

AHI Carrier (NZ) Ltd

A Carrier Joint Venture Company

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Condition Report

Date: 24/1/17

Taupo District Council
72 Lake Terrace
Taupo

Attention: Garreth Robinson

RE: Air Conditioning of Main Building.

Dear Garreth

History Summary

The air conditioning in the Taupo District Council building is divided into two main areas when AHI-Carrier Ltd started the maintenance in 2007.

The original building has two floors and is parallel with the lake. It contains the mayoral chambers and council offices on the top floor and customer services on the ground floor. These were air conditioned by a large air handler in the ground floor plantroom.

Back Office

This area for the building has two floors and is parallel with Rifle Range Road. It contains the administration, planning and support offices. The air conditioning was supplied by two (2) Temperzone air handlers on the roof with supply and return ducting through the building. An additional section was added to this building and the air conditioning was by four (4) additional ducted units.

Front Office Air Conditioning Upgrade

In early 2013, the air handlers were removed and new ducted, cassette and Hi-wall units were installed throughout the offices. Tempered fresh air was ducted to the offices to meet the building code.

Issues Identified from the Front Office Upgrade.

The units supplied are from Panasonic NZ. It is doubtful that the units selected are commercial rated. The units are in operation for 12 hours a day compared to a domestic unit that operates occasionally.

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The large ducted unit for the ground floor offices struggles to supply a consistent temperature to the many offices due to grille location and selection. The existing ducting was retained during the upgrade and doesn't account for the changed office layout.

Due to ongoing issues with temperature control the administration corner office has been removed from the central system and has individual split units installed to create a more comfortable environment for the staff. There are ongoing issues with the other offices as there is not an independent control of heating or cooling. This is made worse by the solar gain from the sun's location at different times of the day.

The upstairs offices have a mixture of single split units for areas like the council chambers and the mayor's office. The four offices on the north aspect are serviced from a single ducted unit. The offices are affected by the sun at different times of the day which has some offices requiring heating and the other need cooling. This cannot be achieved with a single unit and is causing staff complaints. The issue with this system is that all the indoor units either heat or cool at the same time. You can't heat one office and cool the office beside you.

The installation called for a separate filtered, tempered fresh air system to the ground floor and top floor. The importance of tempering the air is to ensure the air entering the air conditioning system is above 16°C. In the winter the outside air can be as low as -5°C which is entering the building causing issue such as drafts and ice forming on the air conditioning coils resulting in poor performance and reduced heating output capacity.

The original installation included the filtered fresh air but the electric duct heaters were not installed. AHI-Carrier Ltd has installed a 9kW electric duct heater on the ground floor fresh air system but as yet the top floor has not been completed.

The filters for the top floor fresh air system were installed in a non-standard way. Access to the filters is from the roof and the large roof fan has to be removed to access the filters. This has now been rectified.

The Panasonic outdoor units have been installed on the roof on timber frames. The anchor bolts through the roof have started to wear and the roof is leaking water to the ceiling below. A better solution is to install all the outdoor units on Monkey Toe mounts.



The front office air conditioners are not under a central control system. To use energy wisely, most buildings have a system that can schedule the air conditioning to start times and finish times. This also has after hours and holiday functions. It also ensures that units are not left operating after hours.

Back Offices Air Conditioning.

This building was originally made up of many small offices with supply and return air grilles in each office. The air was connected to a common duct system and supplied from two Temperzone air handlers on the roof. Each floor is supplied by its own AHU. In addition, the back section of the building was extended and 4 independent ducted systems were added into the space. These have been replaced as these were operating on R22 refrigerant.

The last upgrade of the offices resulted in many of the office walls being removed allowing for a more open plan arrangement. The changes resulted in the main air system from each floor being affected by the existing ducted systems, ie fighting each other. Also, controlling the temperature in the large space and in small offices was challenging from the one supply system.

A few years ago the two Temperzone air handlers were replaced as they were on the now redundant R22 refrigerant and were at the end of their economic life. The original Temperzone units were rated at 30kW Cooling and were fixed speed (the fan does not ramp up and down). These were replaced with Temperzone 40kW fixed speed two-stage compressor units instead of inverter stage compressors. The two stage system means large amounts for heating or cooling are being used to control temperature in the offices which is very challenging and has ongoing issues throughout the year. Inverter controlled compressors allow for infinite control of the heating or cooling load in the offices. A 2-stage system is normally selected when costs are a major constraint.

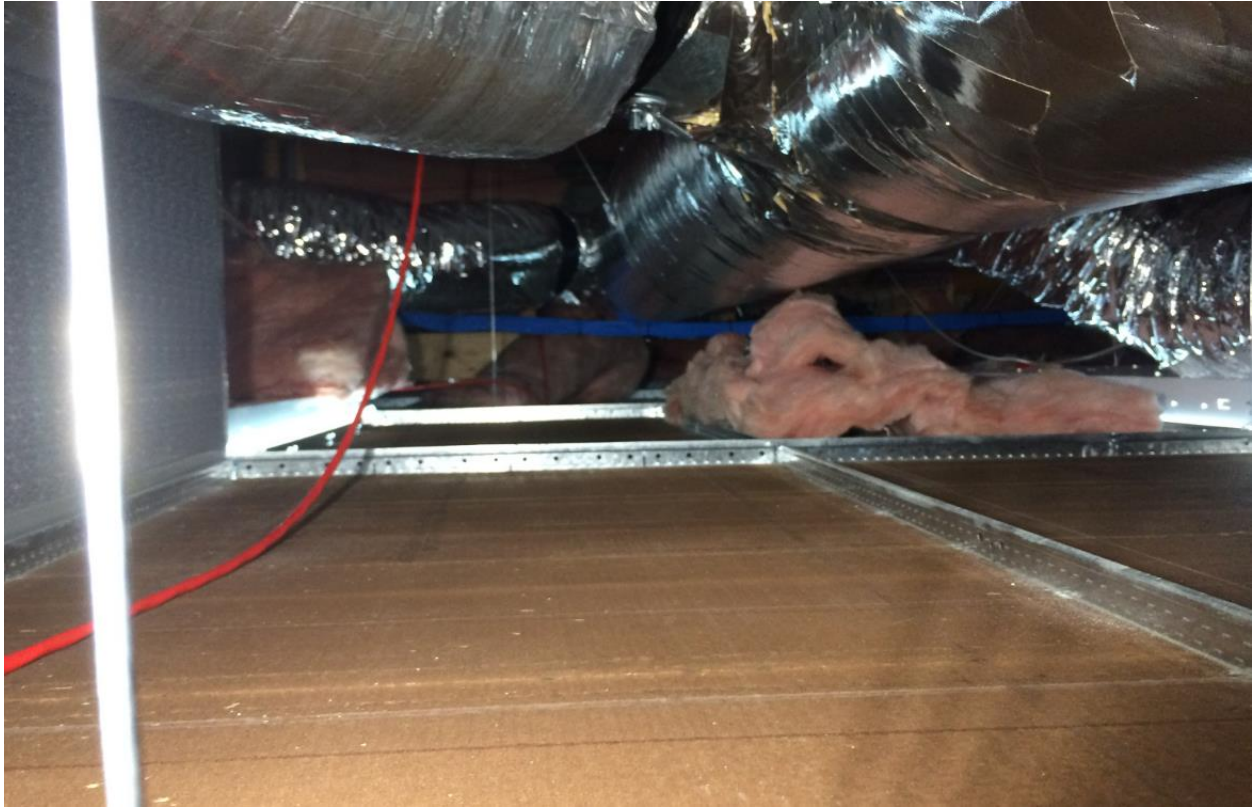
Over the past 18 months we have been assisting the TDC Facilities Manager to look at solutions to better control the temperature in the office spaces. Some smaller offices were removed from the main system and were given individual split units as comfort control was very difficult. The selected units were from the Toshiba Commercial range; they have a 24/7 day wired wall controllers and have the ability to be connected to a future building BMS for optimum energy efficiencies.

The remaining spaces use the AHU ducted system but still suffered from daily and season temperature fluctuations. This is mainly due to the selection of the fixed speed AHU. These are cheaper than the inverter type but have the disadvantage of start / stop control as opposed to a smoothly ramped control. This results in large variations in temperature in the building which staff is experiencing.

Ceiling Spaces:

The current ceiling spaces on the ground and top floor are quite congested with ducting, data cables and power cables. Some of the air conditioning ducting and insulation is redundant and should be removed. The electrical wiring should also be assessed as some of the cables not used have power connected to them.

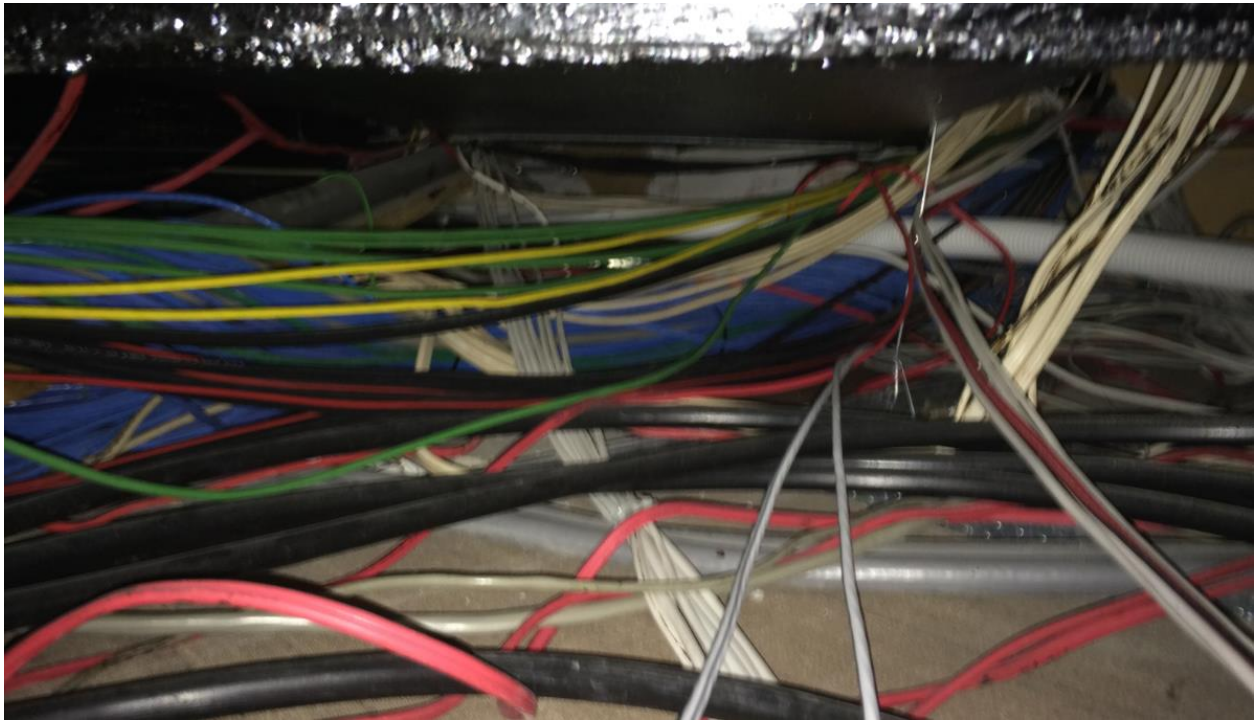




The insulation has been removed in mainly parts of the ceiling tiles.



Redundant ducting and loose wiring can cause a fire hazard.



A lot of the existing wiring has not been secure as per the regulations. Power wiring is mixed and tangled with data, fire and communications cable.

Ground Floor Outdoor Units



Many of the outdoor units have been installed in the vehicle lane at the rear of the building. The main issues are the ground level units could be damaged by vehicles using the lane. Other units have been installed at height to prevent damage from vehicle. This makes it hard for



maintenance and repairs EH&S process becomes very involved ie the lane has to be restricted, a platform may need to be used for access etc.

Solutions

Ceiling Space

To address the congestion in the ceiling space will involve the following

This will require

- Removal of office furniture in the space
- Ceiling grid to be removed and reinstated
- Removal of the ducting and redundant equipment.
- Fire system to be disconnected to prevent false triggers
- Electrical wiring to be assessed and redundant wiring removed. All existing wiring to be tidied and labeled.
- Fire sensors and wiring to be tidied.
- All fire dampers and fire wall assessed and reinstated to code.
- Office personnel to be relocated during this time (could be up to a month)

Once completed the insulation should be replaced and installed correctly on the tiles to provide the required level of insulation. This will reduce the energy losses in heating and cooling and reduce the electrical energy losses as the air conditioning equipment will be operating on a reduced capacity.

Air Conditioning

All outdoor units should be installed on Monkey Toe roof brackets removing the wooden mounts. This will help reduce the deterioration of the roof and reduce the possibilities of water leaks.

The tempered air system for the fresh air to the top floor needs to be completed. Energy is being lost in the winter as the air conditioning system is heating very low temperature air in the building space.

The front office air conditioning on the ground and top floor need to be assessed as office spaces need better temperature control.

The back office air handlers on the roof for the ground and top floor should be removed. The 2 – stage compressor control make it hard to have accurate temperature control throughout the building and leads to customer complaints. The option of an economizer on the fresh air intakes was not used so efficiency gains cannot be achieved. The spaces would be better served with smaller commercial ducted, cassette and hi-wall units. There are a number of Toshiba Commercial Units that have been installed which will reduce the amount of air conditioning plant required to complete the building.

To maximize energy efficiencies, all air conditioning, lighting and other services equipment could be controlled by a central BMS system. This allows for scheduling of equipment, saving energy by using the air outside, and turning off items after hours. Modern BMS allows access over the internet for control and fault recognition.



Lighting

A full assessment should be made to replace the old florescent lighting throughout the building with the new very efficient LED lighting. This can also be controlled by the BMS.

These solutions should be combined with building improvements to maximize the energy savings of the building.

Yours faithfully
AHI-Carrier (NZ) Ltd



Bruce Smith
Hawkes Bay Branch Manager.

