

# GEOTECHNICAL INVESTIGATION FOR PROPOSED FILLING STATION ON PORTION 197 OF WITKOPPIE 64-IR



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OCTOBER 2006

Project No.: 208/15

## **1 INTRODUCTION**

This report is produced by GMH/Tswelelo Consulting Engineers on the instruction of the Airports Company of South Africa (ACSA). The objective of the report is to assess the suitability of the proposed site from a geotechnical perspective for development into a Filling Station. To this end, an investigation was conducted on site, trial holes were inspected, soil samples submitted to a soils laboratory for testing, and recommendations regarding the proposed foundation designs are arrived at as set out in this report.

## **2 DESCRIPTION OF SITE**

### **2.1 General**

The site can be described as Portion 197 of the Farm Witkoppie 64-IR, and is located adjacent and to the West of the OR Tambo International Airport in Johannesburg, and more specifically in Jones Road. The site forms a sliver of land adjacent to the very busy road, and is vacant except for a few exotic trees and sparse grass cover.

### **2.2 Proposed Development**

The proposed development will consist of a typical petrol filling station development, with possible associated uses like a convenience store and car wash. As such it will have a maximum height of one storey.

### **2.3 Topography**

The site is very flat, and is lower than the road adjacent to it. It is expected that the development will mainly be constructed on imported fill.

### **2.4 Local Geology**

The local geology for site, being located at S26 09 00.0/E28 13 26.7, consists of lavas of the sub-humid moist zone of the Ventersdorp Supergroup as it occupies a graben valley striking east-west through the City of Johannesburg. The material consists of red clayey silts and typically extends to depths in excess of 12 m. In the case of this particular site, the expected blanket of hillwash and pebble marker consisting of vein quartz have previously been removed under an earthworks operation.

## **3 INFORMATION SOURCES CONSULTED**

The following sources of information were consulted:

- Geological Map 1:1 000 000 published by the Government Printer
- 1: 50 000 Topo-Cadastral map

- Detail topographical survey made available by the developer in electronic format, reduced copy bound in this report.
- Engineering Geology of Southern Africa, Volume 1 (ABA Brink)
- Home Building Manual Part 1 & 2 , available from the NHBRC

#### **4 FIELD WORK AND TESTING**

The work on site consisted of the digging of 2 trial holes by hand on 17 October 2006. These holes were profiled on 18 October 2006 by George Hattingh Pr Eng, and recorded by Willem Pretorius Pr Eng, both of GMH/Tswelelo Consulting Engineers.

Samples of the residual material were recovered in sample bags and submitted to Civilab in Booyens for testing (see soil test results included in this report). Foundation indicator tests were conducted on all samples submitted.

#### **5 SOIL PROFILES**

The soil profiles were taken in line with the Revised Guide to Soil Profiling for Civil Engineering Purposes in South Africa by Jennings et al. The profile consists of mixed building rubble of a typical thickness of 150mm, over the residual lava. The thickness of the lava has been proven up to 1500mm, but is expected to extend for several meters deep. The in situ soils are not expected to vary significantly across the site .

#### **6 ENGINEERING PROPERTIES**

The engineering properties are indicated on the attached soil test results sheets.

#### **7 GEOTECHNICAL CONSIDERATIONS**

##### **7.1 Ground Water**

No free water was encountered in any of the trial holes. It is unlikely that ground water will be a significant factor on this project.

##### **7.2 Collapsible Material**

The material will show a measure of compressibility. This indicates that the site can be classified as Site Class S1.

##### **7.3 Heaving Material**

The lavas found in the trial holes are not expected to show any heaving characteristics.

#### **7.4 Corrosiveness of Soils**

As no metallic pipes or services are envisaged, no corrosiveness tests were conducted.

#### **7.5 Environmental Aspects**

No special precautions required.

### **8 RECOMMENDATIONS**

#### **8.1 Foundations**

In view of the possible compressibility of the material, it is recommended that reinforced strip footings be constructed on compacted in situ materials. The bases of foundations to be exposed to a width of 300mm wider than the foundation, and then compacted using a whacker until no further consolidation takes place. Foundations prepared in this way should be suitable for single storey structures. It is further advised that light reinforcement be utilised in all masonry.

#### **8.2 Excavations**

No problems with excavation are anticipated as the silty sand profile is expected to extend for several meters deep. Excavations will be stable for up to a meter in dry conditions. Precautions are required for excavations deeper than 1 meter.

#### **8.3 Fill Material**

The silty sand material on site is suitable for foundation fill when compacted to 93% mod AASHTO. It is expected that the site will be developed on fill, and in view of the compressibility of the in situ soils, it is advisable to compact the whole of the site using a vibratory roller before the imported material is placed.

#### **8.4 Roads**

All material used in roads (ie selected layer, subbase as well as base course) will have to be imported.

#### **8.5 Water Entrapment**

Drainage of the site to be done in such a way as not to trap water as this may result in unwanted consolidation of the in situ soils.

## 8.6 General

The site is suitable for the envisaged development, provided the precautions and guidelines are implemented correctly.

## 9 SUMMARY

The findings of this investigation have been based on two trial holes excavated on site. The profiles recorded and the results of the soil tests, give an indication, but not necessarily total definition of the conditions on site. The variation in the soils on site is of such a nature that the process of observation should extend to the construction stage when the site is opened up on a large scale. At that stage it may be appropriate to adjust some of the general recommendations as set out above. Provision should therefore be made for a geotechnical engineer to be on hand to assess individual foundations.

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SOIL PROFILES

SOIL TEST RESULTS

PHOTOGRAPHS





