

# Memo

To: Mark Iles

From: Jose Pereira

Date: 16/07/2014



sustainablethinking®

## RE: HB13604 Macquarie Heads Development Road Upgrade – Additional test pitting at Mill Bay

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Dear Mark,

The Department of State Growth has engaged **pitt&sherry** to develop the design and tender documentation for the upgrade of Macquarie Heads Development Road. Additional test pitting has been requested by the Department of State Growth at Mill Bay to acquire additional information regarding the strength of the subgrade on the foreshore side of the road.

Three test pits were excavated on the foreshore side of Ocean Beach Road at Mill Bay located at the following chainages: 1.5 km, 1.67 km and 1.75 km. Samples of the materials encountered were collected and test pit logs prepared. DCP testing was undertaken where appropriate.

CBR values were estimated for each material type encountered to evaluate subgrade strength. This Memo includes the findings of the additional test pitting works undertaken and analysis of the information collected to determine whether the current pavement design requires alteration and whether additional drainage measures need to be incorporated into the detailed design. The test pit logs have been incorporated into the Pavement Report for inclusion in the tender documents.

- Test Pits Information

- OBR\_1 (chainage 1.5km): The test pit was excavated in the shoulder until the target depth of 1.80m and water inflow was registered at a depth of 1.60m. The subgrade is composed of sand with an estimated CBR value of 8%. A gravel layer approximately 500mm thick with an estimated CBR value of 40% was found over the subgrade.
- OBR\_2 (chainage 1.67km): The test pit was excavated in the shoulder until the target depth of 1.90m and water inflow was registered at a depth of 1.80m. The subgrade is composed of sand with an estimated CBR value of 8%. A gravel layer approximately 600mm thick with an estimated CBR value of 40% was found over the subgrade.
- OBR\_3 (chainage 1.75km): The test pit was excavated in the shoulder until a depth of 1.10m where the excavation had to be interrupted due to loose material collapsing underneath a water main located on the side of the road. The subgrade is composed of sand with an estimated CBR value of 25%. A gravel layer approximately 400mm thick with an estimated CBR value of 40% was found over the subgrade.

- Implications for the current pavement design

The three test pits excavated indicate an existing granular material over the subgrade with thickness around 400mm and CBR values estimated in 40% which will be used as a good quality Sub Base for the pavement structure. For the section of the road with an existing seal in the vicinity of Mill Bay, a 150mm thick additional layer of Base Class B will be constructed over the existing granular material providing adequate subgrade covering as recommended in the Pavement Investigation report prepared by **pitt&sherry** (document number: HB13604H004 Pavement rep 31P Rev 01).

For the areas outside of the existing seal, a new pavement structure has been proposed with 390mm thick of granular material (120mm of Sub Base 2, 120mm of Sub Base1 and 150mm of Base Class B) over an estimated subgrade CBR of 8%, which is considered adequate as it exceeds the minimum recommended value of 300mm associated with the design traffic and subgrade conditions.

An analysis was undertaken using Circlly software to confirm that the existing pavement design does not need modification considering the additional information obtained from these three test pits.

- Implications for the drainage design

Two of the three test pits excavated showed water inflow at approximately 1.6m deep. As the existing pavement does not indicate signs of deformation and apparent distresses in the surface (NDI condition) in the areas of the test pits, it is unlikely that ground water table will influence the existing and/or proposed pavement structure. However, as the test pits might not be representative of the entire Mill Bay area and also as a risk management factor, it is recommended to include a provisional quantity for rock drainage blanket in the schedule of rates.

Do not hesitate to contact me if further questions arise.

Kind Regards,

Jose Pereira

**Senior Pavement Engineer**

Project No.: HB13604

[illegible]

Photo



### Sketch



Classification Symbols and Soil Descriptions	Relative Density	Consistency	Moisture Condition	Pavement Surface Condition					
	Based on Unified Soil Classification System	VL - Very Loose	VS - Very Soft	D - Dry	Deformation	Surface Integrity	Cracking		
		L - Loose	S - Soft	M - Moist	<5mm - ND	Intact - I	Type	Spacing (mm)	Width (mm)
		MD - Medium Dense	F - Firm	W - Wet	5-10mm - LD	Cracked - C	Alligator - a	<100 - cs	<0.5 - f
		D - Dense	VST - Very Stiff		10-20mm - MD	Patched - P	Longitudinal - l	100-500- ms	0.5-2 - n
	VD - Very Dense	H - Hard		>20mm - SD	Seal Break - B	Transverse - t	>500 - ws	>2 - g	
		Fb - Friable				Both - b			





## Engineering Log - Pavement Pit

Pit Number

**OBR\_3**

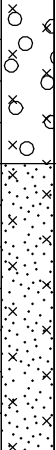
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Project No.: HB13604

Client:	Department of Infrastructure Energy and Resources	Logged By:	Neil Johnson	Date:	12/06/2014
Project Name:	Macquarie Heads Road - Mill Bay	Checked By:		Date:	

Reference Point (CH 0.0 ): Lyell Highway Link Number: Easting: 360160 mE  
Excavation Method: Excavator (3m x 1.2m) Chainage: 1750 m on left hand side 3 m from the centre line Northing: 5332315 mN

Grade: 2 % Crossfall: 3 % Seal Width: 6.0 m Seal Type: Flush seal  
Left Shoulder Width: 0.7 m Right Shoulder Width: 0.5 m Left hand side: At grade Right hand side: Cut 3 m high  
Pavement Drainage: Adequate  
Table Drains: Left hand side: Inadequate Right hand side: Inadequate  
Pavement Condition: NDI Rut Depth: mm Deflection:

Samples Tests Remarks	Depth (m)	Graphic Log	Classification Symbol	Material Description MAIN COMPONENT; plasticity or particle characteristics, with secondary and minor components, colour	Estimated CBR	Moisture Condition	Consistency Density Index	Dynamic Cone Penetrometer blows/100mm	CBR Correlated from Dynamic Cone Penetrometer Measurements
B - see OBR1/1			GP	GRAVEL; coarse grained, quartzite, rounded to sub rounded, with coarse sand fines, none plastic, brown. (Pavement and Shoulder material)	40	D-M	MD		
	0.5		SP-SM	silty SAND; fine grained, with some coarse, rounded, quartzite gravels, grey.  Excavation collapsing around water main discontinued pit at 1.1m	25				
	1.0								
	1.5			Hole terminated at 1.10m at target depth					

Photo



Sketch



Classification Symbols and Soil Descriptions	Relative Density	Consistency	Moisture Condition	Deformation	Pavement Surface Condition	Cracking
Based on Unified Soil Classification System	VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense	VS - Very Soft S - Soft F - Firm VSt - Very Stiff H - Hard Fb - Friable	D - Dry M - Moist W - Wet	<5mm - ND 5-10mm - LD 10-20mm - MD >20mm - SD	Surface Integrity Intact - I Cracked - C Patched - P Seal Break - B Pothole - H	Type Alligator - a Longitudinal - l Transverse - t Spacing (mm) <100 - cs 100-500- ms >500 - ws Width (mm) <0.5 - f 0.5-2 - n >2 - g