

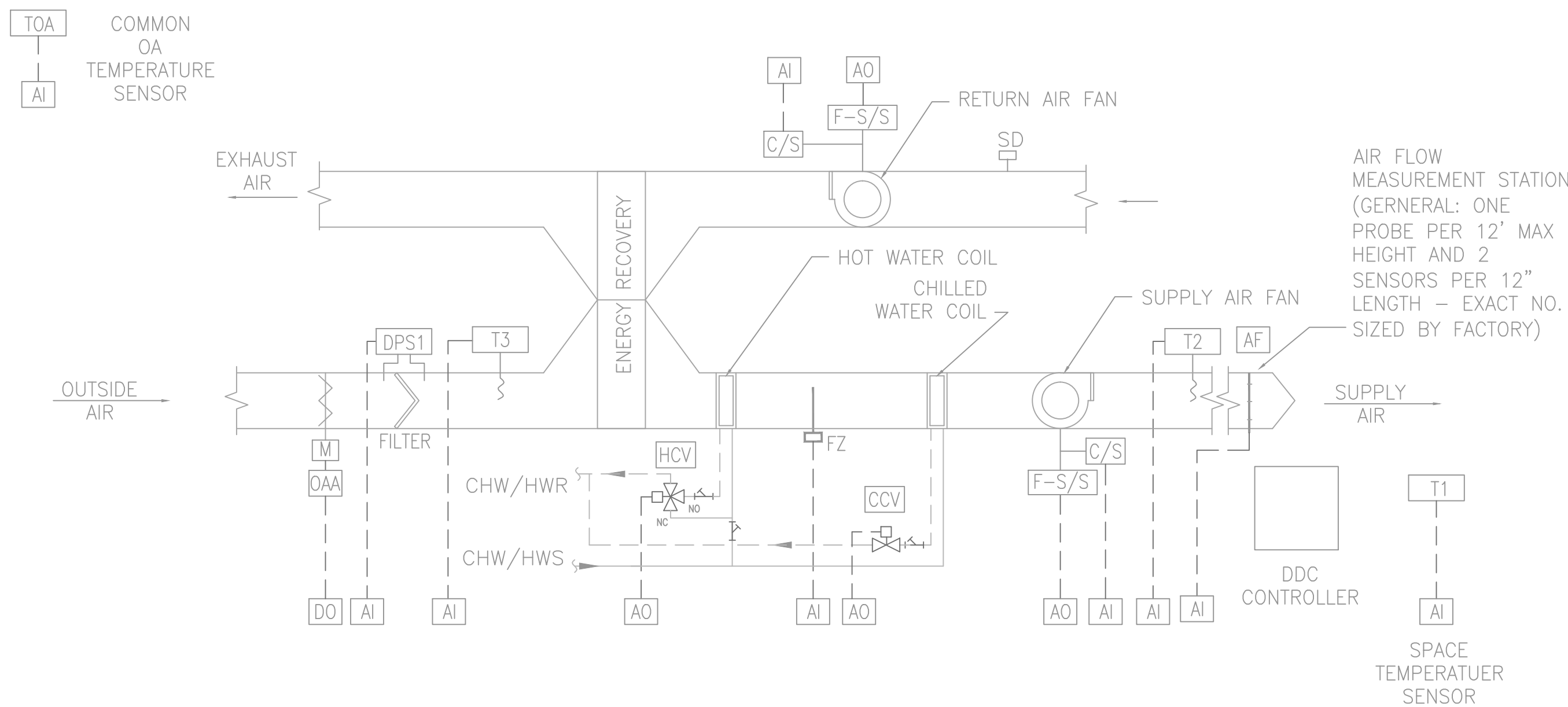
1 CHILLER ROOM CONTROL DIAGRAM
M308 SCALE: NONE

CHILLER ROOM TEMPERATURE CONTROL:

1. THE COTROLLER SHALL HAVE HAND, OFF, AUTOMATIC SELECTION SWITCH FOR FAN AND DAMPER CONTROL.
2. WHEN ROOM TEMPERATURE IS AT OR HIGHER THAN SET POINT OF 85°F (ADJ.) AS SENSED BY THE TEMPEARTURE SENSOR, THE MOTORIZED DAMPER AT AIR INLET SHALL OPEN AND THE EXHAUST FANS SHALL BE ON. DAMPER SHALL CLOSE AND FANS STOP WHEN TEMPERATURE IS LOWER THAN SET POINT.

REFRIGERANT LEAK MONITOR CONTROL:

1. WHEN REFRIGERANT LEAK IS DETECTED BY THE MONITOR, THE HORN AND STROBE SHALL BE ON AND A SIGNAL SHALL SEND TO THE BAS SYSTEM ALARM.
2. AT THE SAME TIME OF LEAK DETECTION, THE FAN AND DAMPER CONTROLLER SHALL OPEN THE OUTSIDE AIR DAMPER AND TURN ON THE EXHAUST FANS.
3. SELECT HORN AND STROBE TO BE DIFFERENT FROM BUILDING FIRE ALARM.
4. REFRIGERANT DETECTION SYSTEM: BY BACHARACH, VULCAIN, OR EQUAL.



2 AIR HANDLING UNIT WITH ENERGY RECOVERY (PAU-1, PAU-2) CONTROL DIAGRAM
M308 SCALE: NONE

SEQUENCE OF OPERATION - PRIMARY AIR UNIT (HEATING AND COOLING WITH ENERGY RECOVERY):

- THE BUILDING CONTROL SHALL PROVIDE ALL NECESSARY CONTROL DEVICES (CONTROLLER, SENSORS, VALVES, ACTUATORS, RELAYS, WIRING, ETC.) FOR A COMPLETE CONTROL SYSTEM.
- THE DDC CONTROLLER SHALL INCLUDE CONTROL SUBROUTINES FOR OCCUPIED/UNOCCUPIED CYCLE, OPTIMUM START-STOP, ECONOMIZER CYCLE AND SPACE TEMPERATURE CONTROL. THE CONTROLLER SHALL BE ABLE TO COMMUNICATE AND ACCEPT INSTRUCTION FROM THE HEAD END COMPUTER. IN CASE OF LOST COMMUNICATION WITH THE CENTRAL SERVER, THE CONTROLLER SHALL BE ABLE TO PERFORM STAND ALONE OPERATIONS.
- COOLING MODE (OUTSIDE AIR TEMPERATURE IS ABOVE 60°F OR ACCORDING TO DATE SCHEDULE): HEATING COIL CONTROL VALVE CLOSED/COOLING COIL CONTROL VALVE MODULATES. DURING OCCUPIED CYCLE {BY TIME SCHEDULE - WEEKDAY ON 05:00AM/ OFF 5:00PM (ADJUSTABLE)}: OUTSIDE AIR DAMPER IS 100% OPEN. THE UNIT SHALL BE ON (SUPPLY AND RETURN FANS ON FOR 100% DESIGN CFM THROUGH AIR FLOW MEASUREMENT). THE CONTROLLER SHALL MODULATE CHILLED WATER CONTROL VALVE TO SATISFY THE DISCHARGE AIR TEMPERATURE OF 52°F SET POINT TEMPERATURE.
DURING UNOCCUPIED CYCLE: OUTSIDE AIR DAMPER IS 20% OPEN, AND 80% RETURN AIR THROUGH BY-PASS DAMPER. UNIT SHALL RUN IN ACCORDING TO NIGHT SET-BACK SCHEDULE. FAN SHALL BE ON WHEN ROOM TEMPERATURE IS HIGHER THAN THE SET POINT TEMPERATURE OF 80°F (READING FROM ROOM 409). DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT 52°F SET POINT.
- HEATING MODE (OUTSIDE AIR TEMPERATURE IS AT OR BELOW 60°F OR ACCORDING TO DATE SCHEDULE): HEATING COIL CONTROL VALVE MODULATES/COOLING COIL CONTROL VALVE CLOSED. DURING OCCUPIED CYCLE (BY TIME SCHEDULE - WEEKDAY ON 05:00AM/ OFF 5:00PM (ADJUSTABLE)): OUTSIDE AIR DAMPER IS 100% OPEN. THE UNIT SHALL BE ON (SUPPLY AND RETURN FAN RUN CONTINUOUSLY TO DELIVER 100% AIR FLOW). THE CONTROLLER SHALL MODULATE THE HEATING COIL CONTROL VALVE TO SATISFY THE DISCHARGE AIR TEMPERATURE OF 60°F SET POINT TEMPERATURE.
DURING UNOCCUPIED CYCLE: OUTSIDE AIR DAMPER IS FULLY CLOSED. THE UNIT FANS SHALL BE OFF. THE HEATING COIL CONTROL VALVE SHALL BE OPEN TO ALLOW HOT WATER TO FLOW TO COIL TO PREVENT FREEZING OF THE COIL AND PIPING.
- A TEMPERATURE LOW LIMIT (FREEZESTAT) SHALL DE-ENERGIZE FAN AND CLOSE OUTSIDE AIR DAMPER IF AIR TEMPERATURE AT DISCHARGE OF HEATING COIL DROPS BELOW 35°F (FAN CAN ONLY BE RESTARTED AFTER MANUALLY RESETTING THE FREEZESTAT).
- DUCT MOUNTED SMOKE DETECTORS SHALL DE-ENERGIZE SUPPLY FAN (RETURN FAN SHALL STAY ENERGIZED) WHEN SENSING PRODUCTS OF COMBUSTION.
- THE FOLLOWING ALARMS SHALL BE DISPLAYED AT THE HEAD END COMPUTER:
 1. NO AIR FLOW: SUPPLY FAN AND RETURN AIR FAN STATUS (CURRENT SWITCH) AFTER MOTOR IS ENERGIZED.
 2. LOW SUPPLY AIR TEMPERATURE (FREEZESTAT).
 3. HIGH FILTER AIR PRESSURE LOSS (1" WG ADJUSTABLE).

SEQUENCE OF OPERATION (HEATING AND COOLING WITH ENERGY RECOVERY):

- THE BUILDING CONTROL SHALL PROVIDE ALL NECESSARY CONTROL DEVICES (CONTROLLER, SENSORS, VALVES, ACTUATORS, RELAYS, WIRING, ETC.) FOR A COMPLETE CONTROL SYSTEM.
- THE DDC CONTROLLER SHALL INCLUDE CONTROL SUBROUTINES FOR OCCUPIED/UNOCCUPIED CYCLE, OPTIMUM START-STOP, ECONOMIZER CYCLE AND SPACE TEMPERATURE CONTROL. THE CONTROLLER SHALL BE ABLE TO COMMUNICATE AND ACCEPT INSTRUCTION FROM THE HEAD END COMPUTER. IN CASE OF LOST COMMUNICATION WITH THE CENTRAL SERVER, THE CONTROLLER SHALL BE ABLE TO PERFORM STAND ALONE OPERATIONS.
- COOLING MODE (OUTSIDE AIR TEMPERATURE IS ABOVE 60°F OR ACCORDING TO DATE SCHEDULE): HEATING COIL CONTROL VALVE CLOSED/COOLING COIL CONTROL VALVE MODULATES. DURING OCCUPIED CYCLE {BY TIME SCHEDULE - WEEKDAY ON 05:00AM/ OFF 5:00PM (ADJUSTABLE)}: THE UNIT SHALL BE ON (SUPPLY AND RETURN FANS RUN CONTINUOUSLY TO PROVIDE 100% CFM AIR THROUGH AIR MEASUREMENT). IF THE ECONOMIZER CYCLE CANNOT SATISFY THE SPACE TEMPERATURE SET POINT OF 75°F (ADJUSTABLE), THE OA DAMPER SHALL BE ADJUSTED TO PROVIDE MINIMUM AMOUNT OF OUTSIDE AIR AND OPEN RETURN AIR DAMPER. THE CONTROLLER SHALL MODULATE THE WATER CONTROL VALVE TO RESET THE DISCHARGE AIR TEMPERATURE TO SATISFY THE SPACE SET POINT.
DURING UNOCCUPIED CYCLE: THE SPACE SET-BACK TEMPERATURE IS 80°F. THE UNIT SHALL BE ON WHEN SPACE TEMPERATURE IS HIGHER THAN THE SET-BACK TEMPERATURE. WHEN ECONOMIZER CYCLE CANNOT SATISFY THE SET-BACK TEMPERATURE, OA DAMPER IS CLOSED AND RETURN AIR DAMPER OPEN. THE CONTROL VALVE IS MODULATED TO PROVIDE COOLING. WHEN TEMPERATURE IS SATISFIED, THE UNIT SHALL BE OFF. PROVIDE OVERRIDE OPTION AT TEMPERATURE SENSOR TO RETURN TO OCCUPIED CYCLE FOR 1, 2, OR 3 HOURS OPERATION WITHOUT RESET THE TIME SCHEDULE.
- HEATING MODE (OUTSIDE AIR TEMPERATURE IS AT OR BELOW 60°F OR ACCORDING TO DATE SCHEDULE): HEATING COIL CONTROL VALVE MODULATES/COOLING COIL CONTROL VALVE CLOSED. DURING OCCUPIED CYCLE {BY TIME SCHEDULE - WEEKDAY ON 05:00AM/ OFF 5:00PM (ADJUSTABLE)}: OA DAMPER OPEN FOR MINIMUM OA AND RETURN AIR DAMPER OPEN. THE UNIT SHALL BE ON AND SUPPLY AND RETURN FANS RUN CONTINUOUSLY TO PROVIDE 100% CFM AIR. THE CONTROLLER SHALL MODULATE THE HEATING COIL CONTROL VALVE TO RESET THE DISCHARGE AIR TEMPERATURE IN ACCORDING TO SPACE TEMPERATURE IN ORDER TO SATISFY THE SET POINT OF 70°F (ADJUSTABLE).
DURING UNOCCUPIED CYCLE: THE SPACE TEMPERATURE SET POINT TEMPERATE SHALL BE 60°F. OA DAMPER IS CLOSED AND RETURN AIR DAMPER OPEN. WHEN SPACE TEMPERATURE DROP BELOW SET POINT, THE CONTROLLER SHALL MODULATE THE HEATING VALVE TO RESET DISCHARGE AIR TEMPERATURE IN ACCORDING TO THE SPACE TEMPERATURE. WHEN SPACE TEMPERATURE IS SATISFIED, THE UNIT IS OFF AND ALL FANS ARE OFF. THE HEATING CONTROL VALVE SHALL BE OPEN WHEN UNIT IS OFF (FAN OFF) TO ALLOW HEATING WATER TO FLOW TO COIL TO PREVENT PIPING AND COIL FROM FREEZING. HEATING VALVE SHALL ALSO BE FAIL OPEN. PROVIDE OVERRIDE OPTION TO RETURN TO OCCUPIED CYCLE FOR 1, 2, OR 3 HOURS WITHOUT RESET THE TIME SCHEDULE.
- A TEMPERATURE LOW LIMIT (FREEZESTAT) SHALL DE-ENERGIZE FAN AND CLOSE OUTSIDE AIR DAMPER IF AIR TEMPERATURE AT DISCHARGE OF HEATING COIL DROPS BELOW 35°F (FAN CAN ONLY BE RESTARTED AFTER MANUALLY RESETTING THE FREEZESTAT).
- DUCT MOUNTED SMOKE DETECTORS SHALL DE-ENERGIZE SUPPLY FAN (RETURN AIR FAN SHALL STAY ENERGIZED) WHEN SENSING PRODUCTS OF COMBUSTION.
- THE FOLLOWING ALARMS SHALL BE DISPLAYED AT THE HEAD END COMPUTER:
 1. NO AIR FLOW: SUPPLY FAN AND RETURN FAN STATUS (CURRENT SWITCH) AFTER MOTOR IS ENERGIZED.
 2. LOW SUPPLY AIR TEMPERATURE (FREEZESTAT).
 3. HIGH FILTER AIR PRESSURE LOSS (1" WG ADJUSTABLE).

3 AIR HANDLING UNIT WITH ENERGY RECOVERY (CAC-1, CAC-3) CONTROL DIAGRAM
M308 SCALE: NONE

1 CONTROL SYSTEM DIAGRAM 2
NOT TO SCALE

SEAL

SCHOOL & LOCATION
Commodore John Barry Elementary School
5900 Race Street, Philadelphia PA 19139

PROJECT TITLE
NEW CONSTRUCTION

DRAWING TITLE
CONTROL SYS. DIAGRAM 2

APPROVED BY

SCHOOL DISTRICT OF PHILADELPHIA
THE SCHOOL REFORM COMMISSION

DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES

JAN 28/2006 STREET
PHILADELPHIA PA 19130
(215) 400-0730 FAX (215) 400-0731

CONTRACTOR TO VERIFY ALL CONDITIONS AND DIMENSIONS AT SITE

9	8	7	6	5	4	3	2	1	NO.	DATE	REVISION

SPEC NO.
B-840C of
2005/06

DATE
12/29/06

SCALE
NONE

LOCATION NO.
120

DRAWN BY
WVC

TYPE NO.
-

CHECKED BY
MMT

FILE NO.
-

DRAWING NO.
M308