Fan Coil Unit Replacement

Many owners have been looking to replace their fan coil unit(s) (FCU) and the Board of Managers, in order to obtain bulk pricing, has selected Unilux as the contractor to replace the (FCU) in your home.

Pricing for the replacement of your FCU, which will include connection to the riser, drywall removal to allow for installation (if necessary), installation of the FCU retrofit, repair of the drywall, and a smart thermostat, at a cost $9,300.

You may be asking Why Do I Need to Replace My FCU? Attached you will find the report that was commissioned by the Board of Managers back in 2022 by Sunnyside Design to assess the condition of the existing FCU's. This report gives a detailed account of the condition of the FCU's - please note that #22.1 on page 6 recommends mandatory replacement of all FCU's as soon as possible.

You may also be asking What's Involved in the FCU Replacement Process? Attached you will find an informative document "What to Expect" which will explain the process to replace your FCU.

We will be holding a one-hour look and learn seminar where you will be able to see what the new FCU looks like and Unilux will talk about the replacement process and answer any questions you may have.

When: Monday, April 27, 2026, 6:30 to 7:30 p.m.

Where: In person in the Social Room or virtually via Zoom

https://us06web.zoom.us/j/84691408851?pwd=F8UcofEoTXF6JbrjQxW7C8yW4YlPbO.1

You can sign up with Unilux at **https://uniluxpayments.com/metropolis**.

If you have any questions, please contact the Management Office.

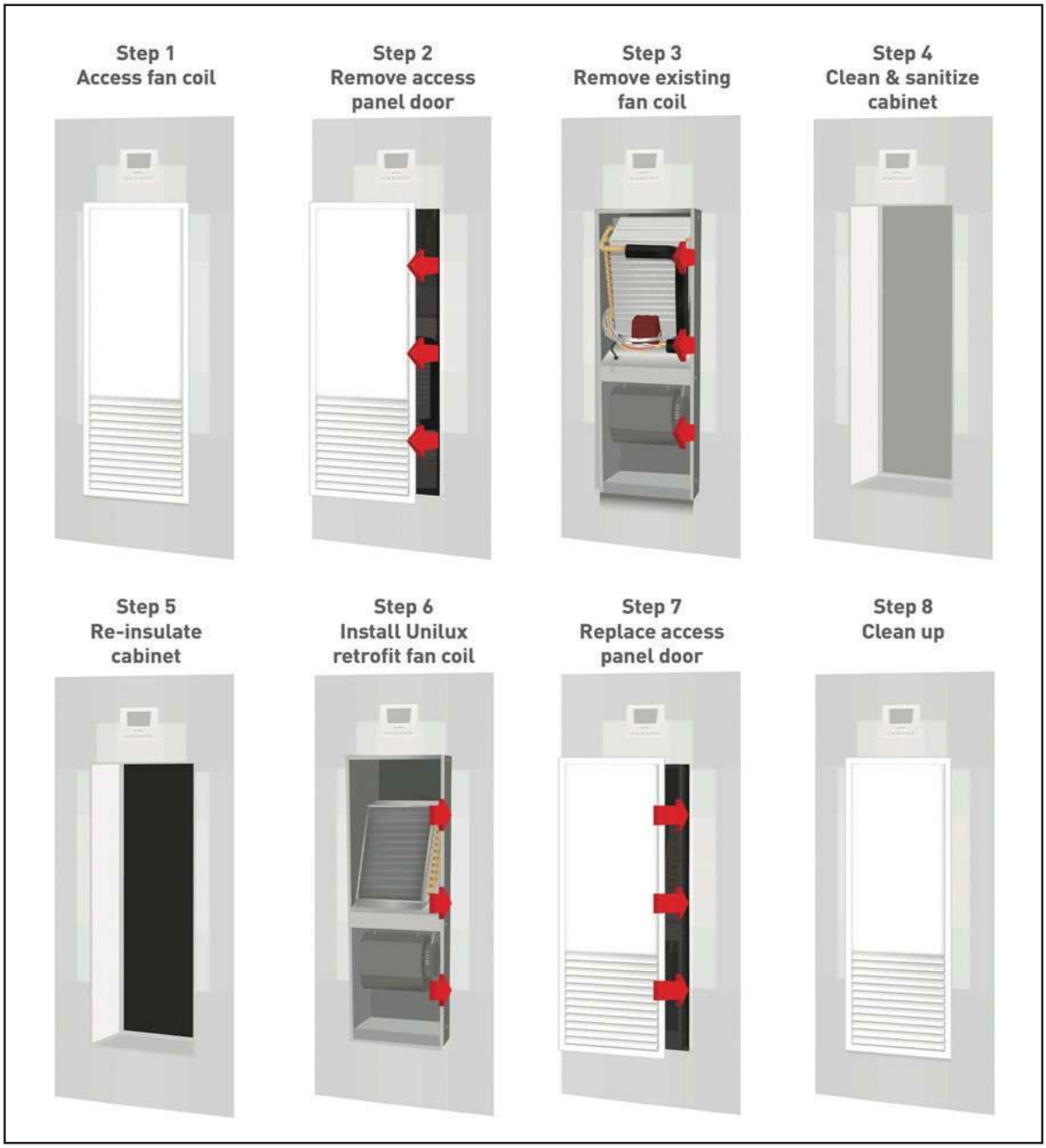
Kim Wenkus

Community Association Manager

The Retrofit Process

The Unilux retrofit insert is designed to minimize the disturbance to the resident but still meet the same standards in quality and longevity of the original fan coils installed during the building's construction.

The retrofit insert unit replaces all the functional components of the fan coil without damaging the existing drywall, trim, or paint.



Scope of Work

1. *Remediation and Removal*

- Protect floors and walls around fan coil with mats and plastic sheets.
- Erect negative-pressure tent to prevent fiberglass and microbial growth from contaminating the suite.
- Disconnect existing equipment from power and water supply.
- Remove original equipment and interior cabinet components including coil, blower, drain pan, fan housing, wiring, and fiberglass insulation.
- Remediation in accordance with Illinois Department of Public Health guidelines.

2. *Supply and Install Fan Coil*

- Install closed-cell anti-microbial foam insulation along cabinet walls.
- Supply and install Unilux retrofit fan coil unit to match existing capacity.
- Water Coil: 4-pipe; 1/2" copper with corrugated aluminum fins; manual air bleeder.
- All stainless-steel chassis.
- Drain pan fully welded and positively sloped to center.
- ECM motor, 3-speed fan, flood sensor, ecobee smart thermostat.
- 3-way valve and actuator.
- Reconnect system to power and water supply, and test.
- Change isolation valves.
- 2-year warranty (optional 5-years).

3. *Replace riser T-connection (branch line connection to main riser)*

- Turn off water to the riser and drain system.
- Cover floors and furniture with plastic; cut drywall in front of risers.
- Remove existing riser T-connection.
- Furnish and install new cooper Ts, connecting riser with fan coil branch line.
- Four connections per fan coil (hot supply, hot return, cold supply, cold return)
- Pressure test; refill riser.
- Replace drywall, plaster, and prime paint (color match not included)

Pricing:

- $9,300 per fan coil unit model SC300-800

Two payment options

1. 30% deposit, 70% upon completion
2. 30% deposit, 70% spread across 12 equal monthly payments ($300 admin fee)

Notes

1. This quotation is valid for 30 days.
2. Fan coils have a 2-year warranty on manufacturing and installation defects. Plumbing work has a 1-year warranty on workmanship.
3. If owners do not opt in to riser repair option, then the building's chief engineer will be required to drain and refill the risers.
4. Permits, permit drawings, and structural engineering is not included. If risers are not properly anchored, Unilux will notify management before any work commences.
5. This Quotation is based upon the specifications provided. Every attempt has been made to comply fully with all applicable sections, except as noted. All equipment proposed is itemized for your review. Any item that should have been specified, but is not listed, is not included. A careful review of the Specifications, Drawings and any addenda should be made and compared for compliance with this Quotation.

Sunnyside Design Group, Inc.

MECHANICAL & ELECTRICAL BUILDING SYSTEMS' CONSULTING

Ms. Kim L. Wenkus - Community Association Manager April 13, 2022
Metropolis Condominium Association - Eight West Monroe Street - Chicago, Illinois 60603

RE: **Metropolis Condominium Fan-Coil Units Investigation**
Eight West Monroe Street - Chicago, Illinois -
SDG Project #22–032

Dear Ms. Wenkus:

Per your request, and as a follow-up to our 08 MAR 2022 Site Visit, plus 18 MAR 2022 & 06 APR 2022 Site Surveys, the Sunnyside Design Group has conducted an Investigation of the Residential Vertical Concealed Closet Style Stacked 4-Pipe Fan-Coil HVAC Units (FCUs) and related HHW & CHW Risers, and reports as follows:

1.0 - A Conversion Drawing calls for all FCUs *"PROVIDE 2-WAY CONTROL VALVE FOR ALL UNITS EXCEPT UNITS AT LOWER TWO FLOORS OF EACH RISERS, PROVIDE 3-WAY CONTROL VALVES FOR LOWER UNITS AT EACH RISERS*.".

1.1 - The typical valve shown in **Photo #01** (as an example) happens to be on one of the lower two floors and is 2-way, 2-position - not 3-way. The purpose for the 3-way valves was to maintain chilled and heating hot water flow and distribution in the risers even when there is no call for cooling /heating. Without any - the system is compromised and can present expansion, vibration, noise issues and leaks.

1.2 - When only two-way control valves (which was not the design intent) are used, pump and water bypass or pump speed control must be included in the system to ensure that the continual targets water flow will be maintained and to avoid having the maximum close-off pressure rating of the valve exceeded.

1.3 - Three-way valves were presented on the design documents, yet none were observed where they were supposed to be located.

2.0 - A Conversion Drawing calls for all FCUs to have "*FACTORY MOUNTED PIPING PACKAGE INCLUDING SUPPLY LINE - BALL VALVE, BALANCING VALVE, CONTROL VALVE; RETURN LINE - BALL VALVE, CIRCUIT SETTER*.". A Conversion Drawing also stated for all equipment to have a "*…SWING JOINT (MINIMUM OF FOUR ELBOWS) AT RUN-OUTS TO EQUIPMENT*...".

2.1 - The piping/valves shown in **Photos #02 & #03** (as examples) appear to be part of a factory-installed piping package and meets the swing joint requirement, yet fails to include a supply line balancing valve or a return line circuit setter. Without proper balancing device it would be difficult to meet the space heating or space cooling design & distribution intents.

2.2 - The piping package with shut-off & control valves, plus pipe loops (swing joint) for the heating hot water supply & return, were integral parts of the FCUs (furnished by the manufacturer).

2.3 - It should be noticed how "clean" the factory-applied valve & piping solder joints appear and hold up; as compared to those in **Photos #04 & #05** (as an example).

3.0 - A Conversion Drawing calls for providing "*...1-1-1/2" THICK FIBERGLAS WITH ASJ (ALL SERVICE JACKET) INSULATION ON ALL... HEATING HOT WATER AND CHILLED WATER PIPING SYSTEMS*."

909 Ridgeway Court - Schaumburg, IL 60194 - 4235
Tel…847.452.6543
E-Mail…SunnysideDesign@aol.com WebSite…SunnysideDesignGroup.com

3.1 - We find that 1/2-inch to 3/4-inch thickness flexible elastomeric "unicellular" insulation is used on all insulated heating hot water and chilled water pipe risers, pipe runouts, pipe fitting and on some valves. This is quite different from the expensive, more effective and better quality specified 1-1/2-inch thickness fiberglass insulation with an ASJ.

3.2 - **Photo #06** (as an example) shows such pipe insulation that is essentially ineffective, yet in one FCU these pipes are fully insulated (to a degree). **Photos #01, #03 & #04** (as examples) also show piping and valves within the FCU plenum that are not insulated. **Photos #07** & **#08** (as examples) presents labels showing signs of moisture damage (in part, probably due to condensation off the uninsulated piping/valves above). **Photo #09** (as an example) shows riser pipe insulation that has been breached.

3.3 - With any conventional pipe / fitting insulation, in general, it is applied to prevent heat loss on both hot (heating hot water) pipes & cold (chilled water) pipes, and to prevent condensation on cold (chilled water) pipes. It needs to be installed tight to the pipe / fitting, completely sealed without voids and open seams / joints - all so as not to allow moist air to breach the water vapor / heat barrier. During the in initial Survey, it was agreed not to simply pull apart any insulation to observe covered piping / fittings, given the fact that most of those such access openings are packed with insulation (**see Photo #10**). All this would need to be properly replaced following insulation guidelines besides needing wall openings/closings for proper access. This also applied to the similar sheet insulation applied on the inside of the FCU cabinet itself. Upon review of **Photos #11 & #12** it can be seen where that plenum insulation is already not secure. When the extra large openings on the side of the FCUs cabinet **Photo #13** (as an example) are left open to the FCU plenum, air from the riser pipe chase will easily infiltrate. Air readily comes from the riser cavity into the negative pressure FCU plenum by simply pushing open the dangling and unsecured cabinet sheet insulation.

3.4 - **Photo #14** shows an attempt to seal the FCU plenum from the open pipe chase cavity by applying a sealant.

3.5 - Any new application will need to address proper sealing to avoid pulling any riser chase cavity air into the FCU cavity. Insulation lining for FCU cabinet should adhere to the interior surface and lack voids and be tight up around the insulation on the runouts.

4.0 - Upon review of **Photos #15** & **#16** (as examples); is BX metal clad flexible electrical cable showing a sign of failure. BX has limited use in Chicago, yet is not allowed for this specific application. BX is not rigid, it settles and in this case, ended up resting next to and touching the easily penetrated unicellular insulation on a copper pipe. This raises safety, performance, Code violation, electrical and lower life expectancy concerns. Upon review of **Photos #11 & #17**, it can be noticed that the BX has electrical (black) tape applied to prevent galvanic corrosion and direct contact between these two dissimilar materials.

4.1 - Ref. - Department of Buildings Code Memorandum dated 07 FEB 2017 related to the limited metal-clad cable to be permitted for use in some existing walls or partitions, where other work <u>does not require or include removal of existing finished surfaces</u>, during existing building rehabilitation.

4.2 - Ref. - Chicago Electrical Code Article 334: Metal-Clad Cable: Type MC Paragraph 18-27-334.3 "*Uses permitted. Except where otherwise specified in this chapter and where not subject to physical damage, listed Type MC Cable with listed fittings shall be permitted for branch circuits in concealed work <u>fished into existing walls or partitions where it is not possible to install conduit</u>*.".

4.3 - In other words, for the case presented, the City of Chicago Code Electrical Code only allows for listed flexible cable (BX) with listed fittings to be when the work is "rehabilitation" in an existing building (which the Metropolis conversion was not). The conversion was a total re-do and it was possible to install rigid conduit.

5.0 - Upon review of **Photo #18**; there is clear and obvious evidence of galvanic corrosion where incompatible metals (steel versus copper) directly meet each other.

5.1 - This progresses rapidly and is especially true when the ambient environment where located has a high relative humidity level (as it does, at times, in the FCU plenum for which this appears).

6.0 - Upon review of **Photos #21** through **#26** (as examples) it can be noticed that on the external surfaces of the some readily accessible and physically observable copper piping, valves and pipe fittings; bluish-green patina oxidation appears and white efflorescence mineral residue has collected.

6.1 - The blue-green oxidation is common but can be a result of a very small less than a pinhole leak. The white build-up of minuscule quantities of calcium, sodium, etc. is also common. We find this quite often - with the patina attributed to a Pipe Fitter's failure to remove excess & residual flux after soldering. Upon review of the **Photos #04** & **#05** (as examples) it can be noticed that the Pipe Fitter(s) also failed to remove excess solder before it hardened.

6.2 - The Conversion Drawings fail to specify the copper pipe / fitting type. In general, for the applications observed, we find that Type "L" should be used in lieu of Type "M". Just looking at the 3/4-inch & 1/2-inch sizes; Type "L" is 41 percent to 43 percent thicker and heavier than Type "M". We could not confirm as to what Type is installed, or if the installations include both types. Granted the copper pipe / fittings themselves can last upwards to 50 years if properly installed, yet pinhole leaks, poor solder or soldering and corrosion will decrease that useful expected life span and can lead to major water leaks.

6.3 - This observation of minor pipe / fitting patina and efflorescence would be risky to ignore. On the other hand, that alone does not mean the subject pipe / fitting joint will continue to corrode and leak. However, teamed with the understanding that soft solder may have been used in lieu of silver (hard) solder (which holds up better against stress, pressure and high temperatures) - any poor and sloppy installation can be expected to fail at some point.

6.4 - Soft solders or other low-temperature lead alloys are typically not suitable for the applications observed.

7.0 - Shown is a recent leak (**see Photo #27**) that when accessed for repair, the male pipe simply separated and pulled out of the female flared joint with no evidence of any solder. This specific failed connection was repaired using a mechanical pressure (i.e. "Pro-Press") application (**see Photo #28**).

7.1 -When installed (**see Photo #29**), in this case (as an example), it becomes evident that the horizontal runout from the riser is not aligned, is distorted and not connected horizontally plumb. There also is little evidence of solder. We suspect that the piping may have been used as handles for lifting or moving the FCU, or damaged somehow by other improper handling. It just happens to be that this joint on other heating hot water runouts has been identified as the source of most, if not all, past leaks. In the referenced Photo, it can be noticed that the runout off the HHW riser appears plumb, yet the runout extension to the FCU's coil appears out-of-line. It should be noted that there are at least 1024 of these connections making it likely that more leaks will show up.

8.0 - Upon review on **Photos #30** through **#33** (as examples), the drain pans are in bad shape (rusted and in some cases not clean). They appear to be coming close to being subject to rust breakthroughs, resulting in leaks when there is any condensation produced off the cooling coil.

8.1 - These FCUs have a standard galvanized drain pan, yet were available with the factory-installed option of stainless steel which could have prevented any rusting and premature failure.

8.2 - There is always the likelihood of having drain pan debris from a rusted pan clogging the drain tube creating a drain pan overflow.

9.0 - The noticed water alarms & leak alerts electronic detectors (**see Photos #34** & **#35**, as examples), as placed on top of semi-porous sheet insulation at the bottom of the FCU cabinet, are not the best position for them to be located. This would be true even if there were a slow water leak, notwithstanding a failed pipe joint located outside of the FCU cabinet (i.e. off the riser).

12.0 - Unfortunately, most of the risers are too close to the FCU to allow for shut-off valves to be installed between the riser and FCUs (**see Photos #12 & #36**). The risers are typically located either at the side or back the FCUs. Where the risers are at the side of the FCU, any valves external to that FCUs would not be readily accessible (not enough wall space for an access panel). In the many other cases, where the risers are at the back of the FCU, any valves external to those FCUs would be inaccessible.

12.1 - If feasible, this would allow work to be performed on a FCU without draining the entire riser. However, this would only be an advantage if a problem with the FCU was internal (i.e. upstream of [or before} the supply shut-off valve, or downstream of (or after) the return shut-off valve).

12.2 - The subject leaks, as understood, were all before the supply shut-off valve, and/or after the return shut-off valve - leading to the need to drain the riser to fix the problem.

12.3 - In other words, once the problems are addressed related to where past leaks occurred, having internal shut-off valves would be of little concern.

13.0 - Upon further surveying, the chances of finding a clean, unrusted drain pan; clean air filter & coil face; properly sealed & fully insulated pipes / fittings; three-way control valves; riser isolation & drain valves; expansion loops or compensators; properly installed pipe guides & anchors; labeled circuit & breaker ampacity electrical distribution panel (**see Photo #37**); or a leaking pipe, valve or fitting - all appear to be limited.

14.0 - The Conversion Drawing Piping Diagram shows pipe anchors at the 6th, 11th & 18th floors for 12 of the 15 pipe risers ("R-1" & "R-5" through "R-15"); and at the 11th & 18th floors for 3 of the 15 pipe risers ("R-2", "R-3" & "R-4"), all without any details related to type or position (i.e. above and/or below the floor slab).

14.1 - Upon further investigation, we found copper pipe riser clamps with proper rigid inserts in place of the pipe insulation with the clamps resting on, or up to, the structural slab. As installed, these will prevent vertical movement (up and down) of a riser at the point of where the anchor is located and secured.

15.0 - The Conversion Drawing Piping Diagram also shows pipe expansion compensators at the 8th & 15th Floors for 12 of the 15 pipe risers ("R-1" & "R-5" through "R-15"); and only at the 15th Floor for 3 of the 15 pipe risers ("R-2", "R-3" & "R-4"), again all without any details related to type. These devices allow for minimal and controlled pipe vertical

movement (up & down) between anchor points. It should be noted, however, that the Conversion Drawings presented a "*TOTAL ANCHOR-TO-ANCHOR EXPANSION TABLE*" with directions on the specifics related to the copper piping. It simply shows the heating hot water expansion at 1.8' per 100' length (which could also be interpreted as height). There are no specifics for chilled water. It also has a "*PIPE EXPANSION LOOP DIMENSION SCHEDULE*" showing total anchor to anchor expansion for various pipe sizes with related loop height & width dimensions.

15.1 -Upon review of **Photos #38, #39 & #40**), shown are typical pipe riser anchor point "anchored" at the floor slab using a Unistruct support and two-piece Unistruct steel pipe clamps, tightened around insulation inserts. This has been discovered for each and every location accessed.

15.2 -With pipe anchors at each floor, the pipe riser expansion does not seem to be of concern or as being responsible for past leaks. The HHW loops within the FCU take-up limited pipe expansion, and work well as long as the runouts are positioned centered in the FCU cabinet's expansion slot and those runouts from the riser tee are at 90 degrees as they enter the cabinet prior to soldering of the joints.

15.3 -The design intent was to spread any expansion in opposite directions from the anchor points. Expansion compensators where shown included in the riser, having anchor points mid-way between each expansion compensators. On those 16-story risers (i.e. "R-1" & "R-5" through "R-15"), shown was an expansion compensator off floors 8 & 15 with an anchor on floors 6, 11 & 18. On those 12-story risers (i.e."R-2", "R-3" & "R-4"), shown was an expansion compensator off floor 15 with an anchor on floors 11 & 18. Various locations accessed on floors - & - did not show any evidence of an expansion compensator. **Photo #41** is typical of each place where we were able to a see up into a pipe chase. As such, we found no evidence of any pipe loops. There also was no evidence of any expansion compensators (as where presented on the design documents).

17.0 - The Conversion Drawings failed to show any riser pipe guide locations or specifications.

17.1 - **Photo #42** shows riser pipes sitting in a guide. Upon review of the close-up (**see Photo #43**) without having any control of lateral movement, whereby pipe insulation has probably worn away and the pipe is being allowed to rock from side to side and will make noise when doing so. **Photo #44** shows a pipe clamp at the 4th Floor performing as a pipe anchor.

17.2 - Investigation found sufficient pipe riser clamps with proper rigid inserts in place of the pipe insulation.

18.0 - We reached out to an Associate Vice President of the Client Service Group with AMS (sub-contractor responsible of the installation), stating "*We are in the process of directing the Metropolis Condominium at 8 West Monroe where it will be required to replace 256 vertical 4-pipe fan-coil units. These were installed years ago by AMS. However, the building lacks specifics on riser pipe sizes, anchors, expansion devices, etc. In the event the AMS still has any shop drawing or other data, that can help with any of those unknowns, we are hoping that you, or one of your colleagues, can point us in the right direction so that we can secure any available documentation. Please let us know if there is a chance of this happening*.". AMS immediately replied "Let me check with my design group and see what old information we might have. I will get back to you.".

18.1 - Reply "*I* (AMS) *had to poke my IT department. Since the job was so old it got archived on our server so I do not have direct access to any files easily. Let me poke them and see what I can get. Sorry for the delay.*".

19.0 - Lack of proper expansion and other movement control due to improper pipe anchoring, pipe guiding and fire-stopping can all lead to stress / strain on the pipe fittings (especially any that have been less-than-professionally

installed), along with having the pipes pushed up, down or over to touch steel - all leading to eventual distribution system failures and leaks.

20.0 - In regard to the total FCU count for floors 4-12 & 14-20, based on the Conversion Drawings, we find that 256 vertical FCUs are used to serve the living quarters on those floors.

20.1 - There are 13 FCUs on the 4th Floor.

20.2 - There are 14 FCUs on each the 2 floors 5 & 6 - of which, per floor, one is horizontal type serving common areas.

20.3 - There are 16 FCUs on the 7th Floor - of which four are horizontal types serving common areas.

20.4 - There are 17 FCUs on each of 12 floors 8-12 & 14-20 (noting that the Conversion Drawing Riser Diagram only shows 15).

20.5 - The preceding does not count any FCUs on the 21st Level Penthouse of which none show up on the riser diagram or floor plan.

21.0 - Finally, we find that the typical useful expected life of these types of FCUs range for 15 years to 25 years, with 20 years being the average. Good maintenance and better quality materials (such as a stainless steel drain pan) would have increased the life expectancy (i.e. 25 years); while the lack of maintenance and poor quality materials, teamed with some of the other less than acceptable installation issues discovered so far, have decreased the life expectancy of the Metropolis Condominium's Residential FCUs (i.e. 15 years). In other words, it appears the FCUs are coming at the end of, or may have already exceeded, their useful expected life span.

21.1 - As such, we find that mandatory replacement of each and every FCU is required - as soon as possible.

22.0 - We understand that the past water leaks have caused many problems and we expect that another leak could happen at any time. All that puts the Metropolis Condominiums in a bad situation. Nevertheless, servicing of each FCU is encouraged, as is repairing of any pipe / fitting that appears subject to failure, yet if it wasn't urgent, all that could be a waste of time & money, versus entertaining the required replacements of these aged (going on 18 years old) assemblies and, when replaced, having the pipe / fitting, electrical and insulation issues addressed. Most often any such replacement project would ideally take place in the intermediate season, like right now (starting of Spring 2022). Unfortunately, time is not on our side and the supply chain problems are equally against us. For the time being, we may need to relay on the water alarms warning us of failures until mandatory replacements are scheduled.

22.1 - Replacements could dictate 15 stages, one for each riser, with each stage taking at least 3 to 4 days.

22.2 - All will be disruptive, costly, inconvenience and will require scheduled shutdowns. To complicate matters, with the FCU isolation valves located within and being part of each FCU to be replaced, the HHWS, HHWR, CHWS & CHWR runouts will have to be cut at each of the 15 four-pipe risers. This will require each entire riser to be isolated and drained. Unfortunately, the Conversion Drawing Piping diagram and floor plan failed to show the location of, or existence of, any riser isolation and drain valves, nor are any pipe sizes shown (other than 2" for the chilled water and 1-1/2" for the heating hot water where the drop down from the 10th floor ceiling space). The only exception is that sizes are shown for the condensation drains.

23.0 - Once all FCUs are replaced and runouts properly installed, we would not expect any leaks, and also could conclude that external shut-off valves would be of little use.

24.0 - **Photo #46** shows a FCU with its face panel removed. In order to replace the FCU, a good portion of the finished wall will need to be removed, replaced and patched. The FCU cabinet itself is behind the finished wall. This becomes even more disruptive when it comes to wall removal / replacement to have access to the pipe risers, runout tees, stub out extensions and / or all related pipe insulation - for either repairs or replacements.

25.0 - In that the pipe anchors observed are confirmed as proper, once all pipe insulation issues addressed, the HHWS. HHWR, CHWS, CHWR & CD risers themselves can remain. However, each replaced FCU will require new branch runouts and runout connections at the related riser.

26.0 - Mandatory replacements shall include three-way control valves for FCUs on the lower two floors (**see 1.0**), HHW & CHW balancing valves for all FCUs (**see 2.0**), 1-1/2-inch thickness fiberglas insulation with an ASJ to replace compromised flexible elastomeric "unicellular" pipe insulation (**see 3.1**), properly applied FCU Insulation lining (**see 3.5**), rigid conduit versus cable (**see 4.0**), galvanic corrosion protection where incompatible metals (steel versus copper) directly meet each other (**see 5.0**), silver (hard) solder versus soft solder (**see 6.3**), remedy to correct "bad" pipe fitting joints (**see 7.0**), stainless steel drain pans (**see 9.0**), and properly placed water alarms & leak alerts (**see 9.0**).

The preceding initial review information is not to be construed as an endorsement, or as nonconstructive criticism, of any or all of the designed systems, or of those that designed such systems. This analysis was created to provide the Metropolis Condominium Association with accurate and authoritative information. It is intended that this information be reviewed by the Metropolis Condominium Association and the Building Group.

Very truly yours,

SUNNYSIDE DESIGN GROUP, INC.

Michael H Wulf Sr

Michael H. Wulf, Sr.
Building Systems' Consultant

MHWSR / kd

encl. - 43 Photographs (#01 thru #18 & #21 thru #45)