## Facility: 2999 Olympus Blvd, Dallas TX (Cypress Waters Complex)

**Balancing Procedures:** Below consist of the procedure NT will implement based upon current design & specification documents that we have obtained as of May of 2021. As further Design Sequences or Controls sequences are developed, it may require the balancing procedure to be modified to accommodate the new sequences. The balancing procedure below should be provided to the design & controls team for their review for further suggestions and consideration for implementation of their specific more elaborate procedures. Below are further statements of needed clarifications before final implementation of the balancing process for specific assets.

### OAHU 11-1 (Outside Air System)

The unit located on the roof & has the capabilities of providing up to 40,000 cfm outside air to the building. The airflow is distributed through a qty of (10) VAV terminal units with each one located on the 10 floors, respectively.

The design max for each VAV is 4000 cfm with a min design of 700 cfm.

Each VAV will be calibrated by duct traverse, once all VAVs are calibrated the AHU will be tested with all VAVs calling for their max design cfm, a static profile will be created, and a duct static set point will be determined.

The current design has a total exhaust for the building of 13,750 CFM. NT will set the min cfm for each VAV to be 1375 CFM (increased from 700 CFM min Design) to prevent a negative building phenomenon. As the building is finished out and any exhaust is added the min cfm for the VAV serving that floor would be required to be increased.

The OAHU-11 provides a maximum design of outside air of 40,000 CFM. That amount of outside air with the minimal exhaust current design could cause way too much positive building pressure. NT will verify what is the optimum Maximum outside air setpoint the unit should be set at while maintaining a max building pressure of +0.05" wc of pressure. The unit Max Speed will be set to this parameter & documented.

The AHU will be put into auto mode and the VAV dampers should modulate between the min and max CFM set points. NT will stress the unit at these points to validate & document the pressures & fan speed set points are being maintain. Finally, it is important that the modulation between max and min cfm should be determined by CO2 sensors communicating with the VAV based on occupancy of each floor. The protocol & sequence should be provided by the controls & sensor teams for remaining team to approve. The CO2 sensors functionality will be tested for performance between the NT & Controls team working in conjunctions to ensure proper calibration.

### HEF 11-1 (Smoke Exhaust)

The fan is connected to the discharge supply duct of OAH11-1. It is only in operation when the elevator pressurization system activated. When this activation occurs, OAHU shall shut down with intake damper closed. The HEF11 inlet damper opens & activates the fan. The VAVs on the affected floors shall fully

open and all others shall close. In essence the outside air duct & associated VAV's now act as an exhaust outlet for smoke evacuation. Once all dampers are proven the exhaust fan shall start and run at a constant speed. The total cfm will be determined at each open grille and a smoke test performed on affected floors.

**EPF-11-1 thru 3 (Elevator Pressurization Fans)**

Each fan located on the roof and is ducted down through down to the 2nd floor level of the fan's respective elevator hoist. The overall airflow will be measured and set to the max design CFM of the fan. The amount of total CFM of each fan needs to be determined by the design team since the schedule & the riser diagrams CFM are in conflict. Once the fan total is set, each grill will be measured & balance if the team can physically get to the associated grill dampers which will be determined prior to testing.

When the system is activated via the fire alarm, the shaft pressures will be measured & recorded at the elevators on specific floors per sequence with the elevator doors closed. During testing the cart would automatically go down to 1st floor & the doors on 1st level shall be open. For example, an incident on Level 5, we would read floors 3,4,5 & 6 pressures with level 1 elevator door open with cart.

If pressures are not achieved, NT will adjust the fan VFD speed to achieve the 0.10" wc of pressure at the Elevator door.

**SCUs (Self Contained Air Handler System - 1 per floor)**

The unit will provide 32000 CFM to each floor thru a VAV system. Current connected load for the shell is 12060 cfm on the 1st floor, 8040 cfm on the 2nd floor and 1100 cfm on floors 3-10. For the unit to run at an acceptable cfm (8000 cfm 25%) for floors 3-10, a minimum of qty (4) 6 feet long 14" branch ducts open ended should be provided on each floor/system with heavy duty manual volume damper to be set at 1800-2000 cfm each.

All VAVs will be calibrated and new branch duct opening set for design cfm. A duct static set point will be determined for each unit based on what is needed to satisfy the connected VAVs with the VFD at a minimum of 25%. The duct static set point will be adjusted each time an area is finished, the duct openings should be used for the connection to new VAVs or removed and capped.

The specifications call for the BCS contractor to install the static pressure sensor provided with the unit in the ductwork 2/3rds down the duct run. Since the ductwork is a loop and a minimal number of VAVs are installed in the shell phase, the sensors may need relocated as tenant spaces are finished for optimal performance and energy savings. This location can determine at a later date with the assistance of the NT team working with the controls team.

**General Exhaust**

EF 11-1 serves the restrooms on each floor, a manual volume damper installed at the main takeoff for each floor will be used for the total floor exhaust, individual exhaust grilles will be balanced using

manual volume damper at each takeoff (access doors may be needed if the takeoff is above hard ceiling). The submittal for EF 11-1 has a design of 20,000 cfm, the connected load is 8550 cfm, the contract drawing schedule calls for 10,000 cfm. A VFD is required & final CFM design airflow shall be determined by the design engineer.

EF 11-2 serves the janitor's closets on each floor, a manual volume damper installed at the main takeoff for each floor will be used to adjust the cfm for each exhaust grille (1 per floor). The submittal for EF 11-2 has a design of 2,000 cfm, the connected load is 750 cfm per the contract drawing schedule. Speed controller or VFD is required & final CFM design airflow shall be determined by the design engineer.

EF 1-1 serves the fitness room at 3000 cfm this will be determined by duct traverse and static profile will be provided.

**Condenser Water system**

The CW system contains 2 cooling towers served by 3 pumps with one pump provided as a standby. The pumps provide cooled water to each of the SCUs at a rate 310 gpm. The pumps are rated at 1350 gpm each, with 2 pumps running and all SCUs calling for flow there is a 400 GPM differential (15 % diversity). We will simulate this differential in testing the pumps at full flow conditions. The flow will be determined thru an installed circuit setter at each SCU. A differential pressure sensor 2/3rds downstream will be required to adjust flow based on load and control speed of pumps.

The riser diagram in the contract drawings show a CW pump being installed on a 2" line added to the riser at each floor. A circuit setter should be provided on the 2" pipe at each floor for future tenant connections. PT ports should also be provided on each side of the pump for testing pressure differential across the pump.