



**NSW Bridge Association Supplementary Air Conditioning Proposal
Level 1, 162 Goulburn St, Sydney 2010**

**Stage 2a – Technical Report on Base building System
15th October 2007**

TABLE OF CONTENTS

1. Requirements of this report.....	2
2. Methodology.....	2
3. Results.....	2
4. Assumptions.....	3
5. Alternative Technologies.....	3
6. Measurement Report.....	4
7. VRF Quotation from Genesis Air Services.....	5

1. REQUIREMENTS OF THIS REPORT

As part of Southland Pacific's consultancy on the feasibility, costing and management of the proposed NSWBA air conditioning upgrade, this report focuses on assessing the suitability of the existing building air conditioning infrastructure to support additional local condenser water air conditioning units in the Level 1 tenancy.

It follows the successful completion of Stage 1 consultancy, which concluded that the proposed air conditioning upgrade to NSWBA was permissible and within legal and regulatory requirements of Council, EPA and Strata.

This report is based on the results of measurements performed on the building condenser water loop to establish water flow and hence heat sinking capacity, and on current fresh air supply to determine requirements for supplementary flow. The fresh air requirements will also have a bearing on the amount of additional cooling capacity required due to the additional heat load from unconditioned outside air at ambient temperature.

2. METHODOLOGY

Measurements were performed on the water flow in the pump housing, and in the loop itself to determine current flow rates, and calculations performed to establish likely flow rates under standard operating conditions, given possible variations due to additional loads being imposed on the circuit.

Measurements were performed using non-invasive ultrasonic test apparatus employing a Doppler shift calculation technique.

3. RESULTS

Results were disappointing, and substantially lower than predicted.

Measured **air flow rates** during normal operation are **458 litres per second**, with a maximum flow rate of **884 litres per second**, meaning that an additional supplementary fan unit of over 2,000 litres per second would be required to satisfy standards requirements.

The amount of cooling capacity required to effectively condition this quantity of outside air on a hot day would be 10kW over and above the heat load from the room itself.

Calculated water flow rates are **0.85 litres per second** for the tenancy. A 9.5kW Temperzone unit has a basic requirement for 0.45 litres per second, meaning that even 2 such units (19kW total) would exceed the capacity of the loop. Future attachments to the loop by other tenants in the building could reduce flow rates even further.

Given even a modestly sized installation of 30-40kW, there is no way the base condenser water system can be deployed or modified to support the cooling requirements for 200 persons at the required fresh air supply rate.

4. ASSUMPTIONS

It is believed that a smaller impeller has been fitted in this case, based on discrepancies between the flow as measured in the housing and the water circuit. Southern Cross Pumps were unable to provide in formation about the impeller fitted to this particular pump.

Calculations are based on a typical 285mm pump impeller, although the actual diameter of the impeller is not known. The maximum impeller size available in this pump unit is 345mm. In any case, the possible variation in impeller size is still insufficient to positively influence the feasibility of using the condenser water loop in the project.

5. ALTERNATIVE TECHNOLOGIES

A relatively recent technology that may be deployed as an alternative to the condenser water cooling packs described in previous quotations and specifications. These systems are known as VRF (Variable Refrigerant Volume) systems, and are similar in construction to the ‘split system’ air conditioning units sold in retail outlets for domestic use. They differ in the sense that they are able to change the flow rate of the refrigerant to suit the demands of the local cooler packs, and also in that they are capable of running very high vertical line lengths to the rooftop units. VRF systems are very reliable, quiet, energy efficient, and have a lifespan of at least 10-15 years. Development Application requirements for such a installation would be greater, as there would be higher visibility of the equipment from the outside of the building, but should not present an obstacle to approval.

The system specified is indicatively priced at \$150k + GST, but this may vary a little once technical specifications have been finalised. At this stage, estimated time to install such a system is approximately 8 working days, with 3 days allocated to disruptive work inside the Level 1 tenancy. Delivery time for the equipment is estimated at 4 to 5 weeks. The cost estimate does provide a reasonable guide for the NSWBA Council to evaluate whether this is a viable option or not. If the NSWBA wishes to proceed, Southland will immediately finalise costs, get sign off from NSWBA, and begin a development application.

7. VRF Quotation from Genesis Air Services

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AACIAT

PAGE 01/01

REPORT

AACIAT

(02)8223-9023

REP-115 COMPANY ST

Just received the pump curve

Date : 10/10/07

Print Date: 10/10/07

Sheet No. : 2

Job Name: OFFICE BUILDING

Address 162 Goulburn St
Sydney

GENESIS SERVICES .. Attention: Mark

Level 1

OS/Air	'As Found' 458 L/s	Damper Fully open 884 L/s	No change in airflow when the after hours switch was enabled
Condenser Water	25mm Dia Oventrop valve		

The remaining condenser water system

- * Level 5 has 25mm supply & return pipes to an unsited unit
- * All other levels (I was informed) only have capped off branch gate valves

Dedicated Cdn W Pump

Previous figures {

- Southern Cross .. 80 50 - 315 (S/No 51 93 - 75 M/No ASHC 2B)
- Motor ... Taco 7.5 Kw x 1440 rpm @ 13.8 amps Frame D132
- Working Pressures
- Shut off Head ... Dis +310 Suc +22 = Total 288 Kpa DP
This calculates to an impellor size of approx 285 Dia.
- Working Head ... Dis +287 Suc +22 = Total 265 Kpa DP
With the above impellor a calculated (approx) flow is 6.0 L/s

10/10/07

The system does not have a by-pass incorporated to allow for any excess water flow and as only two 25mm valves are open, this will have the affect of artificially increasing the pumping head pressure

13 floors x 1.0 L/s = 13 L/s .. Cannot be achieved with a 285 Dia Imp.

To achieve 13.0 L/s with all floors open or with a working by-pass a Maximum impellor of 342mm will be required. The existing pump should be inspected to ascertain the actual impellor size (not stamped on pump base)

The maximum pump efficiency point (with max imp) is achieved at 11.0 L/s ... (0.83L/s per floor)
With the max impellor installed, the Shut off Head should be 415 Kpa & an operating pressure of 330 Kpa

Sorry about the delay

Regards

Ron Davies

Genesis Air Services Pty Ltd

ACN 081 793 415

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Air Conditioning

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15th October 2007

REF No. MG/1219

Southland Pacific Asset Protection Pty Ltd
Level 13, 162 Goulburn Street
DARLINGHURST NSW 2010

Attention: Mr. Jason Woods

RE: AIR CONDITIONING UPGRADE GOULBURN STREET

I would like to take this opportunity of allowing our Company to quote on the air conditioning for the above mentioned premises.

SUMMARY

After recent discussions, it is my opinion that the following option be considered

Supply, Install and Commission 1 Fujitsu VRF "V" Series Air Conditioning system with 120kW total Cooling Capacity. This will supply six (6) fan coil units each with a maximum capacity of 25kW. Air will distributed via sheet metal and flexible ductwork to the existing outlets. The Three Condenser units will be positioned on the roof (subject to access) these condensers will feed refrigerant via a two (2) pipe system to each fan coil as required. Power will be fed from the tenancy sub board to the outdoor units. The system offered will have a single group control allowing easy control of each fan coil or all fan coils together.

Outside air will be introduced via heat recovery ventilators (HRVs). The outside air requirement will have a heat load of up to 40kW. The HRVs will reduce the additional capacity required to just 10kW. The primary function of the HRVs is to deliver treated fresh air to an air conditioned space to satisfy Australian Standards and Building codes for ventilation rates.

This system offered will allow the tenant to remove the need to rely on the existing chiller and base building services, allowing the air conditioning to run as required to suit their needs. Should there be a small gathering then the selected area can be turned on, meaning a substantial saving in energy consumption.

BUDGET ESTIMATE: \$146,500.00

**One Hundred And Forty Six Thousand, Five Hundred Dollars
Excluding GST**

EXCLUDES

- GST Goods and Services Tax
- Core holeing
- Out of hours work
- Crane Hire (if Required)
- Parking Fees
- Outside louvres

TERMS OF PAYMENT

10% Deposit upon acceptance of quote.
90% Upon Completion and presentation of invoice.

Yours faithfully



Mark Greentree
MANAGER