

Brisbane Office
 Job No: DL16/216
 Ref No: 10986
 Author: L. Slater

6th October, 2016

Pensar Civil Pty Ltd
 PO Box 3950
 South Brisbane Qld 4101

ATTENTION: MR GARREN HOWELL
 Email: garren@pensar.com.au
 Cc: nickm@pensar.com.au

Dear Sir,

**RE: COMPLIANCE REPORT FOR BULK EARTHWORKS FILLING OPERATIONS
 FLAGSTONE CITY STAGE 1B,
 FLAGSTONE, JIMBOOMBA**

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1.0 INTRODUCTION

1.1 General

This report presents results of Level One Earthworks Inspections and associated Compaction Compliance testing carried out on Earthworks Fill placed and compacted to form pavement subgrades at the Flagstone City Stage 1B, Jimboomba (The Site).

The work was commissioned by Mr. Garren Howell representing Pensar Civil Ltd Pty (The Client), using Purchase Order M16-180.

Earthworks were carried out by The Client.

Earthworks filling operations were carried out between 29th June 2016 and 23rd September 2016.

1.2 Previous Earthworks

As far as could be determined, no previous earthworks have been carried out at the site.

1.3 The Project

The Purpose for filling at The Site is to construct a Residential Subdivision which includes new pavements, residential building platforms and associated underground services. The Bradford Lees Pty Ltd Earthworks Cut/ Fill Plans, Drawing No. C1-S1B-CIL-101, Revision B, dated 15.10.2015, indicates the extents and thickness of fill to be constructed at The Site.

This plan is considered to be a reasonable indication of the actual fill constructed at The Site. The actual thickness of fill on an individual Lot can be obtained from the Developer as a Lot Disclosure Plan.

The Site is bounded by future residential developments to the East, and undeveloped land to the North, South and West.

Picture 1: Aerial View of the Site 17/05/2016 (Image Source: Nearmap.com)



2.0 THE BRIEF

The Brief from the Client was limited to:

- Level One Inspection and Testing of the placement and compaction of fill materials in accordance with AS3798 2007 – “Guidelines on Earthworks for Commercial and Residential Developments”,
- Logan City Council Project Specifications.
- Relative Density Control Testing in accordance with AS1289 – Testing of Soils for Engineering Purposes and at frequencies required in AS3798 Table 8.1.

All other design requirements such as CBR and Quality of Materials, site classification, material, settlement assessments and existing filling were not included in the Brief and are therefore excluded from this Report.

3.0 METHODOLOGY

Earthworks Inspection and Testing was carried out on the stripped and exposed ground surfaces and during the placement and compaction of fill materials.

Field and laboratory testing included a walk over assessments of the existing ground conditions, observation of filling and compaction activities and field density testing using a nuclear soil moisture density gauge and Hilf compactions. All work was carried out in accordance with AS 3798 (Guidelines on Earthworks for Commercial and Residential Developments) and AS1289 (Testing of Soils for Engineering Purposes).

3.1 Stripped Surface Assessment

The fill areas at The Site were observed to be stripped and cleared of all visible organic matter, deleterious, loose and unsuitable materials to depths exposing competent ground.

The natural materials forming the natural foundation exposed after the stripping and clearing can be summarised as:

- Sandy Clay (CI-CH) – Medium to high plasticity, fine to medium grained sand, grey brown mottled orange brown and moist.

Following the stripped surface assessment of the fill areas, the fill foundation was approved for filling using the following process:

- Walk over assessments confirming that the competent ground was exposed.
- Proof roll testing using large sized truck confirming no movement of the exposed natural foundation.

On this basis, the compliant assessments in accordance with above indicate that the exposed ground forming the fill foundation is capable of supporting new fill materials.

Picture 2: View of the Stripped Surface Prior to Filling



3.2 Filling Operations

Fill materials were used from onsite cuts, road box excavations and trench excavations.

Fill materials can be summarised as:

- Sandy Clay (CI), medium plasticity, fine to coarse sand, grey brown,
- Clayey Sand (SC), fine to coarse sand, medium plasticity, with traces of fine to coarse gravels, grey brown mottled orange red.

Placement and compaction of the fill materials was carried out using the following plant:

- | | |
|-----------------|-----------------|
| • Dozer | • Scraper |
| • Moxie | • 815 Compactor |
| • Body Trucks | • Excavators |
| • 825 Compactor | • Water Truck |

The fill materials were moisture conditioned prior to and during placement to moisture contents suitable for compaction. Deleterious materials such as organics, sticks, roots and over size particles were sorted and removed during placement or were rejected for use. Occasional cobble sized particles may remain in the fill however are not considered to affect the fill as a mass.

Placement of the fill materials was carried layers appropriate for the above plant and compacted using the above plant carrying out multiple passes.

Our representative observed the filling process as described above and it was assessed to be consistent for the entire thickness of fill.

Field density tests and laboratory compactions were carried out on the fill materials in accordance with Table 5.1 and 8.1 of AS3798 2007 (Guidelines on Earthworks for Commercial and Residential Developments) and tested to AS1289 test methods (Testing of Soils for Engineering Purposes). Testing achieved the required specification of 95% of the Hilt Density.

Fill placed and compacted at measured density ratios less than 95% were tined, moisture conditioned and re-compacted until the required specification was achieved. Retesting was carried out using Random Stratified Location methods.

Picture 3: View of the Site During Construction



Picture 4: View of the Site During Construction



The Location of the field density tests are shown on the Site Plan contained in Appendix A. These test locations and levels were not obtained by survey and therefore should only be considered as approximate.

4.0 STATEMENT OF COMPLIANCE

Our representatives observed the relevant earthworks operations including the stripped surface, fill placement and compaction operations and carried out field density tests and laboratory compaction tests in accordance with the required standard (AS3798, AS1289) and Specification.

It is confirmed that Level 1 Inspection and Testing has been carried out on the earthworks fill to form the residential Lots and embankments below subgrade at The Site. Based on the observations made by our Geotechnicians and the results of the field and laboratory tests, the placed and compacted fill

at the above project has, as far as we have been able to assess, been constructed in general accordance with the intent of AS3798 and the Specifications.

The fill can be deemed to be “controlled” in accordance with AS2870.

5.0 EXCLUSIONS

This statement does not include any top soil, which may be placed for use as dressing or any other subsequent earthworks after 23rd September 2016.

Assessments of material quality such as soaked CBR and site classifications are excluded from this commission.

Our on-site attendance specifically excludes assessments of fill material quality and engineering properties that are outside the requirements of AS3798 - 2007, including soil or fill reactivity and soaked CBR values. We note that the fill materials used may result in unfavourable site classifications and low subgrade design strengths.

Footings and ground slabs for any structures constructed over natural soils or controlled fill should be designed to accommodate the characteristic ground surface movements and settlement potential. Assessments of these design parameters are beyond the scope of this Report.

6.0 LIMITATIONS

This Report has been prepared by Morrison Geotechnic Pty Ltd (**Morrison Geotechnic**), and may include contributions from Morrison Geotechnic’s officers and employees, sub-contractors, sub-consultants or agents (**Contributors**).

This Report is for the sole benefit and use of Pensar Civil Pty Ltd (**Client**), its designers, clients and relevant statutory authorities for the sole purpose of providing geotechnical advice and recommendations in respect of the Flagstone City Stage 1B, Jimboomba (**Project**). The Report is only intended to address those issues expressly described in the Brief/ Work Instructions in this Report.

This Report should not be used or relied upon for any other purpose without Morrison Geotechnic’s prior written consent. Morrison Geotechnic and the Contributors do not accept any responsibility or liability in any way whatsoever for the use or reliance of this Report by anyone other than the **Client**, its designers, its clients and relevant statutory authorities or by anyone else for any purpose other than that for which it has been prepared.

Except with Morrison Geotechnic’s prior written consent, this Report may not be:

- (a) released to any other party, whether in whole or in part (other than to the Client’s officers, employees, advisers, designers, clients and relevant statutory authorities);
- (b) used or relied upon by any other party.

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The information (including technical information and information obtained through discussions) on which this report is based has been provided by the Client and third parties. Morrison Geotechnic and the Contributors:

- (a) have relied upon and presumed the accuracy of this information;
- (b) have not verified the accuracy or reliability of this information (other than as expressly stated in this Report);

- (c) have not made any independent investigations or enquiries in respect of those matters of which it has no actual knowledge at the time of giving this Report to the Client; and
- (d) make no warranty or guarantee, expressed or implied, as to the accuracy or reliability of this information.

Morrison Geotechnic and the Contributors do not accept responsibility or liability for any incorrect assumptions related to this Report. For the avoidance of doubt, this Report:

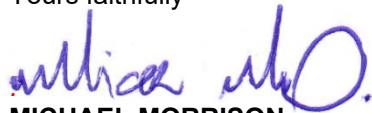
- (a) is not an environmental, contamination or hazardous materials assessment; may be invalid, incomplete or inaccurate (including errors in the scope of work, investigation methodology, observations, opinions and advice) where the information provided to Morrison Geotechnic was invalid, incomplete or inaccurate;
- (b) is limited to observations of those parts of the site described in Section 1.0.

No warranty or guarantee, whether express or implied, is made in respect of the geotechnical data, information, advice, opinions and recommendations present in this Report.

If further information becomes available, or additional assumptions need to be made, Morrison Geotechnic reserves its right to amend this Report.

If you have any queries regarding the above, please contact Michael Morrison at our Brisbane office.

Yours faithfully



MICHAEL MORRISON

For and on behalf of

MORRISON GEOTECHNIC PTY LIMITED



LYLE SLATER

ATTACHMENTS:

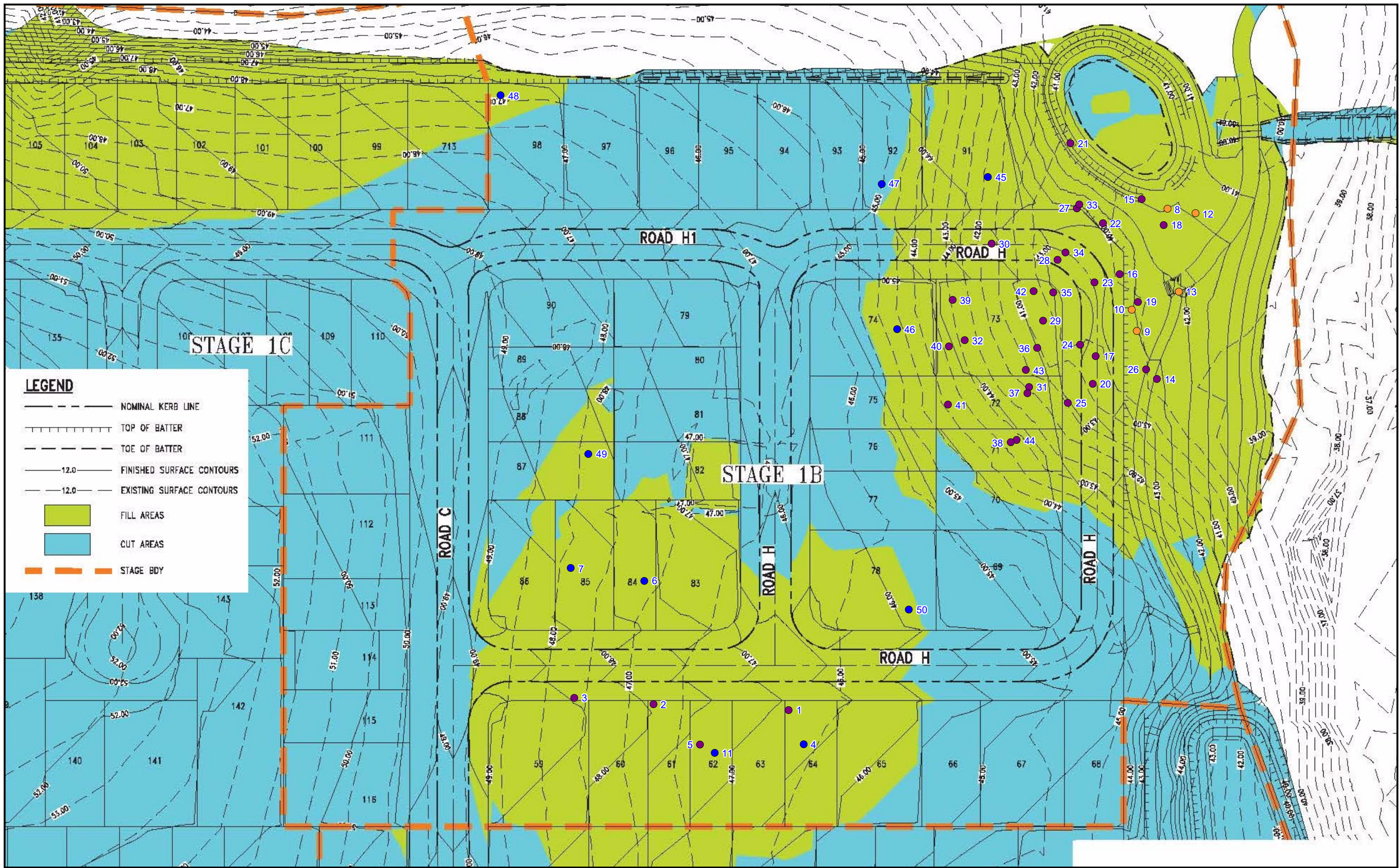
Appendix A – Site Plan Showing Test Locations

Appendix B – Laboratory Test Results Reports

Brochure – 'Important Information About Your Geotechnical Report'

APPENDIX A

Site Plan Showing Test Locations



MORRISON GEOTECHNIC PTY LTD

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Engineers: D.Riley, J. Daly
D.Dragun, & S.Wynne
Geologists: L.Bexley & R.Howchin
Laboratory: M.Morrison

LEGEND

- ▼ 0.0 - 0.99 Below Final Level
- RL 30.0 - 39.9
- RL 40.0 - 49.9
- Final Level

Map Description :	EARTHWORKS FIELD DENSITY TESTING - Level 1 Inspection			
Client :	PENSAR CIVIL PTY LTD			
Project :	FLAGSTONE CITY - STAGE 1B			
Project No :	DL16/216	Drawing No :	DL16/216 - 01	Scale :
				Not to Scale

APPENDIX B

Laboratory Test Results/ Reports

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 1
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	6/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215572	215573		
Test Number :	1	2		
Sampling Method :	-	-		
Date Sampled :	30/06/2016	30/06/2016		
Date Tested :	30/06/2016	30/06/2016		
Material Type :	Allotment Fill	Allotment Fill		
Material Source :	On Site	On Site		
Lot Number :	64	61		
Sample Location :	Lot 64 E 34454.2 N 73540.7 RL 46.000	Lot 61 E 34424.9 N 73527.7 RL 47.000		
Test Depth (mm) :	150	150		
Layer Depth (mm) :	-	-		
Maximum Size (mm) :	19	19		
Oversize Wet (%) :	-	-		
Oversize Dry (%) :	-	-		
Oversize Density (t/m ³) :	-	-		
Field Moisture Content (%) :	11.4	12.4		
Hilf MDR Number :	215572	215573		
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1		
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1		
Moisture Ratio (%) :	103.5	111.5		
Field Wet Density (t/m ³) :	2.112	2.100		
Optimum Moisture Content (%) :	11.0	11.1		
Moisture Variation :	-0.3	-1.4		
Peak Converted Wet Density (t/m ³) :	2.157	2.165		
Hilf Density Ratio (%) :	98.0	97.0		
Minimum Specification :	95	95		
Moisture Specification :	-	-		
Site Selection :	-	-		
Soil Description :	-	-		
Remarks :	-			



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Lyle Slater (Brisbane) - Field Manager
 NATA Accreditation Number
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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 2
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	6/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215574			
Test Number :	3			
Sampling Method :	-			
Date Sampled :	30/06/2016			
Date Tested :	30/06/2016			
Material Type :	Footpath Fill			
Material Source :	On Site			
Lot Number :	-			
Sample Location :	Footpath E 34407.400 N 73520.700 RL 47.700			
Test Depth (mm) :	150			
Layer Depth (mm) :	-			
Maximum Size (mm) :	19			
Oversize Wet (%) :	-			
Oversize Dry (%) :	-			
Oversize Density (t/m ³) :	-			
Field Moisture Content (%) :	10.7			
Hilf MDR Number :	215574			
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1			
Compactive Effort :	Standard			
Field Density Method :	AS1289.5.8.1 & 5.7.1			
Moisture Method :	AS1289.2.1.1			
Moisture Ratio (%) :	92			
Field Wet Density (t/m ³) :	2.130			
Optimum Moisture Content (%) :	11.6			
Moisture Variation :	0.9			
Peak Converted Wet Density (t/m ³) :	2.187			
Hilf Density Ratio (%) :	97.5			
Minimum Specification :	95			
Moisture Specification :	-			
Site Selection :	-			
Soil Description :	-			
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 3
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	6/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215611	215612	215613	215614
Test Number :	4	5	6	7
Sampling Method :	-	-	-	-
Date Sampled :	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Date Tested :	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Material Type :	Allotment Fill	Allotment Fill	Allotment Fill	Allotment Fill
Material Source :	On Site	On Site	On Site	On Site
Lot Number :	64	62	84	85
Sample Location :	Lot 64 E 34461.000 N 73535.000 Final Level	Lot 62 E 34439.000 N 73524.000 RL 47.000	Lot 84 E 34410.000 N 73553.000 RL 47.600 / Final Level	Lot 85 E 34393.000 N 73548.000 RL 48.100 / Final Level
Test Depth (mm) :	150	150	150	150
Layer Depth (mm) :	-	-	-	-
Maximum Size (mm) :	19	19	19	19
Oversize Wet (%) :	-	-	-	-
Oversize Dry (%) :	-	-	-	-
Oversize Density (t/m ³) :	-	-	-	-
Field Moisture Content (%) :	14.0	10.6	9.7	11.5
Hilf MDR Number :	215611	215612	215613	215614
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1
Compactive Effort :	Standard	Standard	Standard	Standard
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1
Moisture Ratio (%) :	100	85	84	87
Field Wet Density (t/m ³) :	2.056	2.029	1.993	2.002
Optimum Moisture Content (%) :	14.0	12.5	11.5	13.2
Moisture Variation :	0.0	1.9	1.9	1.8
Peak Converted Wet Density (t/m ³) :	2.135	2.064	2.059	2.071
Hilf Density Ratio (%) :	96.5	98.5	97.0	96.5
Minimum Specification :	95	95	95	95
Moisture Specification :	-	-	-	-
Site Selection :	-	-	-	-
Soil Description :	-	-	-	-
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 4
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	15/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215824	215825	215827	
Test Number :	8	9	10	
Sampling Method :	-	-	-	
Date Sampled :	7/07/2016	7/07/2016	7/07/2016	
Date Tested :	7/07/2016	7/07/2016	7/07/2016	
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	-	-	-	
Sample Location :	E 34482.100 N 73687.500 RL 39.300	E 34488.400 N 73658.200 RL 39.300	E 34485.100 N 73662.200 RL 39.600	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m ³) :	-	-	-	
Field Moisture Content (%) :	9.9	9.1	8.8	
Hilf MDR Number :	215824	215825	215827	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	84.5	83	82.5	
Field Wet Density (t/m ³) :	1.940	1.962	1.926	
Optimum Moisture Content (%) :	11.7	11.0	10.6	
Moisture Variation :	1.9	1.9	1.9	
Peak Converted Wet Density (t/m ³) :	2.039	2.040	2.029	
Hilf Density Ratio (%) :	95.0	96.0	95.0	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 5
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	15/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY, STAGE 1B	Page 1 of 1	

Sample Number :	215826			
Test Number :	11			
Sampling Method :	-			
Date Sampled :	7/07/2016			
Date Tested :	7/07/2016			
Material Type :	Allotment Fill			
Material Source :	On Site			
Lot Number :	62			
Sample Location :	Lot 62 E 34443.000 N 73523.800 Final Level			
Test Depth (mm) :	150			
Layer Depth (mm) :	-			
Maximum Size (mm) :	19			
Oversize Wet (%) :	-			
Oversize Dry (%) :	-			
Oversize Density (t/m³) :	-			
Field Moisture Content (%) :	15.0			
Hilf MDR Number :	215826			
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1			
Compactive Effort :	Standard			
Field Density Method :	AS1289.5.8.1 & 5.7.1			
Moisture Method :	AS1289.2.1.1			
Moisture Ratio (%) :	102			
Field Wet Density (t/m³) :	2.029			
Optimum Moisture Content (%) :	14.7			
Moisture Variation :	-0.3			
Peak Converted Wet Density (t/m³) :	2.126			
Hilf Density Ratio (%) :	95.5			
Minimum Specification :	95			
Moisture Specification :	-			
Site Selection :	-			
Soil Description :	-			
Remarks :	-			



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Document Code RF89-11

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 6
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215845	215846	215847	215848
Test Number :	12	13	14	15
Sampling Method :	-	-	-	-
Date Sampled :	8/07/2016	8/07/2016	8/07/2016	8/07/2016
Date Tested :	8/07/2016	8/07/2016	8/07/2016	8/07/2016
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	Embankment Fill
Material Source :	On Site	On Site	On Site	On Site
Lot Number :	-	-	-	-
Sample Location :	E 34488.500 N 73689.500 RL 39.900	E 34493.200 N 73671.000 RL 39.700	E 34497.700 N 73650.100 RL 40.000	E 34475.600 N 73686.800 RL 40.000
Test Depth (mm) :	150	150	150	150
Layer Depth (mm) :	-	-	-	-
Maximum Size (mm) :	19	19	19	19
Oversize Wet (%) :	-	-	-	-
Oversize Dry (%) :	-	-	-	-
Oversize Density (t/m ³) :	-	-	-	-
Field Moisture Content (%) :	12.0	14.2	14.7	11.2
Hilf MDR Number :	215845	215846	215847	215848
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1
Compactive Effort :	Standard	Standard	Standard	Standard
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1
Moisture Ratio (%) :	107	105.5	106	89.5
Field Wet Density (t/m ³) :	2.041	2.008	2.043	2.019
Optimum Moisture Content (%) :	11.2	13.4	13.9	12.5
Moisture Variation :	-0.8	-0.8	-0.8	1.3
Peak Converted Wet Density (t/m ³) :	2.124	2.107	2.114	2.100
Hilf Density Ratio (%) :	96.0	95.5	96.5	96.0
Minimum Specification :	95	95	95	95
Moisture Specification :	-	-	-	-
Site Selection :	-	-	-	-
Soil Description :	-	-	-	-
Remarks :	-			



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 NATA Accreditation Number
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Document Code RF89-11

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 7
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215849	215850		
Test Number :	16	17		
Sampling Method :	-	-		
Date Sampled :	8/07/2016	8/07/2016		
Date Tested :	8/07/2016	8/07/2016		
Material Type :	Embankment Fill	Embankment Fill		
Material Source :	On Site	On Site		
Lot Number :	-	-		
Sample Location :	Footpath E 34478.800 N 73668.500 RL 40.300	Road E 34482.300 N 73648.500 RL 40.400		
Test Depth (mm) :	150	150		
Layer Depth (mm) :	-	-		
Maximum Size (mm) :	19	19		
Oversize Wet (%) :	-	-		
Oversize Dry (%) :	-	-		
Oversize Density (t/m ³) :	-	-		
Field Moisture Content (%) :	12.9	13.1		
Hilf MDR Number :	215849	215850		
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1		
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1		
Moisture Ratio (%) :	85	90.5		
Field Wet Density (t/m ³) :	1.976	2.043		
Optimum Moisture Content (%) :	15.2	14.5		
Moisture Variation :	2.4	1.4		
Peak Converted Wet Density (t/m ³) :	2.033	2.084		
Hilf Density Ratio (%) :	97.0	98.0		
Minimum Specification :	95	95		
Moisture Specification :	-	-		
Site Selection :	-	-		
Soil Description :	-	-		
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 8
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215897	215898	215899	
Test Number :	18	19	20	
Sampling Method :	-	-	-	
Date Sampled :	9/07/2016	9/07/2016	9/07/2016	
Date Tested :	9/07/2016	9/07/2016	9/07/2016	
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	-	-	-	
Sample Location :	E 34483.000 N 73683.600 RL 40.200	E 34485.600 N 73664.500 RL 40.300	E 34484.600 N 73642.300 RL 40.700	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m ³) :	-	-	-	
Field Moisture Content (%) :	11.3	10.4	12.1	
Hilf MDR Number :	215897	215898	215899	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	105.5	92	100	
Field Wet Density (t/m ³) :	2.031	2.049	2.100	
Optimum Moisture Content (%) :	10.7	11.3	12.1	
Moisture Variation :	-0.6	0.9	0.0	
Peak Converted Wet Density (t/m ³) :	2.126	2.094	2.159	
Hilf Density Ratio (%) :	95.5	98.0	97.5	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 9
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215926	215927	215928	215929
Test Number :	21	22	23	24
Sampling Method :	-	-	-	-
Date Sampled :	11/07/2016	11/07/2016	11/07/2016	11/07/2016
Date Tested :	11/07/2016	11/07/2016	11/07/2016	11/07/2016
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	Embankment Fill
Material Source :	On Site	On Site	On Site	On Site
Lot Number :	-	-	-	-
Sample Location :	E 34454.600 N 73691.200 RL 40.700	E 34469.900 N 73677.600 RL 40.600	Road E 34474.300 N 73664.100 RL 40.900	Footpath E 34477.800 N 73649.300 RL 41.200
Test Depth (mm) :	150	150	150	150
Layer Depth (mm) :	-	-	-	-
Maximum Size (mm) :	19	19	19	19
Oversize Wet (%) :	-	-	-	-
Oversize Dry (%) :	-	-	-	-
Oversize Density (t/m ³) :	-	-	-	-
Field Moisture Content (%) :	10.9	10.5	10.1	11.6
Hilf MDR Number :	215926	215927	215928	215929
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1
Compactive Effort :	Standard	Standard	Standard	Standard
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1
Moisture Ratio (%) :	95.5	97	84	97
Field Wet Density (t/m ³) :	2.101	2.040	2.086	2.025
Optimum Moisture Content (%) :	11.4	10.8	12.0	12.0
Moisture Variation :	0.6	0.3	1.9	0.3
Peak Converted Wet Density (t/m ³) :	2.124	2.149	2.103	2.119
Hilf Density Ratio (%) :	99.0	95.0	99.0	95.5
Minimum Specification :	95	95	95	95
Moisture Specification :	-	-	-	-
Site Selection :	-	-	-	-
Soil Description :	-	-	-	-
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 10
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215930	215931		
Test Number :	25	26		
Sampling Method :	-	-		
Date Sampled :	11/07/2016	11/07/2016		
Date Tested :	11/07/2016	11/07/2016		
Material Type :	Embankment Fill	Embankment Fill		
Material Source :	On Site	On Site		
Lot Number :	-	-		
Sample Location :	Footpath E 34481.300 N 73635.600 RL 41.400	E 34494.400 N 73651.000 RL 40.400		
Test Depth (mm) :	150	150		
Layer Depth (mm) :	-	-		
Maximum Size (mm) :	19	19		
Oversize Wet (%) :	-	-		
Oversize Dry (%) :	-	-		
Oversize Density (t/m³) :	-	-		
Field Moisture Content (%) :	10.2	12.0		
Hilf MDR Number :	215930	215931		
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1		
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1		
Moisture Ratio (%) :	85.5	104.5		
Field Wet Density (t/m³) :	2.105	2.092		
Optimum Moisture Content (%) :	11.9	11.5		
Moisture Variation :	1.8	-0.6		
Peak Converted Wet Density (t/m³) :	2.133	2.201		
Hilf Density Ratio (%) :	98.5	95.0		
Minimum Specification :	95	95		
Moisture Specification :	-	-		
Site Selection :	-	-		
Soil Description :	-	-		
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 11
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215984	215985	215986	215988
Test Number :	27	28	29	30
Sampling Method :	-	-	-	-
Date Sampled :	12/07/2016	12/07/2016	12/07/2016	12/07/2016
Date Tested :	12/07/2016	12/07/2016	12/07/2016	12/07/2016
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	Embankment Fill
Material Source :	On Site	On Site	On Site	On Site
Lot Number :	-	-	-	-
Sample Location :	E 34462.800 N 73678.000 RL 41.100	Road E 34464.100 N 73665.000 RL 41.500	E 34467.400 N 73650.500 RL 41.700	Road E 34448.400 N 73661.500 RL 41.700
Test Depth (mm) :	150	150	150	150
Layer Depth (mm) :	-	-	-	-
Maximum Size (mm) :	19	19	19	19
Oversize Wet (%) :	-	-	-	-
Oversize Dry (%) :	-	-	-	-
Oversize Density (t/m ³) :	-	-	-	-
Field Moisture Content (%) :	12.9	12.1	12.7	11.1
Hilf MDR Number :	215984	215985	215986	215988
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1
Compactive Effort :	Standard	Standard	Standard	Standard
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1
Moisture Ratio (%) :	89	97	87	72
Field Wet Density (t/m ³) :	2.021	2.080	2.070	2.047
Optimum Moisture Content (%) :	14.5	12.4	14.6	15.5
Moisture Variation :	1.6	0.3	1.9	4.3
Peak Converted Wet Density (t/m ³) :	2.074	2.118	2.094	2.018
Hilf Density Ratio (%) :	97.5	98.0	99.0	101.5
Minimum Specification :	95	95	95	95
Moisture Specification :	-	-	-	-
Site Selection :	-	-	-	-
Soil Description :	-	-	-	-
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 12
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	215987	215989		
Test Number :	31	32		
Sampling Method :	-	-		
Date Sampled :	12/07/2016	12/07/2016		
Date Tested :	12/07/2016	12/07/2016		
Material Type :	Allotment Fill	Allotment Fill		
Material Source :	On Site	On Site		
Lot Number :	72	73		
Sample Location :	Lot 72 E 34471.400 N 73634.900 RL 42.100	Lot 73 E 34452.800 N 73638.100 RL 42.400		
Test Depth (mm) :	150	150		
Layer Depth (mm) :	-	-		
Maximum Size (mm) :	19	19		
Oversize Wet (%) :	-	-		
Oversize Dry (%) :	-	-		
Oversize Density (t/m³) :	-	-		
Field Moisture Content (%) :	12.0	12.4		
Hilf MDR Number :	215987	215989		
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1		
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1		
Moisture Ratio (%) :	86.5	102.5		
Field Wet Density (t/m³) :	2.019	2.072		
Optimum Moisture Content (%) :	13.9	12.1		
Moisture Variation :	1.9	-0.3		
Peak Converted Wet Density (t/m³) :	2.100	2.158		
Hilf Density Ratio (%) :	96.0	96.0		
Minimum Specification :	95	95		
Moisture Specification :	-	-		
Site Selection :	-	-		
Soil Description :	-	-		
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 13
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	216023	216024	216025	
Test Number :	33	34	35	
Sampling Method :	-	-	-	
Date Sampled :	13/07/2016	13/07/2016	13/07/2016	
Date Tested :	13/07/2016	13/07/2016	13/07/2016	
Material Type :	Embankment Fill	Embankment Fill	Embankment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	-	-	-	
Sample Location :	E 34462.900 N 73679.100 RL 41.800	Road E 34465.000 N 73667.400 RL 41.800	Footpath E 34466.600 N 73657.600 RL 42.100	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m ³) :	-	-	-	
Field Moisture Content (%) :	14.4	14.8	18.2	
Hilf MDR Number :	216023	216024	216025	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	93.5	94.5	103.5	
Field Wet Density (t/m ³) :	1.958	2.025	2.026	
Optimum Moisture Content (%) :	15.4	15.6	17.6	
Moisture Variation :	1.0	0.8	-0.6	
Peak Converted Wet Density (t/m ³) :	2.049	2.080	2.104	
Hilf Density Ratio (%) :	95.5	97.5	96.5	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 14
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	216026	216027	216028	
Test Number :	36	37	38	
Sampling Method :	-	-	-	
Date Sampled :	13/07/2016	13/07/2016	13/07/2016	
Date Tested :	13/07/2016	13/07/2016	13/07/2016	
Material Type :	Allotment Fill	Allotment Fill	Allotment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	73	72	71	
Sample Location :	Lot 73 E 34469.000 N 73644.100 RL 42.400	Lot 72 E 34471.700 N 73633.400 RL 42.800	Lot 71 E 34473.300 N 73621.200 RL 43.300	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m³) :	-	-	-	
Field Moisture Content (%) :	12.9	11.1	10.6	
Hilf MDR Number :	216026	216027	216028	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	88.5	85.5	84.5	
Field Wet Density (t/m³) :	2.027	2.066	2.041	
Optimum Moisture Content (%) :	14.6	13.0	12.5	
Moisture Variation :	1.7	1.9	1.9	
Peak Converted Wet Density (t/m³) :	2.117	2.116	2.035	
Hilf Density Ratio (%) :	96.0	97.5	100.5	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 15
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	216110	216111	216112	216113
Test Number :	39	40	41	42
Sampling Method :	-	-	-	-
Date Sampled :	12/07/2016	12/07/2016	12/07/2016	12/07/2016
Date Tested :	14/07/2016	14/07/2016	14/07/2016	14/07/2016
Material Type :	Allotment Fill	Allotment Fill	Allotment Fill	Allotment Fill
Material Source :	On Site	On Site	On Site	On Site
Lot Number :	73	73	72	73
Sample Location :	Lot 73 E 34446.000 N 73645.400 RL 43.700	Lot 73 E 34450.100 N 73635.100 RL 43.800	Lot 72 E 34456.000 N 73622.600 RL 44.100	Lot 73 E 34462.300 N 73655.800 RL 43.200
Test Depth (mm) :	150	150	150	150
Layer Depth (mm) :	-	-	-	-
Maximum Size (mm) :	19	19	19	19
Oversize Wet (%) :	-	-	-	-
Oversize Dry (%) :	-	-	-	-
Oversize Density (t/m³) :	-	-	-	-
Field Moisture Content (%) :	12.5	11.3	13.1	10.6
Hilf MDR Number :	216110	216111	216112	216113
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1
Compactive Effort :	Standard	Standard	Standard	Standard
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1
Moisture Ratio (%) :	87.5	86.5	104	101
Field Wet Density (t/m³) :	2.027	2.010	2.044	2.039
Optimum Moisture Content (%) :	14.3	13.1	12.6	10.5
Moisture Variation :	1.8	1.8	-0.6	-0.1
Peak Converted Wet Density (t/m³) :	2.059	2.108	2.141	2.072
Hilf Density Ratio (%) :	98.5	95.5	95.5	98.5
Minimum Specification :	95	95	95	95
Moisture Specification :	-	-	-	-
Site Selection :	-	-	-	-
Soil Description :	-	-	-	-
Remarks :	-			



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Document Code RF89-11

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 16
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY, STAGE 1B	Page 1 of 1	

Sample Number :	216114	216115		
Test Number :	43	44		
Sampling Method :	-	-		
Date Sampled :	12/07/2016	12/07/2016		
Date Tested :	14/07/2016	14/07/2016		
Material Type :	Allotment Fill	Allotment Fill		
Material Source :	On Site	On Site		
Lot Number :	73	71		
Sample Location :	Lot 73 E 34468.900 N 73638.200 RL 43.500	Lot 71 E 34474.300 N 73622.300 RL 43.900		
Test Depth (mm) :	150	150		
Layer Depth (mm) :	-	-		
Maximum Size (mm) :	19	19		
Oversize Wet (%) :	-	-		
Oversize Dry (%) :	-	-		
Oversize Density (t/m³) :	-	-		
Field Moisture Content (%) :	12.6	14.2		
Hilf MDR Number :	216114	216115		
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1		
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1		
Moisture Ratio (%) :	89	98.5		
Field Wet Density (t/m³) :	2.064	2.082		
Optimum Moisture Content (%) :	14.2	14.4		
Moisture Variation :	1.6	0.2		
Peak Converted Wet Density (t/m³) :	2.107	2.097		
Hilf Density Ratio (%) :	98.0	99.5		
Minimum Specification :	95	95		
Moisture Specification :	-	-		
Site Selection :	-	-		
Soil Description :	-	-		
Remarks :	-			



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APPROVED SIGNATORY



Mick Morrison (Brisbane) - Director
 NATA Accreditation Number
 1162 / 1169

Document Code RF89-11

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 17
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	26/07/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	216152	216153	216154	
Test Number :	45	46	47	
Sampling Method :	-	-	-	
Date Sampled :	15/07/2016	15/07/2016	15/07/2016	
Date Tested :	15/07/2016	15/07/2016	15/07/2016	
Material Type :	Allotment Fill	Allotment Fill	Allotment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	91	74	92	
Sample Location :	Lot 91 E 34440.600 N 73675.300 RL 43.700 / Final Level	Lot 74 E 34437.300 N 73633.300 RL 45.100 / Final Level	Lot 92 E 34418.800 N 73662.600 RL 44.500 / Final Level	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m ³) :	-	-	-	
Field Moisture Content (%) :	12.1	13.6	8.6	
Hilf MDR Number :	216152	216153	216154	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	98	99.5	82	
Field Wet Density (t/m ³) :	2.058	2.073	2.102	
Optimum Moisture Content (%) :	12.4	13.7	10.5	
Moisture Variation :	0.2	0.1	1.9	
Peak Converted Wet Density (t/m ³) :	2.119	2.121	2.106	
Hilf Density Ratio (%) :	97.0	97.5	100.0	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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Mick Morrison (Brisbane) - Director
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 1162 / 1169

Document Code RF89-11

Hilf Density Ratio Report

Client :	PENSAR CIVIL PTY LTD	Report Number:	DL16/216 - 18
Address :	P O BOX 3950, SOUTH BRISBANE, QLD, 4101	Report Date :	30/09/2016
Project Name :	EARTHWORKS SUPERVISION	Order Number :	M16-180
Project Number :	DL16/216	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	FLAGSTONE CITY , STAGE 1B	Page 1 of 1	

Sample Number :	218826	218827	218828	
Test Number :	48	49	50	
Sampling Method :	-	-	-	
Date Sampled :	23/09/2016	23/09/2016	23/09/2016	
Date Tested :	23/09/2016	23/09/2016	23/09/2016	
Material Type :	Allotment Fill	Allotment Fill	Allotment Fill	
Material Source :	On Site	On Site	On Site	
Lot Number :	98	87	78	
Sample Location :	Lot 98 3m From North Boundary 3m From West Boundary Final Level	Lot 87 3m From North Boundary 6m From East Boundary Final Level	Lot 78 5m From South Boundary 6m From East Boundary Final Level	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m ³) :	-	-	-	
Field Moisture Content (%) :	9.4	10.8	11.9	
Hilf MDR Number :	218826	218827	218828	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	87	98	96.5	
Field Wet Density (t/m ³) :	2.106	2.060	2.061	
Optimum Moisture Content (%) :	10.8	11.0	12.3	
Moisture Variation :	1.4	0.2	0.4	
Peak Converted Wet Density (t/m ³) :	2.130	2.137	2.147	
Hilf Density Ratio (%) :	99.0	96.5	96.0	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			



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APPROVED SIGNATORY

Liam A Mcdowall

Liam Mcdowall (Brisbane) - Branch Manager
 NATA Accreditation Number
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Document Code RF89-11

Important Information about Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time to perform additional study.* Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/THE BEST PEOPLE ON EARTH exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.



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