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LEVEL 1 INSPECTION & TESTING 80 WOODS ROAD – STAGES 1 & 2 TRUGANINA, VICTORIA

Prepared for Universal Corporation Pty Ltd

Report Reference: GS4103.1 AA

Date: 7 March 2017

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PROJECT DETAILS

Project Reference	GS4103.1	Rev	AA
Project Title	80 Woods Road – Stages 1 & 2		
Project Location	Truganina	State	VIC
Date	7 March 2017		

CLIENT DETAILS

Prepared For (Client)	Universal Corporation Pty Ltd		
Client Address	57 Yale Drive	Suburb	Epping

DISTRIBUTION

Original Held By	Ground Science Pty Ltd
One (1) Electronic Copy	Universal Corporation Pty Ltd

This document summarises the Level 1 Inspection and Testing performed by Ground Science (nominated GITA) for the aforementioned project and is detailed for the sole use of the intended recipient. Should you have any questions related to this report please do not hesitate to contact the undersigned.

AUTHOR:

Daniel Schorer,
Geotechnical Engineer

REVIEWED & AUTHORISED:

Gee Singh,
Senior Geotechnical Engineer

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1. INTRODUCTION

This report presents the results of inspection activities, compaction control and laboratory testing services performed by Ground Science Pty Ltd (Ground Science) at the project identified as 80 Woods Road (Stages 1 & 2) located in Truganina, Victoria (herein referred to as the 'site'). Ground Science was engaged to provide Level 1 Inspection and Testing services for this component of the project. Authorisation to proceed was provided by Universal Corporation Pty Ltd (herein referred to as the "Client").

Level 1 Testing as defined in AS3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments" provides for full time inspection of the construction of controlled fill and compaction testing in accordance with AS1289 "Methods of Testing Soils for Engineering Purposes". The Level 1 Inspection and Testing was undertaken by experienced geotechnicians from Ground Science.

2. SCOPE OF WORK

2.1 AREAS OF WORK

Ground Science provided Level 1 Inspection and Testing of the controlled fill placed within Lots 220 - 225 within Stages 1 & 2 of the estate. The placement of controlled fill was conducted as part of a development process for a residential subdivision.

The areas on which controlled fill was placed is shown on site plan Figure 1 (presented in Appendix A), which is based on drawings prepared by Reeds Consulting Pty Ltd and provided by the Client (Drawing No. 22562E/1 dated 25/8/16). It is understood that the controlled fill was placed and compacted to approximately 100mm below the required finished level, to allow for up to 100mm of topsoil placement. The placement of the fill under Level 1 Inspection and Testing was performed on 2nd December 2016; which included 1 full day of filling operations. The filling operations were observed on a fulltime basis by Ground Science technicians.

2.2 PLACEMENT SPECIFICATION

The placement of controlled fill on the above-mentioned areas was carried out in accordance with AS3798 (2007) "Guidelines on Earthworks for Commercial and Residential Developments". A Technical specification for the controlled fill placement was not provided. The following is a recommended specification based generally on the requirements of AS3798 (2007) Level 1 controlled fill;

- Prior to filling, the area shall be stripped of topsoil, subsoil, soft material and vegetation to a firm base approved by the superintendent;
- Suitable fill material shall be placed in loose horizontal layers not exceeding 300mm in thickness;
- The fill shall be compacted to a Dry Density Ratio of at least 95% Standard (AS 1289: 5.1.1, 5.4.1 or 5.7.1) as per the project specification requirements;
- The fill is to be moisture conditioned to a moisture ratio of 85% – 115% of standard compaction (AS 1289 5.1.1, 5.4.1, or 5.7.1);
- The fill material shall not contain greater than 20% by volume, of particles coarser than 37.5mm and no particle over 200mm in any dimension;
- The frequency of field density testing shall be in accordance with the guidelines in AS3798 2007 for large scale developments (Type 1), which nominates a frequency of not less than:
    - 1 test per layer or 200mm per 2500m^2;
    - 1 test per 500m^3 distributed reasonably evenly throughout the full depth and area; or
    - 3 tests per site visit; whichever requires the most tests.

3. INSPECTION AND TESTING

3.1 SUBGRADE PREPARATION

Site stripping was conducted prior to the arrival of Ground Science on site. We understand that site stripping included the removal of all material identified to comprise of topsoil, vegetation and dense organic layers. The subgrade was test rolled and no surface deflections and/or soft spots were observed. The subgrade was considered suitable for subsequent fill placement.

3.2 CONSTRUCTION MATERIALS

Fill for the project is understood to have been sourced from onsite stockpiles. All fill materials were hauled and stockpiled adjacent to the fill area. The nominated fill source was inspected by a Ground Science technician prior to its application. The material was visually assessed to comprise of silty clay and gravelly clay, generally brown in colour. The fill material used in this project was nominated by the on-site contractor. Ground Science performed an assessment of the fill source to identify the following material characteristics:

- Material suitability as an engineering property;
- Cohesiveness;
- Free from building debris and vegetative matter;
- Oversize rock particles.

Visual assessments on the above-mentioned properties were conducted on-site and the fill material used was considered acceptable for use. It should be noted that detailed laboratory testing or chemical analyses were not performed on the fill material. The maximum oversize particles within the fill matrix were observed to be up to 200mm. The geotechnicians on site provided instructions to the contractors to remove these materials prior to fill placement. The fill source was assessed to be generally dry of the optimum moisture content. Where fill materials were observed dry of the optimum moisture content, moisture conditioning was provided through the use of a water cart.

3.3 FILL CONSTRUCTION

The contractor had the following plant available on site during the construction period for use in the fill placement;

- Padfoot Roller;
- Grader;
- Front End Loader;
- Water Cart.

During fill placement the weather conditions were generally sunny and windy with temperature conditions during the works ranging from 15 to 20 degrees Celsius.

The filling process was generally consistent throughout the project and involved the loader hauling the fill material from onsite stockpiles to the nominated fill areas. A grader was used to spread the fill into thin loose layers. Compaction was provided using a padfoot roller with a minimum of 8 passes performed. Each layer was placed and compacted to form a composite layer, measuring approximately 300mm in thickness. One (1) composite layer of fill was placed and compacted to achieve the required finished level. Throughout the filling process and/or at the completion of the day's production, compaction testing was performed to assess the achieved density ratio of each layer.

Figure 1 provides a guide to the fill placement and is limited to the areas described in this report. It should be noted that a further topsoil layer of approximately 100mm is expected to complete the finished levels of the fill and does not form part of the controlled fill. This layer is placed to provide a growing medium for grass and gardens. Any fill placed as part of drainage, sewer works or similar does not form part of this Level 1 report.

3.4 RESULTS OF COMPACTION CONTROL TESTING

Level 1 Inspection and Testing was undertaken by experienced technicians from Ground Science who attended the site for the duration of the construction phase and nominated the location of the in-situ density tests.

Testing comprised a total of 3 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 3 "Rapid HILF" Compaction tests (AS1289 5.7.1). The results of the field density and compaction control testing results are presented on the NATA endorsed Field Density Test Reports in Appendix B. It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed.

It is noted that all tests met the minimum density requirement of 95% standard compaction. It is noted that the moisture conditioning was generally around optimum with the majority of test results generally complying with the recommended specification of 85% - 115%. The HILF rapid compaction testing was undertaken in our NATA accredited Thomastown laboratory.

3.5 FINAL SURFACE LEVELS

Observations were made by a Ground Science staff member that filling had been complete up to the nominated finished levels as per confirmation provided from the contractor's site foreman that controlled fill operations were complete. The observed final levels are the constructed finished surface levels of the controlled fill.

4. COMPLIANCE

Ground Science Staff have undertaken Level 1 Inspection and Testing services of the construction of the controlled fill in the areas designated on Figure 1 Ground Science field staff have also observed that the prepared subgrade provided an adequate base for the subsequent placement of controlled fill.

Based on observations made by Ground Science staff and the results of density tests, we consider that the controlled fill placed has been constructed in accordance with the stated intent of the Specification and AS3798 (2007).

5. UNDERSTANDING LEVEL 1 INSPECTION & TESTING

The purpose of performing Level 1 Inspection and Testing is to ensure compliance of the fill with the specification. The engagement of a Geotechnical Inspection Testing Authority (GITA) allows the contractor to perform his role in the construction of the filling operation while the GITA monitors the quality control process of the fill placement. The visual observations of thorough processes and work practices by the contractor allows the GITA to approve the subsequent placement of fill without having to wait for the completion of testing and the extended time it takes to get a test result back. The GITA will however, carry out random spot checks of the filling operations throughout the day's production as confirmation that the placement procedures and the fill moisture content is appropriate. At the end of a day's production the GITA will sign off the completed works as satisfactory. Any failed tests will result in that particular area of operation requiring rectification in the following mornings activities. This may be as simple as extra rolling with compaction plant if moisture conditioning is suitable. Sometimes these areas may be retested if the GITA feels it is necessary.

While the code AS3798 2007 is a guideline on the minimum requirements of filling on commercial and residential developments, some projects require a more detailed project specification to deal with site specific issues. While moisture conditioning of fill sources aids in the ease with which compaction is achieved, it is not necessarily a physical characteristic that determines if the placed fill is acceptable. In some situations the moisture requirement

is an extremely important function of the final constructed product. In these situations a specific project specification should apply to the project as detailed by the designing geotechnical engineer. These are typical of clay liners for wet lands, dams, landfill liners and caps and an array of other engineering situations. Creating a consolidated platform of which is similar to equivalent surrounding natural conditions is the primary aim of level one processes, preventing the occurrence of differential ground movements to footing structures.

For & on behalf of Ground Science Pty Ltd

Daniel Schorer
Geotechnical Engineer

Reviewed By

Gee Singh
Senior Geotechnical Engineer

6. LIMITATIONS

This type of investigation (as per our commission) is not designed or capable of locating all soil conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall soil conditions. However, it should be noted that actual conditions in some parts of the Site might differ from those found. If further sampling reveals soil conditions significantly different from those shown in our findings, Ground Science must be consulted. Maintenance and upkeep of finished fill placement must be regularly monitored as exposure to extended weather periods/other elements may cause surface drying which may lead to cracking. Conversely, excessive exposure to moisture may cause heaving/softening in the soils.

It is recognised that the passage of time affects the information and assessment provided in this document. Ground Science's assessment is based on information that existed at the time of the preparation of this document. It is understood that the services provided allowed Ground Science to form no more than an opinion of the actual site conditions observed during sampling and observations of the site visit and cannot be used to assess the affects of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

The scope and the period of Ground Science services are described in the proposal and are subject to restrictions and limitations. Ground Science did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Science in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Science for incomplete or inaccurate data supplied by others.

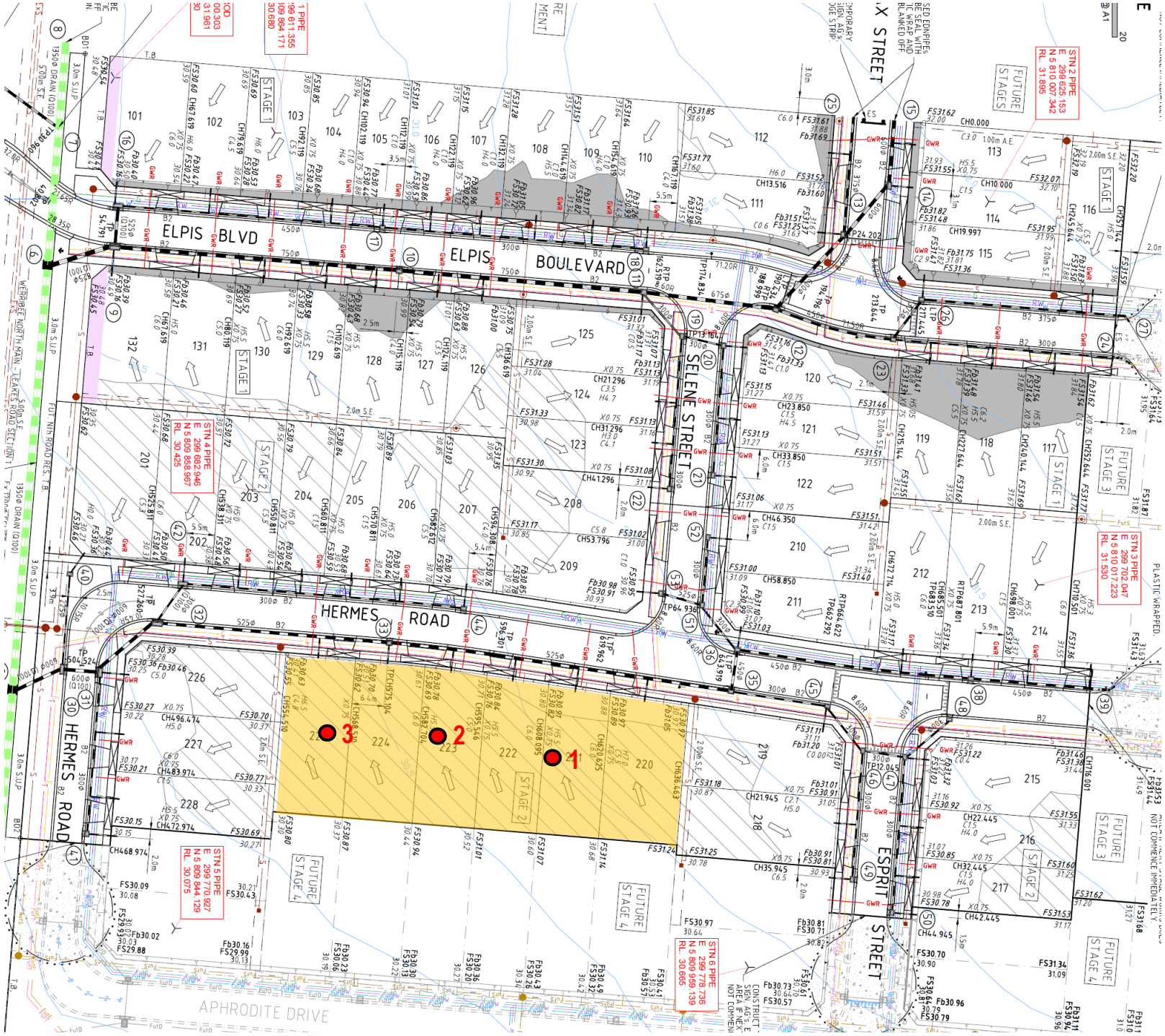
Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

7. REFERENCES

- AS3798 – 2007 Guidelines on Earthworks for Residential and Commercial Developments.

APPENDIX A

Figure 1: Site Plan



80 Woods Road – Stages 1 & 2
Truganina
SITE AND TEST LOCATION PLAN

FIGURE 1

JOB NO: GS4103/1
DATE: 21/02/2017
DRAWN: DS
CHECKED: GS

LEGEND

- Field Density Test location
- Fill Placement Area

Ground Science

APPENDIX B

Field Density Test Report Sheet

field density test results

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client :	**UNIVERSAL CORPORATION (EPPING)**	job No:	**GS4103/1**
project :	**80 WOODS ROAD - STAGE 2 (LEVEL ONE)**	report No.	**AA**
location :	**TRUGANINA**	test date:	**2-Dec-16**

Test Number		1	2	3			
Test location taken from							
North West Corner of Lot No.		2m North	5m North	14m North			
Offset (m)		18m East	17m East	18m East			
Lot No.		221	223	225			
Layer Number		1 (Final)	1 (Final)	1 (Final)			
Time of tests		-	-	-			
Depth of Layer	mm	-	-	-			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m^3	1.899	1.885	1.838			
*Field Moisture Content	%	21.0	23.5	18.5			
Oversize Material	Wet %	7	8	12			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m^3	1.878	1.918	1.940			
*Optimum Moisture Content	%	24.0	24.5	21.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**88**	**96**	**88**			
Moisture Variation	%	**-3.0**	**-1.0**	**-2.5**			
Moisture Variation		**DRY**	**DRY**	**DRY**			
Density Ratio	%	**101.0**	**98.5**	**95.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: gravelly CLAY fill

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 20109
Accredited for compliance with ISO/IEC 17025
The results of the tests, calibrations and/or measurements in this document are traceable to Australian/National Standards

Chris Senserrick
Approved Signatory
Date 21-Feb-17