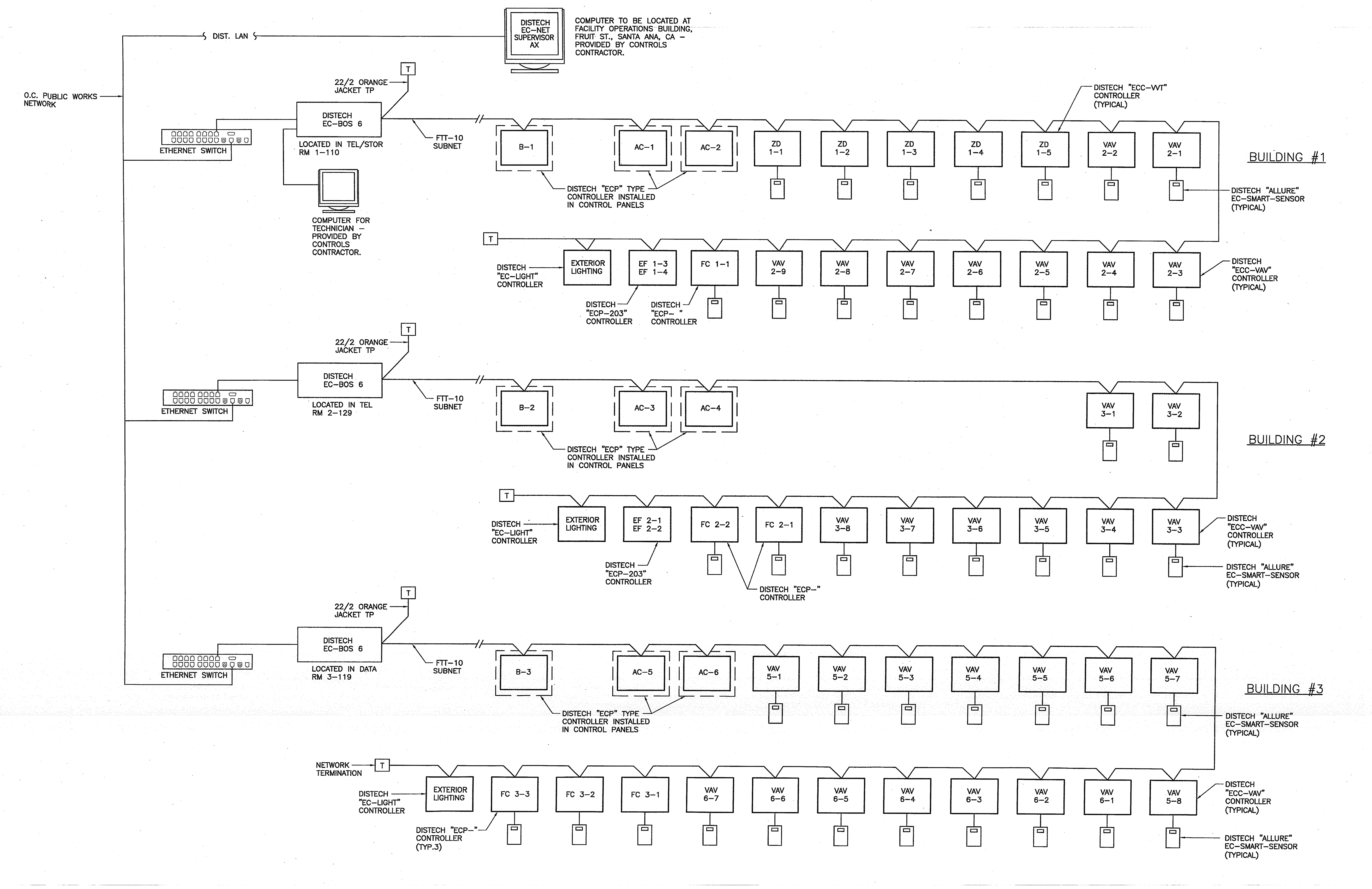


BAS - CONTROL RISER DIAGRAM

SCALE NONE 2

SEQUENCE OF OPERATION - AIR CONDITIONING UNIT (AC-1):

THE DDC SYSTEM SHALL PROVIDE THE OCCUPANCY MODE VIA THE SCHEDULER EMBEDDED WITHIN THE EC-BOS CONTROLLER AND SHALL BE SCHEDULED TO EITHER THE "OCCUPIED" OR "UNOCCUPIED" STATE. THE CONSTANT SPEED SUPPLY FAN AND EXHAUST FAN VFD SHALL START/STOP BASED ON THE BUILDING OPERATING HOURS (ADJUSTABLE).

OCCUPIED:
SUPPLY & EXHAUST FAN CONTROL: THE CONSTANT SPEED SUPPLY FAN SHALL BE COMMANDED TO START BASED ON THE OCCUPANCY SCHEDULE. THE EXHAUST FAN VFD SHALL BE INTERLOCKED TO START WITH THE SUPPLY FAN AND BE CONTROLLED TO MAINTAIN THE DESIRED SPACE PRESSURE SETPOINT OF 0.05" WC (ADJUSTABLE). SHOULD EITHER FAN FAIL TO START, OR SHUT DOWN WHEN NOT COMMANDED TO, AN ALARM SHALL BE SENT TO NOTIFY OPERATIONS AND REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED AND THE SYSTEM RETURNS TO NORMAL.

COOLING MODE: THE DDC SYSTEM SHALL STAGE THE DX COOLING IN RESPONSE TO THE COOLING DEMAND (TERMINAL LOAD) FROM THE ZONES (ZD'S) SERVED.

BYPASS DAMPER (BD-1): THE BYPASS DAMPER SHALL MODULATE TO MAINTAIN THE DESIRED STATIC PRESSURE SETPOINT (ADJUSTABLE) BASED ON FEEDBACK FROM THE SUPPLY AIR STATIC PRESSURE SENSOR LOCATED AFTER THE BYPASS DUCT BUT BEFORE THE FIRST BRANCH DUCT.

ZONE CONTROL: THE VVT (ZD) CONTROLLERS SHALL MAINTAIN THE SPACE TEMPERATURE IN EACH RESPECTIVE SPACE TO THE DESIRED SETPOINT BY MEANS OF VARYING THE AIRFLOW AND REGULATING THE REHEAT VALVE.

ECONOMIZER: WHEN OUTSIDE AIR CONDITIONS ARE SUITABLE FOR ECONOMIZING (OSA ENTHALPY < RA ENTHALPY) AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJUSTABLE), THE OUTSIDE AIR DAMPER SHALL BE MODULATED BETWEEN THE MINIMUM POSITION (22%; ADJUSTABLE) AND 100% OPEN. THE RETURN AIR DAMPER SHALL TRACK THE OUTSIDE AIR DAMPER, WITH THE RETURN DAMPER OPERATION BEING INVERSE TO THE OUTSIDE AIR DAMPER.

FREEZE CONTROL: SHOULD THE SUPPLY AIR TEMPERATURE FALLS BELOW 37°F, AN ALARM SHALL BE ANNUNCIATED AND THE AC UNIT SHALL BE SHUT DOWN.

FILTER LOADING: FILTER LOADING FOR THE FILTERS SHALL BE MONITORED BY A DIFFERENTIAL PRESSURE SWITCH. WHEN THE FILTER HAS BECOME FULLY LOADED AND REQUIRE CHANGING, AN ALARM SIGNAL SHALL NOTIFY OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED, AT WHICH TIME THE ALARM SHALL AUTOMATICALLY RETURN TO NORMAL.

SMOKE CONTROL: SHOULD PRODUCTS OF COMBUSTION BE DETECTED, A SMOKE DETECTOR LOCATED IN THE SUPPLY DUCT SHALL SHUT-DOWN THE AIR HANDLER AS WELL AS SIGNAL THE ALARM CONDITION TO OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED AND THE SYSTEM RETURNS TO NORMAL.

UNOCCUPIED: WHILE IN THE "UNOCCUPIED" MODE, THE AIR CONDITIONING UNIT SHALL REMAIN "OFF". THE OUTSIDE AIR DAMPER SHALL CLOSE 100%, THE RETURN AIR DAMPER SHALL OPEN 100%, AND THE DX COOLING SHALL TURN "OFF".

SEQUENCE OF OPERATION - AIR CONDITIONING UNIT (AC-2, 3, 4, 5, 6):

THE DDC SYSTEM SHALL PROVIDE THE OCCUPANCY MODE VIA THE SCHEDULER EMBEDDED WITHIN THE EC-BOS CONTROLLER AND SHALL BE SCHEDULED TO EITHER THE "OCCUPIED" OR "UNOCCUPIED" STATE. THE AIR HANDLING UNIT SUPPLY AND EXHAUST FAN MOTOR VFD'S SHALL START/STOP BASED ON THE BUILDING OPERATING HOURS (ADJUSTABLE).

OCCUPIED:
SUPPLY & EXHAUST VFD FAN CONTROL (AC-2,3,5 & 6 ONLY): THE SUPPLY FAN SHALL BE COMMANDED TO START BASED ON THE OCCUPANCY SCHEDULE. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE (VFD) SHALL BE CONTROLLED TO MAINTAIN THE DUCT STATIC PRESSURE SET POINT (ADJUSTABLE) BASED ON FEEDBACK FROM THE SUPPLY AIR STATIC PRESSURE SENSOR WHICH SHALL BE LOCATED 2/3 DOWN THE MAIN DUCT. THE EXHAUST FAN VFD SHALL BE INTERLOCKED TO START WITH THE SUPPLY FAN AND BE CONTROLLED TO MAINTAIN THE DESIRED SPACE PRESSURE SETPOINT OF 0.05" WC (ADJUSTABLE). SHOULD EITHER FAN FAIL TO START, OR SHUT DOWN WHEN NOT COMMANDED TO, AN ALARM SHALL BE SENT TO NOTIFY OPERATIONS AND REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED AND THE SYSTEM RETURNS TO NORMAL.

SUPPLY & EXHAUST FAN CONTROL (AC-4 ONLY): THE SUPPLY FAN SHALL BE COMMANDED TO START BASED ON THE OCCUPANCY SCHEDULE. SHOULD SUPPLY FAN FAIL TO START, OR SHUT DOWN WHEN NOT COMMANDED TO, AN ALARM SHALL BE SENT TO NOTIFY OPERATIONS AND REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED AND THE SYSTEM RETURNS TO NORMAL.

COOLING MODE: THE DDC SYSTEM SHALL STAGE THE DX COOLING IN RESPONSE TO THE COOLING DEMAND (TERMINAL LOAD) FROM THE VAV'S SERVED.

VAV CONTROL (AC-2,3,5 & 6 ONLY): THE VAV CONTROLLERS SHALL MAINTAIN THE SPACE TEMPERATURE IN EACH RESPECTIVE SPACE TO THE DESIRED SETPOINT BY MEANS OF VARYING THE AIRFLOW AND REGULATING THE REHEAT VALVE.

ECONOMIZER: WHEN OUTSIDE AIR CONDITIONS ARE SUITABLE FOR ECONOMIZING (OSA ENTHALPY < RA ENTHALPY) AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJUSTABLE), THE OUTSIDE AIR DAMPER SHALL BE MODULATED BETWEEN THE MINIMUM POSITION (ADJUSTABLE) AND 100% OPEN. THE RETURN AIR DAMPER SHALL TRACK THE OUTSIDE AIR DAMPER, WITH THE RETURN DAMPER OPERATION BEING INVERSE TO THE OUTSIDE AIR DAMPER.

FREEZE CONTROL: SHOULD THE SUPPLY AIR TEMPERATURE FALLS BELOW 37°F, AN ALARM SHALL BE ANNUNCIATED AND THE AIR HANDLER SHALL BE SHUT DOWN.

HIGH STATIC CUTOUT (AC-2,3,5 & 6 ONLY): SHOULD THE STATIC PRESSURE RISE TOO HIGH, A STATIC PRESSURE SWITCH WITH MANUAL RESET SHALL TRIP, THE AIR HANDLER SHALL BE SHUT DOWN AND AN ALARM SHALL BE SENT TO NOTIFY OPERATIONS. THESE CONDITIONS SHALL ONLY BE ABLE TO RETURN TO NORMAL WHEN THE MANUAL RESET SWITCH IS RESET.

FILTER LOADING: FILTER LOADING FOR THE FILTERS SHALL BE MONITORED BY A DIFFERENTIAL PRESSURE SWITCH. WHEN THE FILTER HAS BECOME FULLY LOADED AND REQUIRE CHANGING, AN ALARM SIGNAL SHALL NOTIFY OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED, AT WHICH TIME THE ALARM SHALL AUTOMATICALLY RETURN TO NORMAL.

SMOKE CONTROL (AC-2,3,5 & 6 ONLY): SHOULD PRODUCTS OF COMBUSTION BE DETECTED, A SMOKE DETECTOR LOCATED IN THE SUPPLY DUCT SHALL SHUT-DOWN THE AIR HANDLER AS WELL AS SIGNAL THE ALARM CONDITION TO OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED AND THE SYSTEM RETURNS TO NORMAL.

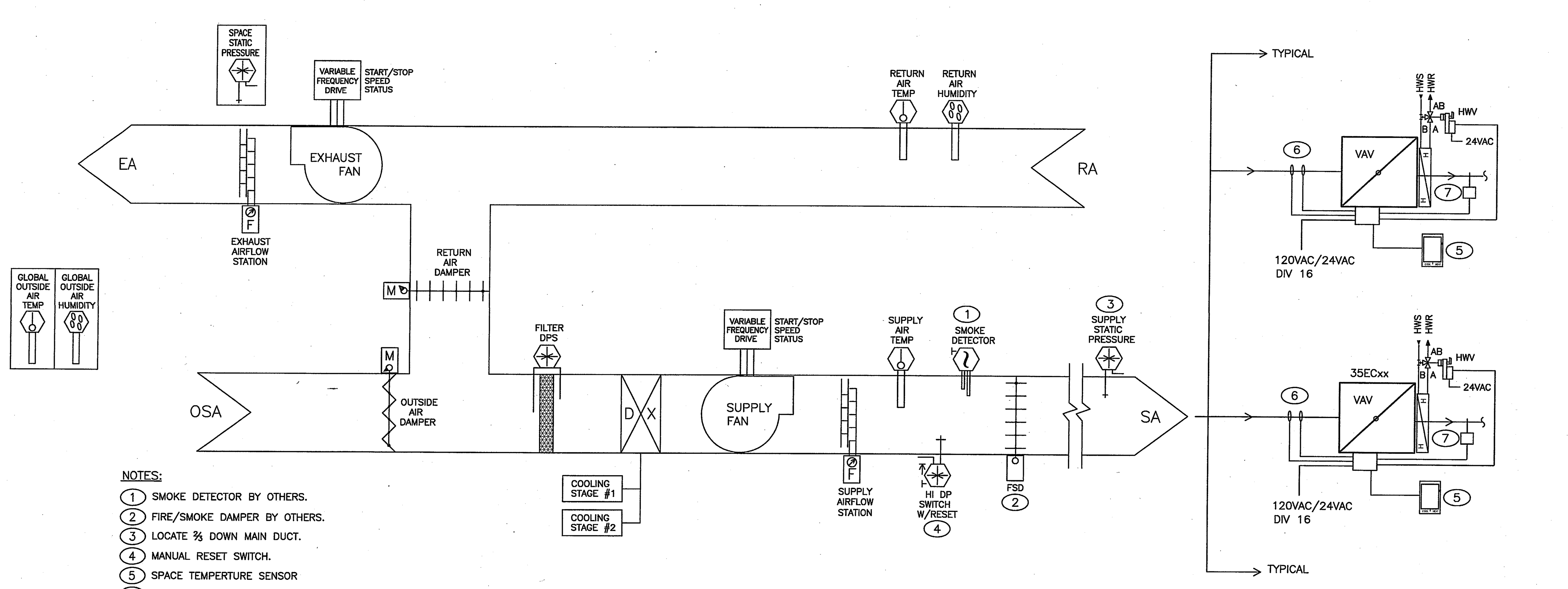
UNOCCUPIED: WHILE IN THE "UNOCCUPIED" MODE, THE AIR CONDITIONING UNIT SHALL REMAIN "OFF". THE OUTSIDE AIR DAMPER SHALL CLOSE 100%, THE RETURN AIR DAMPER SHALL OPEN 100%, AND THE DX COOLING SHALL TURN "OFF".

SEQUENCE OF OPERATION - BOILER (TYPICAL FOR B-1, B-2 & B-3):

1. THE BOILER SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 70°F AND THERE IS A HEATING DEMAND OF 10% OR GREATER FROM THE ZONES SERVED.
2. WHEN ENABLED, THE HHW PUMP (P-1, P-2 OR P-3 RESPECTIVELY) SHALL START AND THE BOILER SHALL OPERATE ON ITS OWN INTERNAL SETPOINTS AND CONTROLS.
3. WHEN THE HEATING DEMAND DROPS BELOW 3% OR THE OUTSIDE AIR TEMPERATURE RISES ABOVE 72°F THE BOILER SHALL BE DISABLED, AND THE HHW PUMP (P-1, P-2 OR P-3 RESPECTIVELY) SHALL STOP.
4. SHOULD THE BOILER GENERATE AN ALARM, AN ALARM SHALL NOTIFY OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED, AT WHICH TIME THE ALARM SHALL AUTOMATICALLY RETURN TO NORMAL.
5. SHOULD THE HHW PUMP START OR STOP WHEN NOT COMMANDED TO, AN ALARM SHALL NOTIFY OPERATIONS. THIS SHALL REMAIN IN EFFECT UNTIL THE ALARM CONDITION HAS BEEN CORRECTED, AT WHICH TIME THE ALARM SHALL AUTOMATICALLY RETURN TO NORMAL.

SEQUENCE OF OPERATION

SCALE NONE 1



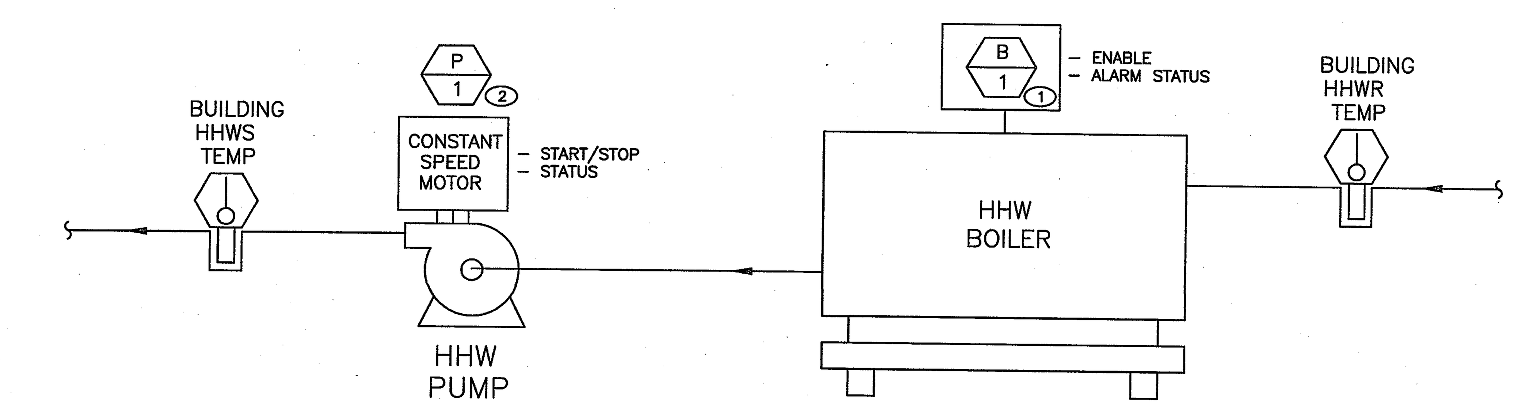
NOTES:

1. SMOKE DETECTOR BY OTHERS.
2. FIRE/SMOKE DAMPER BY OTHERS.
3. LOCATE ⅔ DOWN MAIN DUCT.
4. MANUAL RESET SWITCH.
5. SPACE TEMPERTURE SENSOR
6. AIR FLOW PROBES
7. SUPPLY AIR TEMPERATURE SENSOR

TYPICAL FOR AC-2, 3, 5, 6.

PACKAGED VAV AC UNIT CONTROL DIAGRAM

SCALE NONE 4



NOTES:

1. TYPICAL FOR B-1, B-2 AND B-3.
2. TYPICAL FOR B-1, B-2 AND B-3.

HEATING BOILER CONTROL DIAGRAM

SCALE NONE 3

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Sym.	Descrip.	Date	By

Consultants
FTA F.T. Andrews, Inc. Consulting Engineers. A DIVISION OF AAIDS. 17 PETERS CANYON ROAD, SUITE 150 IRVINE CA. 92606 TEL: 714-283-0341 FAX: 714-283-0348 Job Number: 28088
REGISTERED PROFESSIONAL ENGINEER RAY CRANSTON, JR. STATE OF CALIFORNIA MECHANICAL
Drawn ML Chkd. Date 11-26-09

A-E Seal

A-E ALEXANDER + HIBBS, AIA, INC.
ALEXANDER + HIBBS, AIA, INC. Architecture and Planning 1200 N. JEFFERSON ST. SUITE A ANAHEIM, CALIFORNIA 92807 (714) 630-3686
Design Chkd. Date Nov. 26, 2009

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0742 COUNTY OF ORANGE HEALTH CARE AGENCY 401 SOUTH TUSTIN STREET