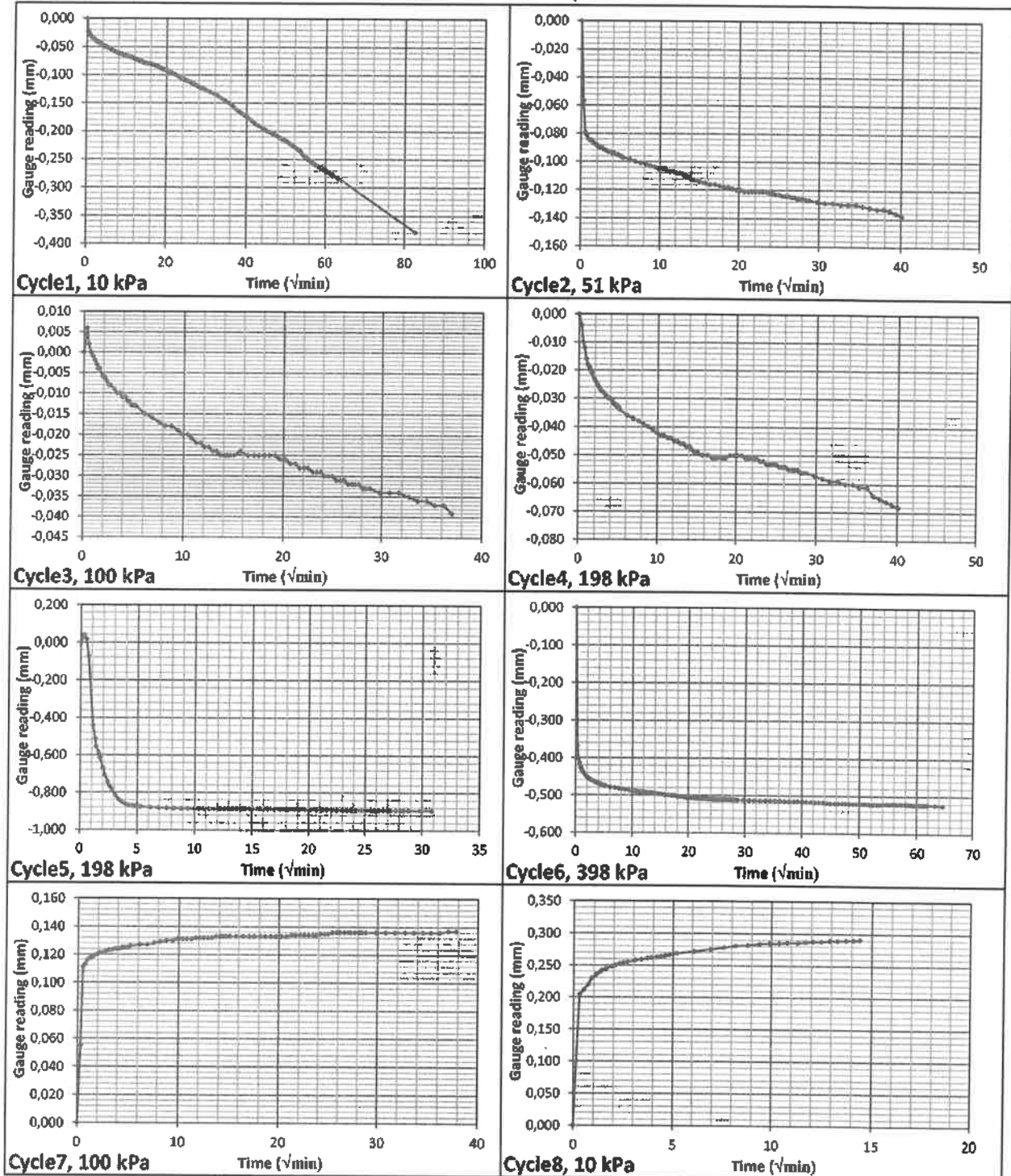




**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	06/10/2021
Project No.	2021-B-1261	Laboratory Number:	S-21-5015
Field Sample Reference	TP05	Depth (m):	1,5

**Test 1 - Consolidation vs Square Root Time**



**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	7/10/2021
Project No.	2021-B-1261	Laboratory Number:	S-21-5027
Field Sample Reference	TP19	Depth (m):	0,9

Test No.	1	
Test Type	Collapse Potential	
Remarks	Collapse Potential: 8.07%	

**Specimen-, Preparation- & Test Conditions**

Specimen Type	Undisturbed	
Moulding Dry Density		
Moulding Moisture		
Testing Moisture	Soaked @ 200kPa	

**Equipment Detail**

Machiene No.	OED14	
Ring	No.	0
	Mass (g)	84,4
	Height (mm)	18,83
	Diameter (mm)	69,83

**Specimen Parameters**

Stage	Initial	Final (Unloaded)	Initial	Final (Unloaded)
Relative density (S.G.)	2,650			
Moisture Content (%)	12,1	24,0		
Dry Density (kg/m <sup>3</sup> )	1396	1624		
Void Ratio, e	0,898	0,632		
Degree of Saturation (%)	36	101		

**Test Data**

Test 1										
Cycle	No.	1	2	3	4	5	6	7	8	
Total time	min	5424	1667	1369	1608	948,6	428,5	3832	1490	
Stress	kPa	10	50	102	202	202	402	102	10	
Strain	%	0,74	1,29	1,76	2,50	10,57	15,23	14,88	14,00	
Void Ratio	e	0,884	0,873	0,864	0,851	0,697	0,609	0,616	0,632	
Mv (1/MPa)		0,000	0,137	0,091	0,073		0,233	0,012	0,096	
t90	min									
Cv	m <sup>2</sup> /year									

Test 2										
Cycle	No.									
Total time	min									
Stress	kPa									
Strain	%									
Void Ratio	e									
Mv (1/MPa)										
t90	min									
Cv	m <sup>2</sup> /year									

The t90 values reported, if any, which are used to calculate the coefficient of consolidation at different loads are selected by the operator conducting the test and checked by the appropriate technical signatories. They may however not reflect an engineer's interpretation of the time settlement graphs and are by no means final.



**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested	7/10/2021
Project No.	2021-B-1261	Laboratory Number	S-21-5027
Field Sample Reference	TP19	Depth (m)	0,9

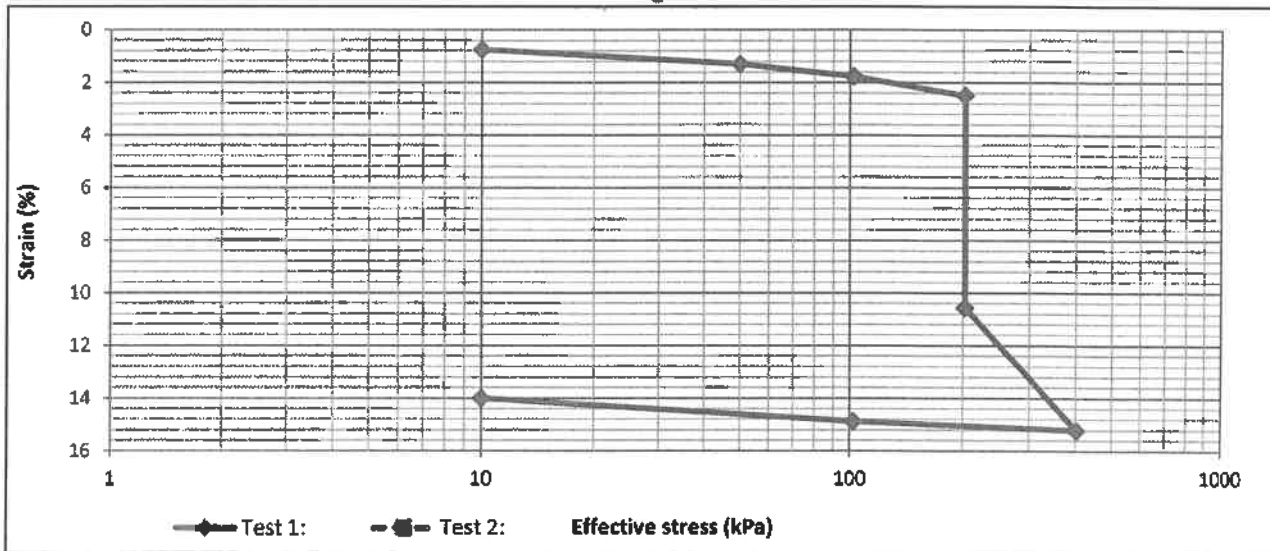
**Test 1: Specimen: Undisturbed , Testing Moisture: Soaked @ 200kPa**

Cycle	1	2	3	4	5	6	7	8											
Stress (kPa)	10	50	102	202	202	402	102	10											
Strain (%)	0,74	1,29	1,76	2,50	10,57	15,23	14,88	14,00											
Void Ratio, e	0,884	0,873	0,864	0,851	0,697	0,609	0,616	0,632											

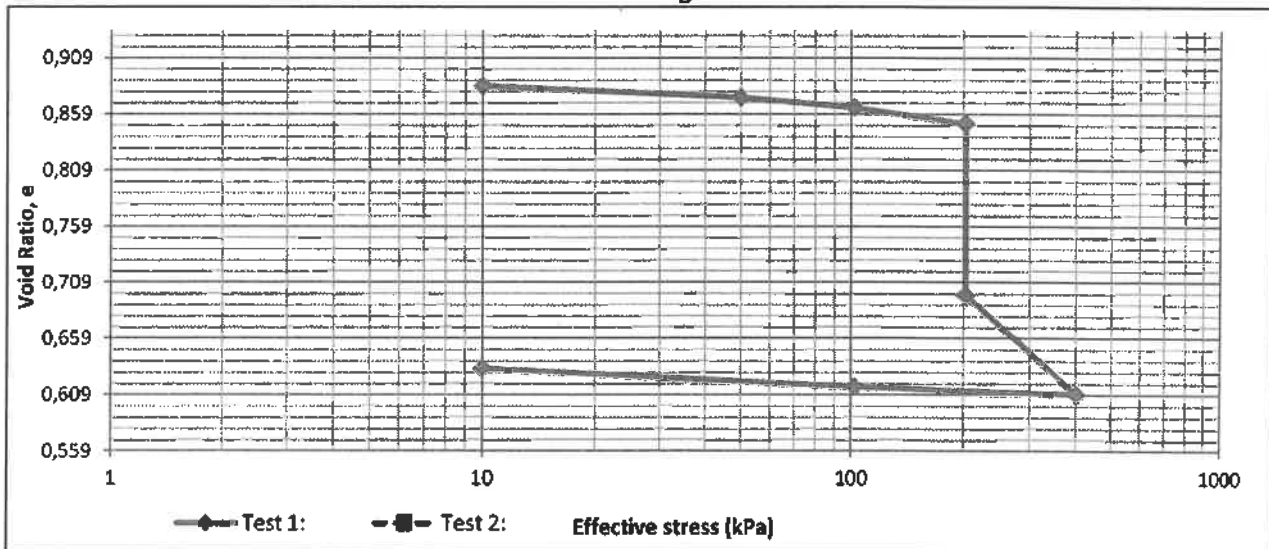
**Test 2:**

Cycle																			
Stress (kPa)																			
Strain (%)																			
Void Ratio, e																			

**Strain Log Stress**



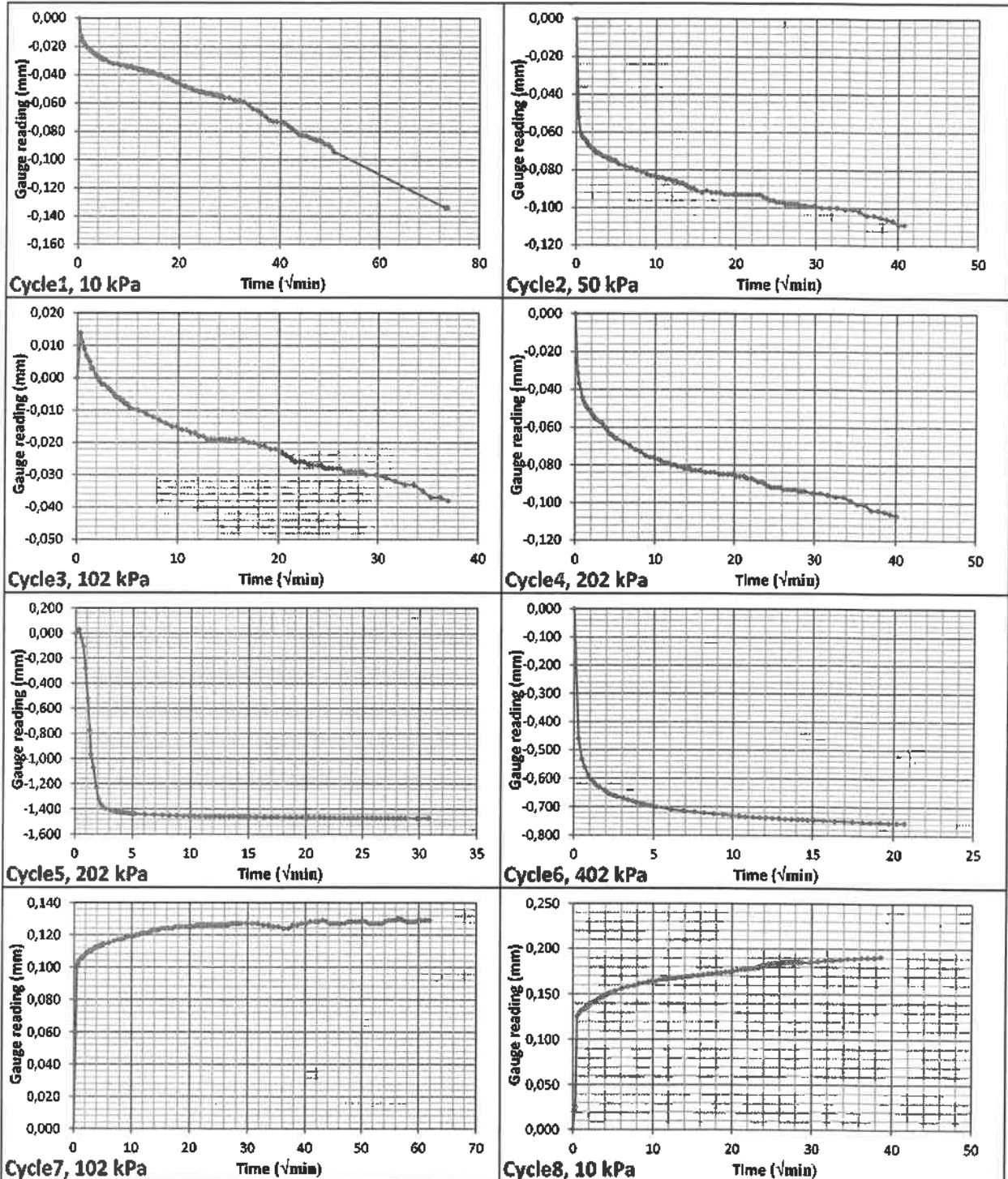
**Void Ratio Log Stress**



**CONSOLIDATION TEST RESULTS - BS 1377: Part 5**

Project	Lion Pride	Date Tested:	7/10/2021
Project No.	2021-B-1261	Laboratory Number:	S-21-5027
Field Sample Reference	TP19	Depth (m):	0,9

**Test 1 - Consolidation vs Square Root Time**



**Client** : INTRACONSULT CC  
**Address** : P O BOX 604  
 : FOURWAYS  
 : 2055

**Client Reference** :  
**Order No.** : IR1737.1

**Attention** :  
**Facsimile** : 011 469 0961  
**E-mail** : intrac@mweb.co.za

**Date Received** : 05/10/2021  
**Date Tested** : 05/10/2021-26/10/2021  
**Date Reported** : 28/10/2021

**Project** : Lion Pride  
**Project No.** : 2021-B-1261

**Report Status** : Final  
**Page** : 1 of 9

Herewith please find the test report(s) pertaining to the above project. All tests were conducted in accordance with prescribed test method(s). Information herein consists of the following:

Test(s) conducted / Item(s) measured	Qty.	Test Method(s)	Authorized By**	Page(s)
Sieve Analysis 0.075mm	14,000	SANS 3001 GR1	B Mvubu	2-8
Hydrometer Analysis	14,000	SANS 3001 GR3	S Pullen/ B Mvubu	2-8
Atterberg Limits <0.425mm	14,000	SANS 3001 GR10	B Mvubu	2-8
pH of Soil *	6,000	TMH1:A20	S Pullen	9
Conductivity of Saturated Soil Paste *	6,000	TMH1:A21T	S Pullen	9
Oedometer: Collapse Potential	3,000	BS 1377 Part 5	J Marques	3 Files; 9 Pages

Any test results contained in this report and marked with \* in the table above are "not SANAS accredited" and are not included in the schedule of accreditation for this laboratory.

Any information contained in this test report pertain only to the areas and/or samples tested. Documents may only be reproduced or published in their full context.

While every care is taken to ensure that all tests are carried out in accordance with recognised standards, neither Civilab (Proprietary) Limited nor its employess shall be liable in any way whatsoever for any error made in the execution or reporting of tests or any erroneous conclusions drawn therefrom or for any consequences thereof.

All interpretations, Interpolations, Opinions and/or Classifications contained in this report falls outside our scope of accreditation.

The following parameters, where applicable, were excluded from the classification procedure: Chemical modifications, Additional fines, Fractured Faces, Soluble Salts, pH, Conductivity, Coarse Sand Ratio, Durability (COLTO: G4-G9).

The following parameters, where applicable, were assumed: Rock types were assumed to be of an Arenaceous nature with Siliceous cementing material.

Unless otherwise requested or stated, all samples will be discarded after a period of 3 months.

This report is completely confidential between the parties (Civilab and Civilab's client) and shall not be disclosed to anybody else, unless agreed upon in writing or made publicly available by the client or required to make available by law.

Deviations in Test Methods:

Technical Signatory:	
Signature:	

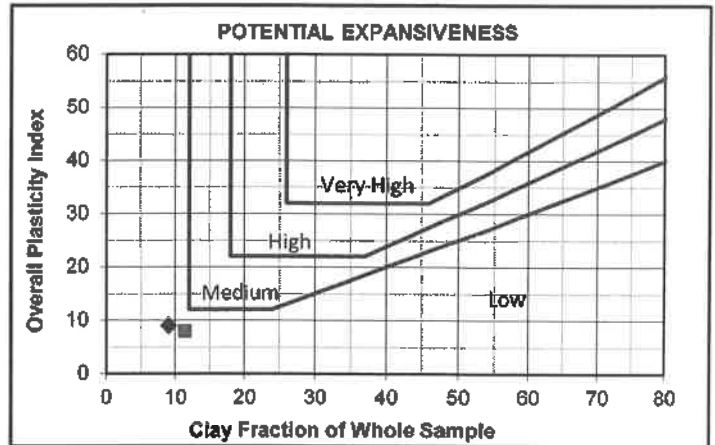
\*\*All results are authorized electronically by approved managers and/or technical signatories.

Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No : 2021-B-1261

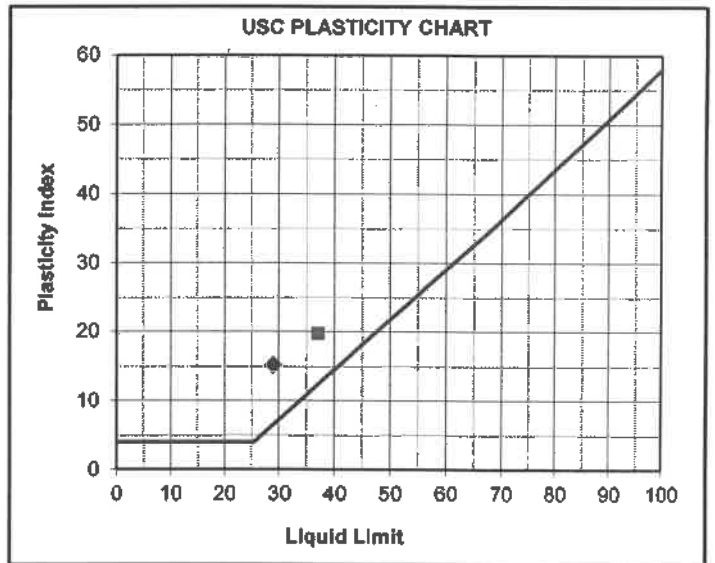
Date Received: 05/10/2021  
 Date Reported: 29/10/2021  
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**FOUNDATION INDICATOR**

Laboratory Number	S-5011 ◆	S-5012 ■
Field Number	TP04	TP04
Client Reference		
Depth (m)	0-0,4	0,4-0,65
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		



<b>Moisture Content &amp; Relative Density</b>		
Moisture Content (%)		
Relative Density (S.G.)		



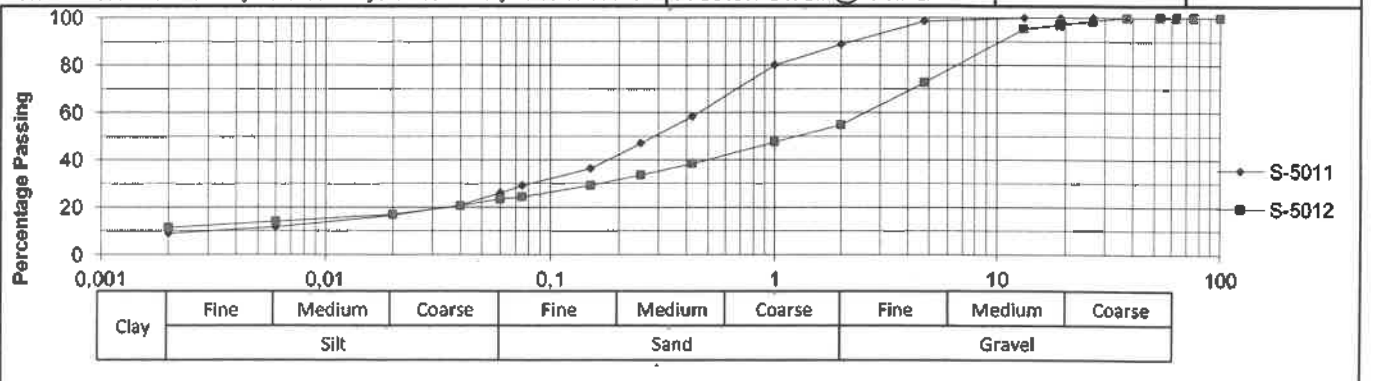
<b>Sieve Analysis (Wet Prep)</b>		
Percentage Passing		
100 mm	100	100
75 mm	100	100
63 mm	100	100
50 mm	100	100
37.5 mm	100	100
28 mm	100	99
20 mm	100	97
14 mm	100	96
5 mm	99	73
2 mm	89	55
1 mm	80	48
0.425 mm	58	38
0.250 mm	47	34
0.150 mm	36	29
0.075 mm	29	24
Grading Modulus	1,24	1,82

Laboratory Number	S-5011 ◆	S-5012 ■
<b>Atterberg Limits -425µ</b>		
Liquid Limit	% 29	37
Plasticity Index	% 15	20
Linear Shrinkage	% 6,0	9,0
Overall PI	% 9	8

<b>Hydrometer Analysis</b>		
Percentage Passing		
0.060 mm	26	23
0.040 mm	21	21
0.020 mm	17	17
0.006 mm	12	14
0.002 mm	9	11
Gravel	% 11	45
Sand	% 63	31
Silt	% 17	12
Clay	% 9	11

<b>Classifications</b>		
HRB (AASHTO)	A-2-6(1)	A-2-6(1)
Unified (ASTM D2487)	SC	SC
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations

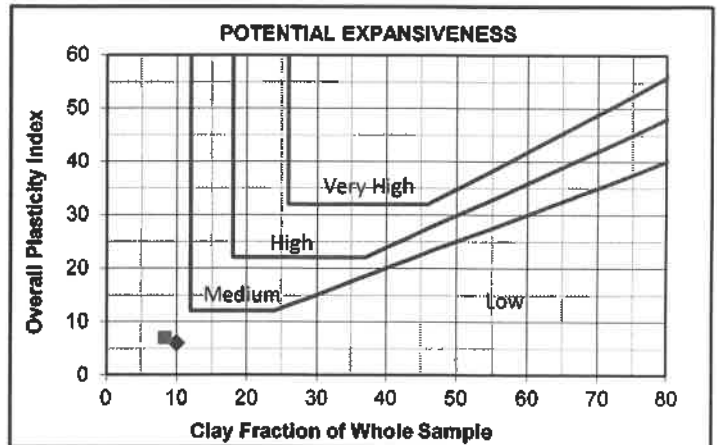


Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No : 2021-B-1261

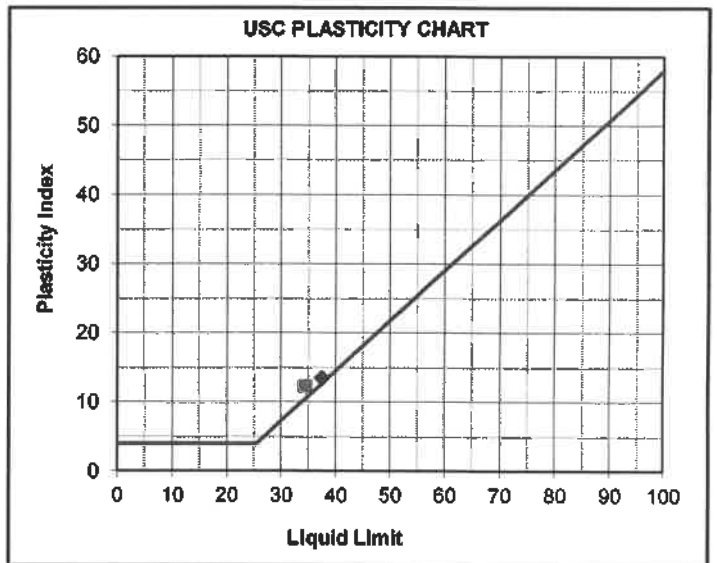
Date Received: 05/10/2021  
 Date Reported: 29/10/2021  
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**FOUNDATION INDICATOR**

Laboratory Number	S-5013 ◆	S-5014 ■
Field Number	TP04	TP05
Client Reference		
Depth (m)	0,9-1,7	0,4-2,8
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		



<b>Moisture Content &amp; Relative Density</b>		
Moisture Content (%)		
Relative Density (S.G.)		



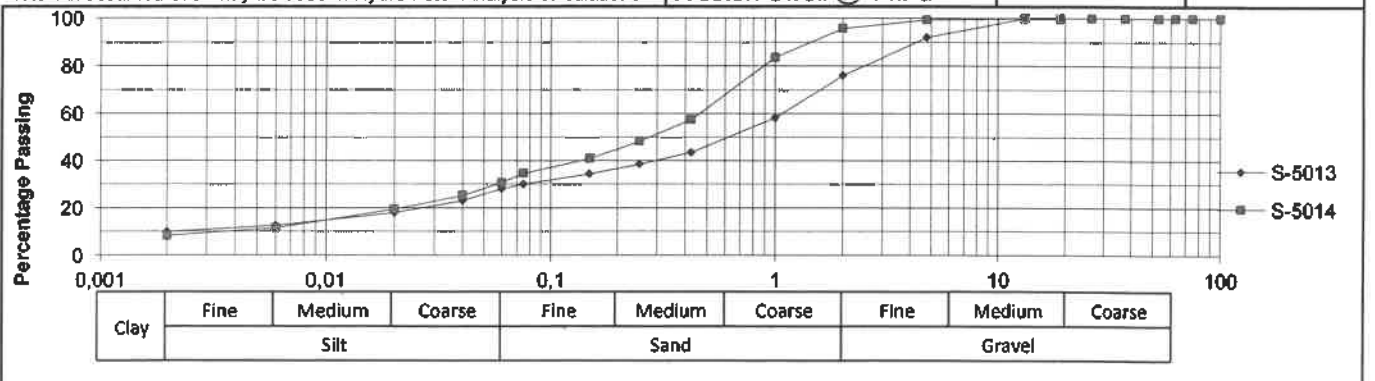
<b>Sieve Analysis (Wet Prep)</b>			
Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	100	100
	37.5 mm	100	100
	28 mm	100	100
	20 mm	100	100
	14 mm	100	100
	5 mm	92	99
	2 mm	76	96
	1 mm	58	84
	0.425 mm	43	57
0.250 mm	39	48	
0.150 mm	34	41	
0.075 mm	30	35	
Grading Modulus	1,51	1,12	

Laboratory Number	S-5013 ◆	S-5014 ■
<b>Atterberg Limits -425µ</b>		
Liquid Limit	% 37	34
Plasticity Index	% 13	12
Linear Shrinkage	% 6,0	5,5
Overall PI	% 6	7

<b>Hydrometer Analysis</b>			
Percentage Passing	0.060 mm	28	31
	0.040 mm	23	25
	0.020 mm	18	19
	0.006 mm	13	11
	0.002 mm	10	8
Gravel	% 24	4	
Sand	% 48	65	
Silt	% 18	22	
Clay	% 10	8	

<b>Classifications</b>		
HRB (AASHTO)	A-2-6(1)	A-2-6(0)
Unified (ASTM D2487)	SC	SC
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations

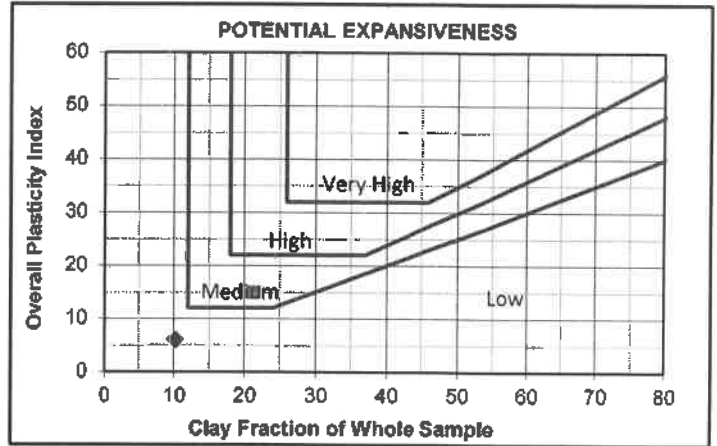


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 Project : Lion Pride  
 Project No : 2021-B-1261

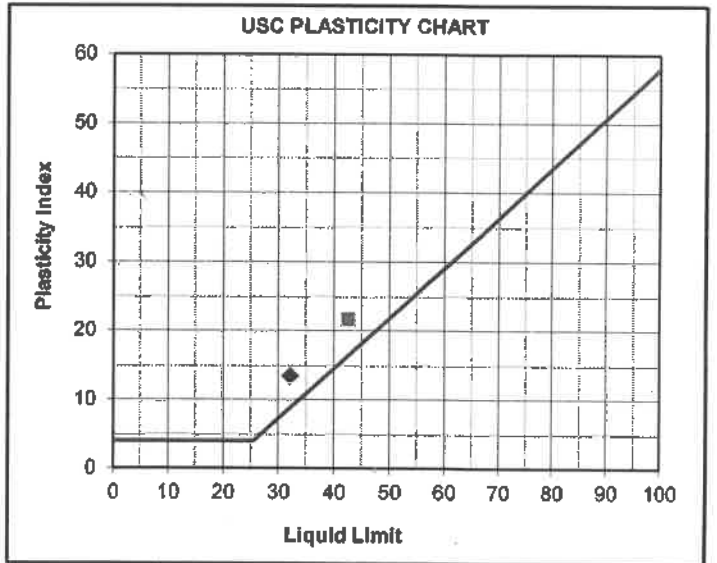
Date Received: 05/10/2021  
 Date Reported: 29/10/2021  
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**FOUNDATION INDICATOR**

Laboratory Number	S-5016 ◆	S-5017 ■
Field Number	TP08	TP08
Client Reference		
Depth (m)	0,5-1,0	1,0-2,4
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		



Moisture Content & Relative Density		
Moisture Content (%)		
Relative Density (S.G.)		



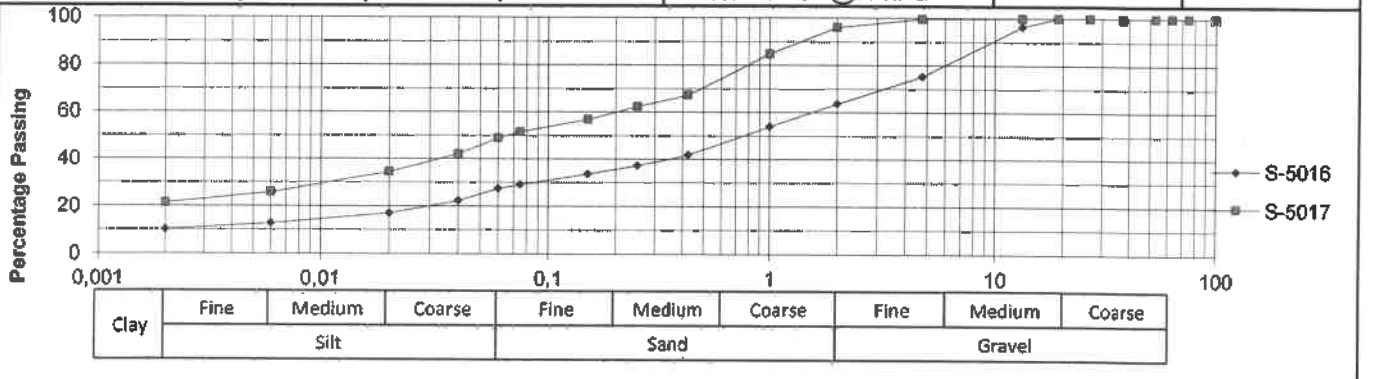
Sieve Analysis (Wet Prep)			
Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	100	100
	37.5 mm	100	100
	28 mm	100	100
	20 mm	100	100
	14 mm	97	100
	5 mm	75	100
	2 mm	64	96
	1 mm	54	85
	0.425 mm	42	67
Grading Modulus	1,65	0,85	

Laboratory Number	S-5016 ◆	S-5017 ■
Atterberg Limits -425µ		
Liquid Limit	% 32	43
Plasticity Index	% 13	22
Linear Shrinkage	% 5,5	9,5
Overall PI	% 6	15

Hydrometer Analysis			
Percentage Passing	0.060 mm	28	49
	0.040 mm	22	42
	0.020 mm	17	35
	0.006 mm	13	26
	0.002 mm	10	21
Gravel	%	36	4
Sand	%	36	47
Silt	%	17	28
Clay	%	10	21

Classifications		
HRB (AASHTO)	A-2-6(0)	A-7-6(8)
Unified (ASTM D2487)	SC	CL
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations



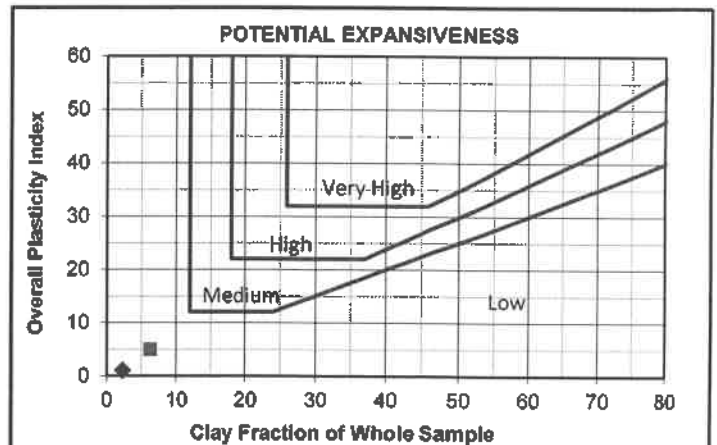


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 Project : Lion Pride  
 Project No : 2021-B-1261

Date Received: 05/10/2021  
 Date Reported: 29/10/2021  
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**FOUNDATION INDICATOR**

Laboratory Number	S-5018 ◆	S-5019 ■
Field Number	TP11	TP11
Client Reference		
Depth (m)	0-0,8	0,8-1,5
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		

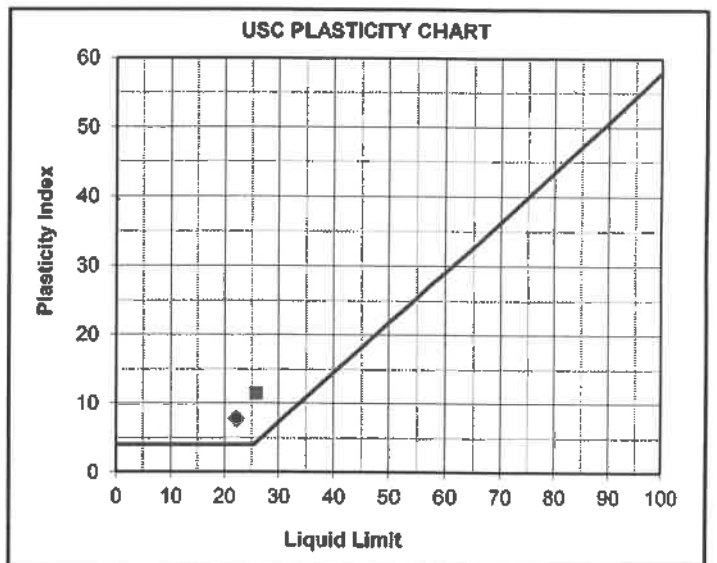


**Moisture Content & Relative Density**

Moisture Content (%)		
Relative Density (S.G.)		

**Sieve Analysis (Wet Prep)**

Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	96	100
	37.5 mm	91	100
	28 mm	89	100
	20 mm	84	100
	14 mm	71	98
	5 mm	44	87
	2 mm	30	65
	1 mm	26	51
	0.425 mm	17	41
0.250 mm	14	38	
0.150 mm	11	35	
0.075 mm	8	30	
Grading Modulus	2,45	1,63	



**Hydrometer Analysis**

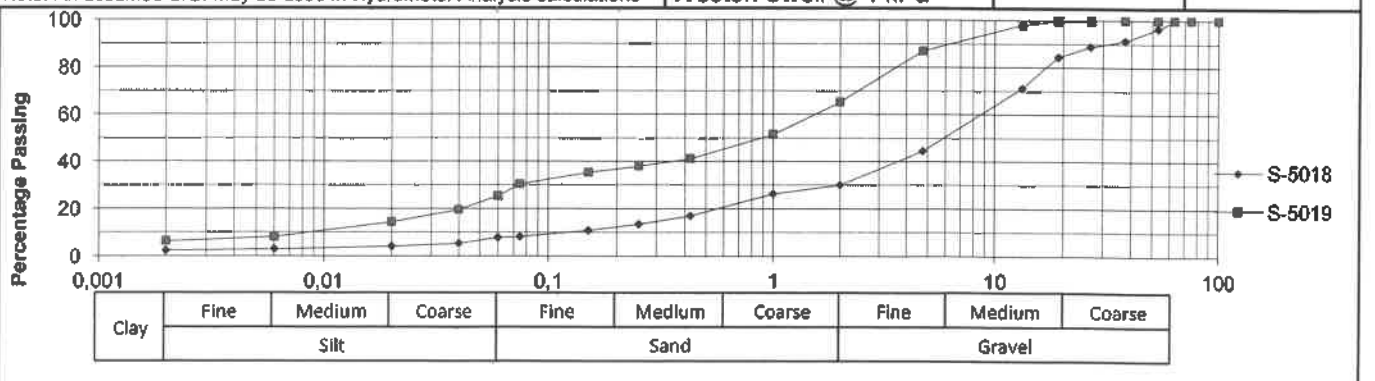
Percentage Passing	0.060 mm	8	25
	0.040 mm	5	20
	0.020 mm	4	14
	0.006 mm	3	8
	0.002 mm	2	6
Gravel	%	70	35
Sand	%	22	40
Silt	%	5	19
Clay	%	2	6

Laboratory Number	S-5018 ◆	S-5019 ■	
<b>Atterberg Limits -425µ</b>			
Liquid Limit	%	22	26
Plasticity Index	%	8	11
Linear Shrinkage	%	2,5	5,5
Overall PI	%	1	5

**Classifications**

HRB (AASHTO)	A-2-4(0)	A-2-6(0)
Unified (ASTM D2487)	GP-GC	SC
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations

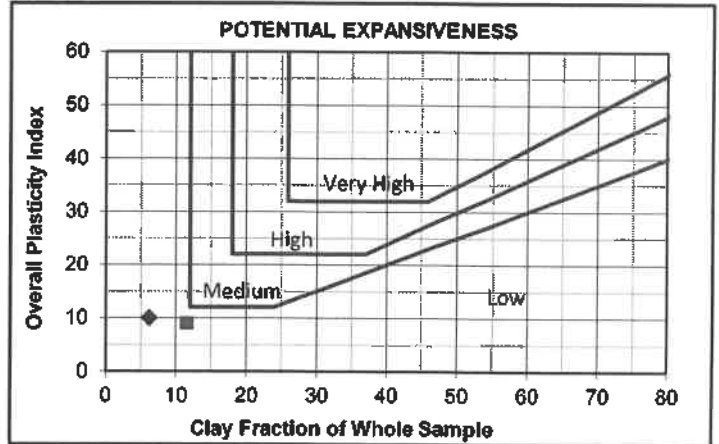


Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No : 2021-B-1261

Date Received: 05/10/2021  
 Date Reported: 29/10/2021  
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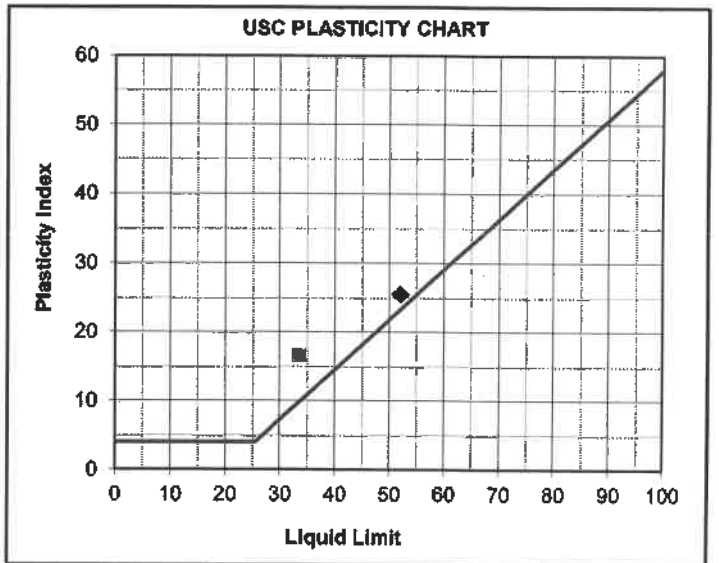
### FOUNDATION INDICATOR

Laboratory Number	S-5020 ◆	S-5021 ■
Field Number	TP11	TP17
Client Reference		
Depth (m)	1,5-2,7	0-1,0
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		



Moisture Content & Relative Density		
Moisture Content (%)		
Relative Density (S.G.)		

Sieve Analysis (Wet Prep)			
Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	100	100
	37.5 mm	100	100
	28 mm	100	100
	20 mm	100	100
	14 mm	98	100
	5 mm	76	99
	2 mm	62	91
	1 mm	50	79
	0.425 mm	39	54
0.250 mm	37	43	
0.150 mm	35	36	
0.075 mm	32	30	
Grading Modulus	1,67	1,25	

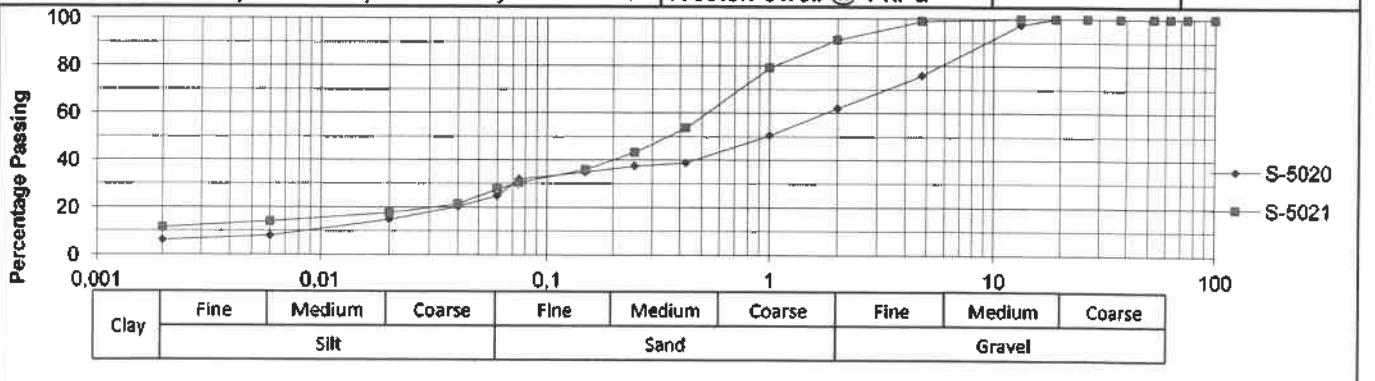


Hydrometer Analysis			
Percentage Passing	0.060 mm	25	28
	0.040 mm	20	21
	0.020 mm	15	18
	0.006 mm	8	14
	0.002 mm	6	12
Gravel	%	38	9
Sand	%	37	63
Silt	%	19	16
Clay	%	6	12

Laboratory Number		S-5020 ◆	S-5021 ■
Atterberg Limits -425 $\mu$			
Liquid Limit	%	52	34
Plasticity Index	%	25	17
Linear Shrinkage	%	10,5	7,5
Overall PI	%	10	9

Classifications		
HRB (AASHTO)	A-2-7(3)	A-2-6(1)
Unified (ASTM D2487)	SC	SC
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations



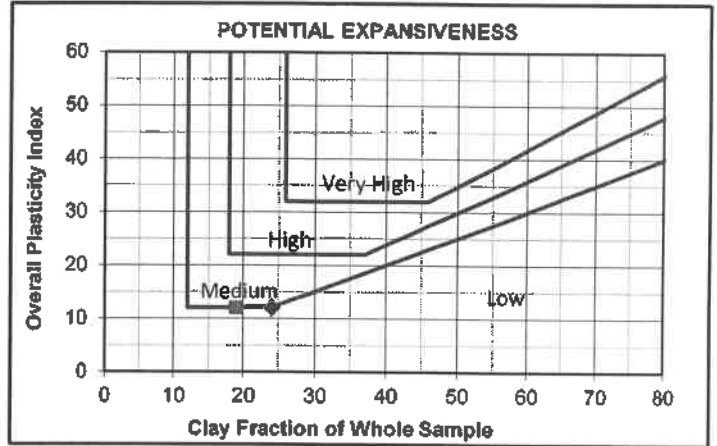


Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No : 2021-B-1261

Date Received: 05/10/2021  
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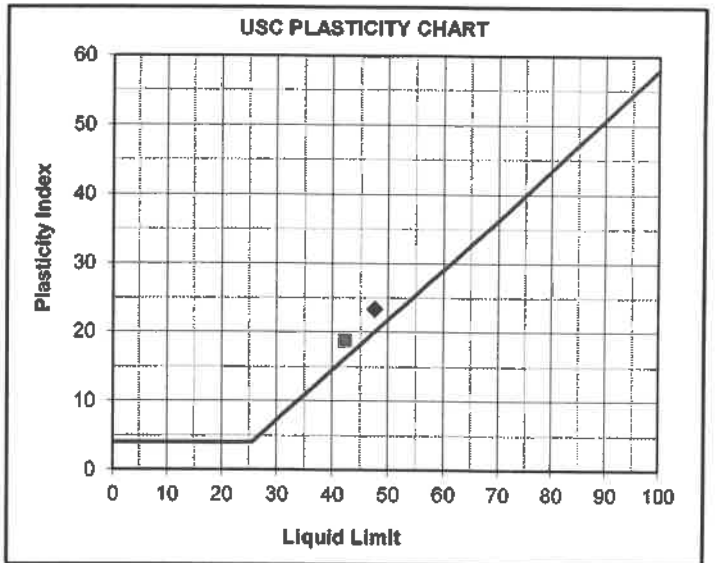
### FOUNDATION INDICATOR

Laboratory Number	S-5022 ◆	S-5023 ■
Field Number	TP17	TP17
Client Reference		
Depth (m)	1,0-1,4	1,4-2,2
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed		
Stabilizing Agent		



Moisture Content & Relative Density		
Moisture Content (%)		
Relative Density (S.G.)		

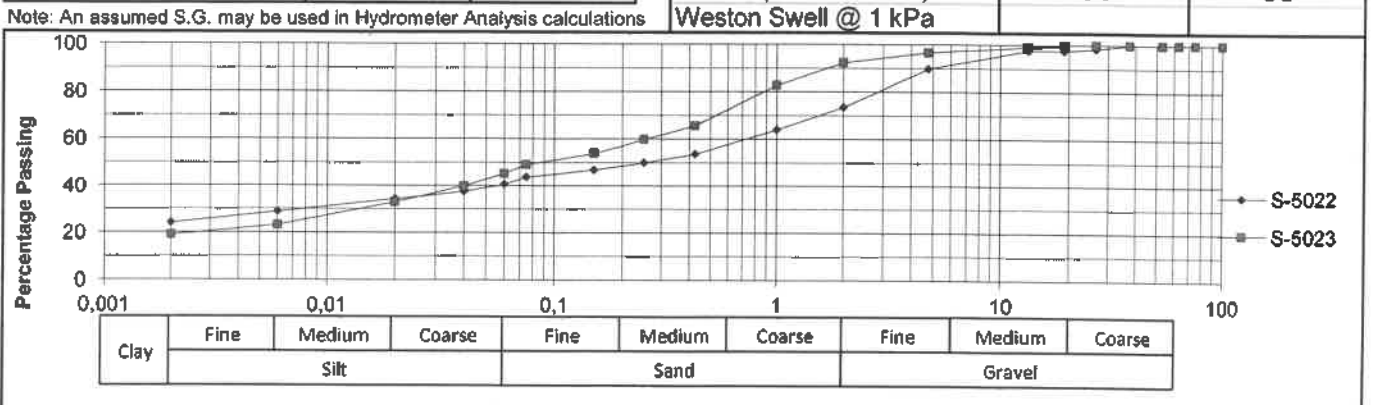
Sieve Analysis (Wet Prep)			
Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	100	100
	37.5 mm	100	100
	28 mm	98	100
	20 mm	98	100
	14 mm	98	99
	5 mm	90	97
	2 mm	73	92
	1 mm	64	83
	0.425 mm	54	66
	0.250 mm	50	60
0.150 mm	47	54	
0.075 mm	44	49	
Grading Modulus	1,29	0,93	



Hydrometer Analysis			
Percentage Passing	0.060 mm	41	45
	0.040 mm	38	40
	0.020 mm	34	33
	0.006 mm	29	23
	0.002 mm	24	19
Gravel	%	27	8
Sand	%	33	47
Silt	%	17	26
Clay	%	24	19

Laboratory Number		S-5022 ◆	S-5023 ■
Atterberg Limits -425µ			
Liquid Limit	%	48	42
Plasticity Index	%	23	19
Linear Shrinkage	%	10,0	9,0
Overall PI	%	12	12

Classifications		
HRB (AASHTO)	A-7-6(6)	A-7-6(6)
Unified (ASTM D2487)	SC	SC
Weston Swell @ 1 kPa		



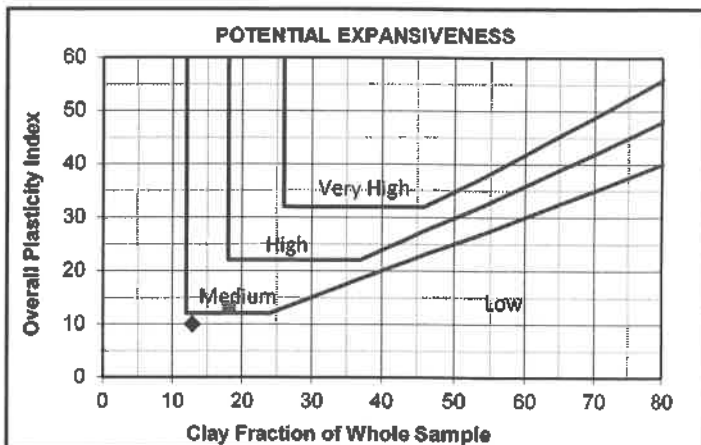
Note: An assumed S.G. may be used in Hydrometer Analysis calculations

Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No : 2021-B-1261

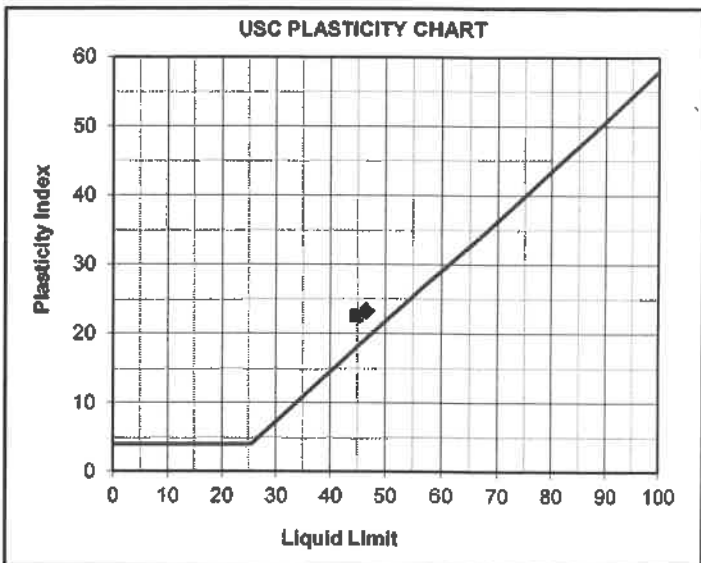
Date Received: 05/10/2021  
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**FOUNDATION INDICATOR**

Laboratory Number	S-5025 ◆	S-5026 ■
Field Number	TP19	TP19
Client Reference		
Depth (m)	0-0,3	0,3-1,1
Position		
Coordinates	X Y	
Description		
Additional Information		
Calcrete / Crushed Stabilizing Agent		



Moisture Content & Relative Density		
Moisture Content (%)		
Relative Density (S.G.)		



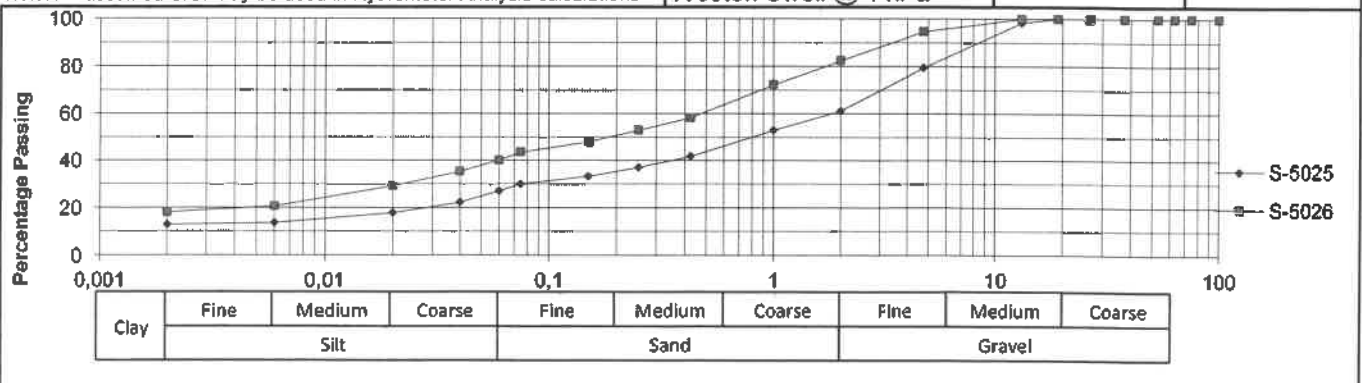
Sieve Analysis (Wet Prep)			
Percentage Passing	100 mm	100	100
	75 mm	100	100
	63 mm	100	100
	50 mm	100	100
	37.5 mm	100	100
	28 mm	100	100
	20 mm	100	100
	14 mm	98	100
	5 mm	79	95
	2 mm	61	82
	1 mm	53	72
	0.425 mm	42	58
0.250 mm	37	53	
0.150 mm	33	48	
0.075 mm	30	44	
Grading Modulus	1,67	1,16	

Laboratory Number	S-5025 ◆	S-5026 ■
Atterberg Limits -425µ		
Liquid Limit	% 47	45
Plasticity Index	% 23	23
Linear Shrinkage	% 10,0	10,0
Overall PI	% 10	13

Hydrometer Analysis			
Percentage Passing	0.060 mm	27	40
	0.040 mm	22	35
	0.020 mm	18	29
	0.006 mm	14	21
	0.002 mm	13	18
Gravel	%	39	18
Sand	%	34	42
Silt	%	14	22
Clay	%	13	18

Classifications		
HRB (AASHTO)	A-2-7(2)	A-7-6(5)
Unified (ASTM D2487)	SC	SC
Weston Swell @ 1 kPa		

Note: An assumed S.G. may be used in Hydrometer Analysis calculations



Client : INTRACONSULT CC  
 Project : Lion Pride  
 Project No: 2021-B-1261

Date Received : 05/10/2021  
 Date Reported : 29/10/2021  
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## pH, CONDUCTIVITY, RESISTIVITY and ORGANIC IMPURITIES

Lab No	Field No	Depth (m)	Coordinates	Description / Additional Information	pH	Electrical Conductivity (S/m)	Electrical Resistivity (Ω/m) *	Organic Impurities
S-5011	TP04	0.0-0.4	X: Y:		6,5	0,005	200,000	
S-5012	TP04	0.4-0.65	X: Y:		6,6	0,004	250,000	
S-5013	TP04	0.9-1.7	X: Y:		6,5	0,003	333,333	
S-5021	TP17	0.0-1.0	X: Y:		7,3	0,009	111,111	
S-5022	TP17	1.0-1.4	X: Y:		7,2	0,013	76,923	
S-5023	TP17	1.4-2.2	X: Y:		7,4	0,015	66,667	
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					
			X: Y:					

Note : \* Electrical resistivity is calculated from the electrical conductivity