

1 July 2024

GEO Ref: 24006AA-D-L10-v1

Your Ref: TBA

James Henderson
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LEVEL 1 GEOTECHNICAL SUPERVISION
CRANE PAD
HMAS CAIRNS
CAIRNS QLD 4870

Dear James,

GEO Design (GEO) has carried out inspections and provided onsite advice in relation to the construction of a crane pad associated with a proposed new substation at HMAS Cairns. This letter report summarises the construction of the crane pad and provides certification of its capacity.

GEO previously provided a crane pad design based on site investigations and the proposed crane equipment to be used. The results of the investigational work together with the design of an appropriate crane pad were presented in our letter report 24006AA-D-L01-v1 dated 20 February 2024.

In general, the crane pad comprised the construction of a reinforced soil platform in the areas where the crane outriggers were to be located. The constructed reinforced soil platform comprised the placement of geogrid and geofabric layers (BiTex30 geogrid) at 150 mm intervals together with the placement and compaction of a crushed concrete product (Minimum CBR50) for a total thickness of 300 mm.

In addition, it is understood that the crane outriggers will be placed on steel plates measuring 2.4 m x 3.5 m. Based on the loads provided for the proposed crane (Leibherr LTM 1250-6.1), the average load exerted onto the reinforced soil platform will be around 122 kPa.

The details and sequencing of the reinforced soil crane pad are summarised below.

1. Clearing and grubbing area and excavate to design level in areas where outriggers are to be placed.
2. Placement of Layer 1 of BiTex30 geogrid.
3. Placement and compaction of Layer 1 of 150 mm of crushed concrete product.
4. Placement of Layer 2 of BiTex30 geogrid.

5. Placement and compaction of Layer 2 of 150 mm of crushed concrete product.

As part of our works, GEO has carried out a "Level 1" supervision of the earthworks in general accordance with section 8 of Australian Standard AS 3798-2007 *Guidelines on earthworks for commercial and residential developments*.

Placement of fill and field density testing was carried out under the supervision of GEO and is considered to be controlled fill to "Level 1" standard in accordance with AS3798-2007.

Field density testing of the backfill material was carried out by an independent NATA accredited laboratory and the results are summarised in the following table.

Test ID	Location	Material	Density Ratio %
24/088	Crane Pad E: 369877 / N: 8126924 / Layer: 1	Backfill	101.5
24/089	Crane Pad E: 369882 / N: 8126923 / Finished Level	Backfill	100.5

The results of the testing are attached.

Based on the results of the field testing, together with observations made during the conductance of the earthworks, it is considered that the works meet the requirements of the design.

The results of the field testing, together with the result of density testing on the placed material that forms the reinforced soil platform for the crane pad, indicates that the required Allowable Bearing Pressure of >122 kPa has been achieved.

A minimum Factor of Safety of 1.3 has been adopted for the design and construction works.

We would be pleased to answer any questions that you may have regarding this matter.

Yours sincerely,



Steve Ford
Geotechnical Engineer
BSc (Geo) BSc (Geo) Hons MEngSc (Geotechnical) MMinEng (Geomechanics)
RPEQ 25762

Attachments

1. Laboratory Test Certificates



Hilf Density Ratio Report

Client :	Geo Design Pty Ltd	Report Number:	1-000-112-094 - 4
Address :	14 Danbullan Street, Smithfield, QLD, 4878	Report Date :	12/04/2024
Project Name :	HMAS Cairns 24006AA-D	Order Number :	
Project Number :	1-000-112-094	Test Method :	AS1289.5.7.1
Location:	Cairns	Page 1 of 1	

Sample Number :	24/088	24/089		
Test Number :				
Sampling Method :	AS1289.1.2.1	AS1289.1.2.1		
Date Sampled :	9/04/2024	10/04/2024		
Date Tested :	12/04/2024	12/04/2024		
Material Type :	Fill	Fill		
Material Source :	Bugeja Recycling	Bugeja Recycling		
Lot Number :	Layer 1	Finish Level		
Sample Location :	HMAS Cairns Substation (Crane Out Rigger Pads) E 369877 N 8126924 Layer 1	HMAS Cairns Substation (Crane Out Rigger Pads) E 369882 N 8126923 Finish Level		
Test Depth (mm) :	120	180		
Layer Depth (mm) :	150	150		
Maximum Size (mm) :	19.0	19.0		
Oversize Wet (%) :	2	1		
Oversize Dry (%) :				
Oversize Density (t/m ³) :	2.70	2.65		
Field Moisture Content (%) :				
Hilf MDR Number :	24/088	24/089		
Hilf MDR Method :	AS1289.5.7.1	AS1289.5.7.1		
Compactive Effort :	Standard	Standard		
Field Density Method :	AS1289.5.3.1 & 5.7.1	AS1289.5.3.1 & 5.7.1		
Moisture Method :				
Moisture Ratio (%) :				
Field Wet Density (t/m ³) :	2.23	2.24		
Optimum Moisture Content (%) :				
Moisture Variation :	2% Below OMC	0% Below OMC		
Peak Converted Wet Density (t/m ³) :	2.20	2.22		
Hilf Density Ratio (%) :	101.5	100.5		
Minimum Specification :	98	98		
Moisture Specification :				
Site Selection :				
Soil Description :				
Remarks :	-			



Accredited for compliance with ISO/IEC 17025-Testing

APPROVED SIGNATORY

Paul Patane - Technician
NATA Accreditation Number
9523

Document Code RF94-10