



# Hall Street Development Bondi Mechanical Services Concept Report

Toga Developments Pty Ltd

26 May 2008

# Mechanical Services Concept Report

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Prepared for

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## Executive Summary

The Mechanical Services proposed for the mixed-used development by Toga Developments located between Hall Street and O'Brien Streets, Bondi, have been outlined in this report, including an outline of the air conditioning system for the apartments and commercial / retail areas.

The performance requirements for the different mechanical systems have also been described.

Environmental sustainable initiatives have been considered in the selection of the environmental temperature control systems.

Separate mechanical systems shall be provided to serve each of the functional areas as follows

Basement Carpark	Common mechanical supply and exhaust systems serving all basement levels Mechanical exhaust system to the Grease Arrestor Room Mechanical exhaust system to the Garbage Room
Retail	Common condenser water loop serving all tenancies with water cooled package air conditioning units provided by the retail tenants Common kitchen exhaust system serving the restaurants Mechanical exhaust system to the toilets Water cooled package air conditioning to serve the gymnasium
Serviced Apartments	Separate chilled and heating water plant serving the serviced apartments Common outdoor air supply systems ducted to each serviced apartment Common toilet exhaust systems serving the apartments
Residential Apartments	Water cooled package air conditioning units serving each apartment Common toilet exhaust systems serving the apartments

Environmental sustainable design initiatives that have been considered in the design of the mechanical systems include:

- Naturally ventilated breeze ways adjacent to the retail areas
- High efficiency motors
- CO monitoring for the carpark with variable speed ventilation fans
- High efficiency chillers
- Non ozone depleting refrigerant
- Variable speed drives on motors to optimise motor and system performance

## 1.0 Introduction

The Mechanical Services proposed for the mixed-used development by Toga Developments located between Hall Street and O'Brien Streets, Bondi, have been outlined in this report, including an outline of the air conditioning system for the apartments and commercial / retail areas.

The performance requirements for the different mechanical systems have also been described.

Environmental sustainable initiatives have been considered in the selection of the environmental temperature control systems.

## 2.0 Outline Description

The project comprises the construction of the following:

- Three (3) levels of basement carpark
- Two (2) levels of retail at lower ground and ground levels
- Open Pool area, gymnasium, restaurants and multipurpose space at Ground level
- Separate entrance lobbies for the serviced apartments and the residential apartments
- One hundred and thirty-six(136) serviced apartments over three levels; i.e. levels 1 to 3
- Four levels of Residential apartments on levels 4 to 7

Separate mechanical systems shall be provided to serve each of the functional areas as follows

Basement Carpark	Common mechanical supply and exhaust systems serving all basement levels Mechanical exhaust system to the Grease Arrestor Room Mechanical exhaust system to the Garbage Room
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Serviced Apartments	Separate chilled and heating water plant serving the serviced apartments Common outdoor air supply systems ducted to each serviced apartment Common toilet exhaust systems serving the apartments
Residential Apartments	Water cooled package air conditioning units serving each apartment Common toilet exhaust systems serving the apartments

### 3.0 Hotel Apartment Air Conditioning

Chilled water fan coil units would be located above the ceiling void. Conditioned air is ducted to the various rooms in a bulkhead arrangement and distributed in the space via air diffusion equipment.

Cooling is provided by a central water cooled chiller plant and chilled water storage which would be located in Basement Level of the building. Cooling Towers will be located at the roof level plantroom. Chilled water is reticulated to the fan coil units by means of insulated copper pipework and chilled water pumps.

Heating to the apartments shall be via a gas fired heating hot water generator located in the basement level plantroom with pipework reticulation to heating hot water coils incorporated in the apartment fan coil units.

### 4.0 Gymnasium

Air conditioning shall be provided to the Upper Floor Gymnasium by means of a floor or ceiling mounted air handling unit. Conditioned air shall be distributed through ductwork and ceiling mounted linear diffusers.

Heating shall be provided via heating hot water coils incorporated in the fan coil units.

The air handling unit shall be located within the gymnasium and outside air shall be introduced from the building facade via a weatherproof louvre.

The system shall be time switched via the BMS with remote monitoring at the BMS.

### 5.0 Retail Areas

The Commercial / Retail areas shall be provided with valved Condenser Water outlets for connection by the future tenants air conditioning plant.

Outside air provisions shall be via intake louvres, in appropriate and acceptable locations on the external façade of the building. The final requirements and installation of the intake louvres shall be by the future tenant and subject to approval.

The retail areas shall be provided with a common kitchen exhaust system to serve the restaurants on ground level in accordance with the requirements of AS1668

### 6.0 Ground Level, Concierge Reception and Waiting Area

Air conditioning to the Ground Level Concierge Reception and Waiting Area shall be provided by means of air handling unit located in the Ground Floor Ceiling with ducted air distribution and ceiling mounted linear diffusers. Outside air shall be introduced from the building facade via a weatherproof louvre. Return air shall be conveyed back to the air handling units via linear return air grilles and ceiling plenum.

The system shall be time switched via the BMS with remote monitoring at the BMS.

### 7.0 Electrical Switchroom, Building Distributor Room

Air conditioning to the Electrical Switchroom and Building Distributor Room shall be provided by air cooled split type air conditioning unit with remote condensers located in Basement Carpark Level 1.

The temperature in each of these rooms shall be monitored at the BMS.

## 8.0 Apartment Lobbies and Outdoor Air to the Apartments

A common system shall be provided to supply tempered air conditioning to the lobbies and outdoor air to the apartments. Tempered conditioned outdoor air shall be ducted to ceiling diffusers in the lift lobbies via the air intake louvre at each level

The tempered outdoor air provided to the lobbies shall also be supplied into the lobbies' ceiling plenum and then into the ceiling void of the apartments via a fire damper, motorised smoke damper, non-return air damper and acoustic transfer air duct. The outdoor air shall be drawn into the apartments by the toilet and general exhaust systems. The acoustic transfer air duct shall be provided to satisfy the acoustic requirements of the apartments and to prevent cross noise propagation between apartments and the lobbies.

Tempered outdoor air shall be provided to the Apartment Lift Lobbies by means of a ceiling mounted fan coil unit with heating hot water coil and chilled water coil. Tempered air shall be distributed through ductwork and bulkhead mounted diffusers. .

The system shall be time switched via the BMS with remote monitoring at the BMS.

## 9.0 Ventilation Systems

### 9.1 Carpark

A mechanical supply and exhaust system shall be provided to serve the carpark levels.

The supply fan shall nominally deliver 80% of the exhaust air quantity on the floors. Carpark intake shall be at Ground Floor of Hall Street entering the carpark at Basement Level 1.

Carpark exhaust shall be discharged at a minimum of 3 metres above the terrace area over the O'Brien Street. Exhaust air shall be removed through sheet metal ductwork via half chevron louvres. Make up air shall be naturally provided to the entrance floor via permanent openings in the mesh type security roller door and mechanically to the other floors via sheetmetal ductwork and supply air grilles.

The carpark supply and exhaust systems shall be monitored and controlled via the BMS in normal mode and via the Fire Alarm System in fire mode.

## 10.0 Apartment Bathrooms, Ensuites and Laundry Exhaust System

Mechanical general exhaust shall be provided to serve the apartment kitchens' domestic kitchen exhaust rangehoods complete with fans, ductwork, fire dampers, volume control dampers and all necessary controls and equipment.

### 10.1 Toilet / Bathroom Exhaust Ventilation System

Mechanical exhaust shall be provided to the apartments' bathrooms, ensuites and laundries by means of ducted exhaust with discharge at roof level through a series of risers. The exhaust risers shall be located equally spaced on the north and south sides of the building. The risers shall connect to axial fans located in the roof plantroom for final discharge to atmosphere. Each riser shall be sized for 100% capacity of the connected exhaust flow rate.

The exhaust systems shall be monitored and controlled via the BMS.

## 10.2 Apartment Kitchen Exhaust System

Mechanical general exhaust shall be provided to serve the apartment kitchens' domestic kitchen exhaust hoods complete with fans, ductwork, fire dampers, volume control dampers and all necessary controls and equipment. The kitchen exhaust system shall be similar to the toilet exhaust as outlined above and each riser shall be sized for a minimum 35% of the connected exhaust flow rate

The exhaust systems shall be monitored and controlled via the BMS.

## 10.3 Apartments Garbage Rooms

The Apartments Garbage Rooms on each level shall be mechanically exhausted via the garbage chute duct. An exhaust grille complete with volume control and fire dampers shall be provided at high level on each floor. Vitiated air shall be conveyed via a fan in the roof plantroom with discharge to atmosphere. The exhaust system shall be monitored and controlled via the BMS.

Ducted supply air shall be provided directly into garbage chute room as make-up air,

## 10.4 Miscellaneous Ventilation Systems

Separate Mechanical Ventilation systems shall be provided to serve the following areas:

- Ø Fire Control Room.
- Ø Sprinkler Valve Room
- Ø Hydraulic Tanks Rooms
- Ø Hydraulic Pumps Rooms
- Ø Gas Meter Room.
- Ø Water Meter Room.
- Ø Basement Garbage Room

All systems shall be provided complete with dedicated fan, sheet metal ductwork reticulation and air diffusion / extraction equipment.

## 11.0 Automatic Controls

A Building Management and Controls System shall be provided to monitor and control all mechanical equipment excluding the apartments air conditioning systems.

The apartments air conditioning systems shall be provided with standalone controls.

The apartments chilled water energy meters shall be monitored by the BMS with a program instigated for automatic billing. The apartment air conditioning units shall be interfaced with the BMS such that any call for cooling will initiate control for chilled water plant operation.

The BMS shall monitor the associated services:-

- Fire Alarm Initiation
- Hydraulics services
  - Cold water booster pumps (2 No.)
  - Hydrant pumps (2 No.)

The BMS shall interface with the electrical services for lighting control of the following service:

- Carpark levels - 2 stage lighting
- Pool Area
- Retail Malls area

- External lights
- Ground and Level 2 lights
- Apartment Floor Lobbies
- Residential apartment lobbies

A high level interface shall be provided with the BMCS system to interface with the security systems and Lifts

## 12.0 Smoke Hazard Management

The building smoke hazard management system shall operate in accordance with the requirements of the BCA consultants requirements, The Fire Safety Engineer and relevant Standards.

Separating construction shall be provided between the smoke zones.

A smoke control system shall be provided to the carpark levels to BCA consultants requirements.

Smoke detectors shall be provided on the downstream side of supply air systems in accordance with AS1668.1 to shut down the mechanical plant upon fire indication with alarm to the building Fire Alarm System and the Building Management System.

The smoke hazard management system shall be designed to instigate the following operation when smoke is detected in an area:-

Shut down of the apartment lobbies supplies supply system

Immediate shut down of the air-handling units;

Shut down of exhaust and supply fans

## 13.0 Design Criteria

### General

The air conditioning systems installed under this Contract shall automatically and throughout all seasons maintain conditions within the space subject only to the limitations of the design conditions:

### Design Conditions

The heating, ventilation and air conditioning systems for all habitable areas shall be designed to satisfy the following criteria.

#### Ambient Conditions

Summer	32°C DB/23°C WB
Winter	7°C saturated

#### Internal Conditions

Summer	23.5°C (Dry Bulb) max	±1.0 °C
Winter	21°C (Dry Bulb) min	±1.0 °C

Humidity will not be controlled in general areas however inherent psychrometric characteristics should limit the maximum internal relative humidity to 60% under most ambient conditions. Minimum humidity levels are not controlled except where indicated for internal room criteria within this Specification.

The air conditioning systems will be designed to satisfy the following criteria within the areas nominated:

### Outside Air

Outside Air to the requirements of AS 1668.1 - generally 10 L/s/person minimum with suitable filtration for general areas.

### Facade and Structure Criteria (details to be confirmed with Architectural specification).

Material	Description	Parameter
Glass	10.38mm laminated glass	Shading coefficient SC= 0.73 Thermal coefficient U=3.6 W/m <sup>2</sup> K
Walls.	Refer to Architectural Specification	Thermal coefficient U= 0.58 W/m <sup>2</sup> K
Floors	Concrete slab with timber finish/carpet/tiles	Thermal coefficient U = 1.3W/m <sup>2</sup> K
Floors - Ground and Lower Ground	Concrete slab with stone	Thermal coefficient U = 3.1W/m <sup>2</sup> K
Roof	Concrete with insulation	Thermal coefficient U = 0.5W/m <sup>2</sup> K

### Internal Design Criteria

Room Description	Room Conditions °C (DB)	Population	Equipment (W/m <sup>2</sup> )	Lights (W/m <sup>2</sup> )	Comments
Apartments	23	1 per 20sqm	10	15	
Apartment Lift	23	1 per 10sqm	Nil	30	
Lobbies					
Retail	23	1 per 5sqm	20	30	
MDF	Max 23	-	2.4kW	15	
Switch Room	Max 25	-	6kW	15	
Carpark Lift	Not	2No.	Nil	30	
Lobbies	controlled				
Gymnasium	22	1 per 3sqm	50	15	
Managers Office	22	2No.	20	15	
Concierge and Waiting	23	1 per 5sqm	5	30	

### Acoustic Design

The systems shall be a design such that the maximum noise levels nominated in Acoustic Consultant's brief is not exceeded.

**Pool Water Temperature**                    27°C - 29°C

#### **VENTILATION**

Outdoor Air - General	To AS1668.2
Apartments Outdoor Air	100 l/s/apartment
Bathroom/Powder Room/Ensuites	The greater of AS 1668.2 or 10 air changes
Apartment Laundries	60 l/s each
Carpark	To AS 1668.2.
Garbage Room	To AS 1668.2
Smoke Control	To BCA Consultants requirements
Toilets	To AS1668.2 (Not less than 10 air changes)
Stair Pressurisation	To AS 1668.1
Plant Rooms	5 L/s/m <sup>2</sup>

#### **REFERENCES**

The design and documentation is to be referenced to the following:

- Architectural Drawings.
- The Building Code of Australia.
- City of Sydney ventilation code.
- NSW Statutory Regulations.
- City of Sydney Council Requirements
- Relevant Australian Standards, particularly AS 1668 Part 1 & 2, AS 3000 and AS 3666