DDC HVAC Controls
Manufacturer either Carrier or Honeywell

The following list of controls and corresponding equipment is for a single occupied floor of the building. The
building has a total of four occupied floors. The aforementioned controls and equipment list is common to all
four floors.

Controller #1 – ***LP gas boiler control***. Located in the mechanical room, this boiler will be running 24/7 in order
to maintain a HW loop temperature setpoint so that reheat capability is available for the multiple VAV boxes
being utilized on the floor of the building. (note 2nd Floor has (2) Boilers – (1) House and (1) 2nd Floor)

- Control objective – control HW loop temperature to a variable setpoint dictated by OAT.
- INPUT – OAT sensor – a global point broadcast across the network tied into this controller.
- INPUT – HW loop temperature – well sensor
- OUTPUT – Boiler ON/OFF if needed via relay
- OUTPUT – Boiler Primary Loop circulator pump ON/OFF if needed via relay
- OUTPUT – Heating Seconday Loop circulator pump and mixing valve
- OUTPUT – HW reset control algorithm via software controlled by OAT

Controller #2 – ***Central air handler control***. This controller will be used to control a central air-handling
system located in the mechanical room that will manage air distribution to the floor it serves. The air-handler
consists of the following pieces of equipment that need to be controlled:

1. Rooftop located DX condenser/compressor unit. This unit will have multi-stage capabilities.
2. HW coil with valve to control discharge air temp.
3. Mixing box utilizing linked OAD and RAD for mixing/tempering of supply air to space.
4. Economizer system controlled via enthalpy setting. – considered the 1st stage of cooling.
5. VFD for control of system static pressure via unit fan speed modulation.
6. Life Safety damper control of mixing box with (2) smoke detection sensors – 1 in supply duct
7. and 1 in return duct.

Electrical Room Air transfer fan.
Each electrical room has a ceiling fan ducted to the return ductwork of the floor AHU. This fan shall activate upon the room exceeding a set temperature.

OTHER SOFTWARE CONTROL ALGORITHMS UTILIZING EXISTING OUTPUTS

- Economizer control via enthalpy sensor input – as stated above, can this be done in software or
- does it need to be done by a separate controller?
- Smoke detection procedures to close dampers – steps are as follows: If smoke detected in the
- return duct, the return damper closes, which makes OAD go full open, fan stays on. If smoke
- detected in supply duct, close smoke damper and turn off fan motor.
- IN OCCUPIED mode – 30% mix in box in heat mode at OAT > 60. 15% mix in box in cool
- mode at OAT > 60. This is to achieve minimum OA CFM for VAV boxes on floors (400 CFM,
- especially during deadband between heating and cooling once cooling is satisfied).

Controllers #3 - 20 (18 total controllers) – ***VAV's (12) /reheat control and (6)w/o***. Boxes for 4th and 5th floor
only. These VAV boxes will modulate a damper for airflow/temperature control to the space as well as
introduce tempered air if necessary via a HW reheat coil in order to maintain room setpoint.

- Control objective – maintain space temperature setpoint via sensor feedback located in controlled zone.
- INPUT – space temperature sensor/thermostat with manual setpoint override capabilities.
- OUTPUT – VAV damper
- OUPUT – HW reheat valve
- ACTUATOR(S) – (1) for VAV damper (1) for HW reheat valve
- MIN airflow position – 400 CFM MAX airflow position – 1000 CFM

Unassigned #1 – ***Zone exhaust fan for pressure relief***. – This fan will modulate via a VFD in order to sustain a
specific pressure setpoint on the floor.

- Control objective – maintain pressure setpoint on the occupied floor.
- INPUT – pressure sensor
- OUTPUT – fan modulation via VFD control loop – (can I control VFD via software, or is there a
- specific controller for this?)

Controller (2nd floor) – ***Radiant heat control House boiler***. This LP gas boiler, located on the second floor of
the building, is dedicated specifically to controlling a boiler loop to which is attached 6 circulator pumps. Each
pump is assigned to a specific zone of radiant heat piping.

- Control objective – Control of radiant heating boiler to maintain radiant loop setpoint as well as control
  of associated zone circulator pumps and zone mixing valves to maintain zone loop setpoints. The zones
  are delineated as follows:
  1. Radiant 1st floor-Garage Ceiling/2nd floor tempering heat
  2. Lobby radiant heat
  3. Stairwell/floor radiant heat
  4. Sidewalk
  5. Radiant water/sprinkler room
- INPUT – OAT via global point over network
- INPUT – radiant boiler loop temp
- INPUT(S) – 5 zone temperature sensors – 1 per zone
- OUTPUT – Boiler ON/OFF via relay dependent on OAT setpoint
- OUTPUT(S) – Circulator pumps ON/OFF via relays dependent on OAT setpoint
- OUTPUT – Boiler loop temp reset control via OAT and software algorithm
- OUTPUT – radiant zone mixing valves - (5) total - modulating

Unassigned – ***Garage exhaust fan***.. This fan is turned on by either of (2) CO2/thermostat sensors, (1) on the
Lower Level and (1) on the 1st Floor Garage areas, exceeding its assigned setpoint limit.

- Control objective – Exhaust fan ON/OFF via CO2 level setpoint
- INPUT – CO2 sensor
- INPUT – Thermostat sensor setpoint
- OUTPUT – ON/OFF via relay

Stairwell pressurization Life Safety Fans (2). These fans are turned on by the fire control station (provided by
others) to pressurize the stairwell served. Upon activation a fan the air relief MOD's (2) per stairwell shall
open.

DDC Graphical Interface The direct digital control (DDC) system shall be monitored and controlled via a PC based graphical user interface. This program will allow the end user to maintain the continuous and comprehensive ability to oversee and control all vital mechanical functions in the building, as well as leaving room for expansion of these capabilities as the mechanical system growth dictates. The software also allows remote monitoring and control by permitted persons via password protected Web based Internet connection software, essentially allowing remote control and monitoring from anywhere an Internet connection is possible. Alarms and other forms of output from the system can be distributed internally within the building network to various selected workstations, or remotely to other sites connected to the Internet, allowing for great flexibility in control and oversight of building functions.
CNN WEB PREFERRED

REV.	DESCRIPTION	DATE
–	FOR CONSTRUCTION	12/18/03

STATE OF MAINE Thomas R. Weiss 7691 REGISTERED PROFESSIONAL ENGINEER

DESIGN/BUILD/MAINTAIN

PROJECT: 280 FORE STREET
OFFICE BUILDING
PORTLAND, MAINE

HVAC_CONTROLS

SHEET TITLE:

SCALE:	NTS	DATE:	11/26/03
PROJECT MANAGER:	TRW		
JOB CAP/DRAWN:	TRW		
E OF RECORD:	D.THAYER,P.E.	SHEET No.	C1
THAYER CAD FILE	C1		