

SEQUENCE OF OPERATION:

BOILERS:

THE PLANT SHALL CONTAIN TWO DUAL-FUEL (NATURAL GAS/OIL) FIRED HOT WATER BOILERS. EACH BOILER SHALL BE EQUIPPED WITH A MODULATING BURNER INCLUDING A VFD ON THE BURNER MOTOR. THE DDC SYSTEM SHALL ENABLE THE BOILERS FOR OPERATION WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 50 DEG F. (ADJUSTABLE) THE BOILER BURNER SHALL MODULATE TO MAINTAIN THE BOILER WATER SUPPLY SET POINT WHICH WILL BE RESET BY THE DDC SYSTEM TO FOLLOW THE AMBIENT TEMPERATURE. AN ASSOCIATED BOILER SUPPLY PUMP SHALL CYCLE TO PROVIDE HEAT TO THE HYDRONIC WATER HEATING SYSTEM TO MAINTAIN THE SYSTEM SUPPLY SETPOINT. WHEN ANY BOILER OR WATER HEATER CALLS FOR HEAT, SUPPLY FAN SF-2 SHALL START AND THE ASSOCIATED MOTOR OPERATED DAMPER SHALL OPEN. SF-2 SHALL RUN UNTIL THE CALL FOR HEAT IS SATISFIED. A SYSTEM OF EXHAUST FANS MOUNTED AT THE FLUE OUTLET SHALL MODULATE TO MAINTAIN A CONSTANT DRAFT PRESSURE SET POINT. THE BOILER PLANT SHALL PROVIDE WATER FOR THE HYDRONIC HEATING SYSTEM AND SHALL PROVIDE DOMESTIC HOT WATER DURING THE HEATING SEASON. DURING THE SUMMER MONTHS, THE BOILERS SHALL BE SHUT OFF.

DOMESTIC WATER HEATERS:

DURING THE SUMMER MONTHS, THE BOILERS SHALL BE LOCKED OUT AND DOMESTIC HOT WATER SHALL BE SUPPLIED BY A PAIR OF DUAL-FUEL (NATURAL GAS/OIL) FIRED DOMESTIC WATER HEATERS. A SYSTEM OF EXHAUST FANS MOUNTED AT THE FLUE OUTLET SHALL MODULATE TO MAINTAIN A CONSTANT DRAFT PRESSURE SET POINT. A DOMESTIC HOT WATER RECIRCULATION PUMP SHALL RUN CONTINUOUSLY TO MAINTAIN HOT WATER FLOW TO REMOTE FIXTURES.

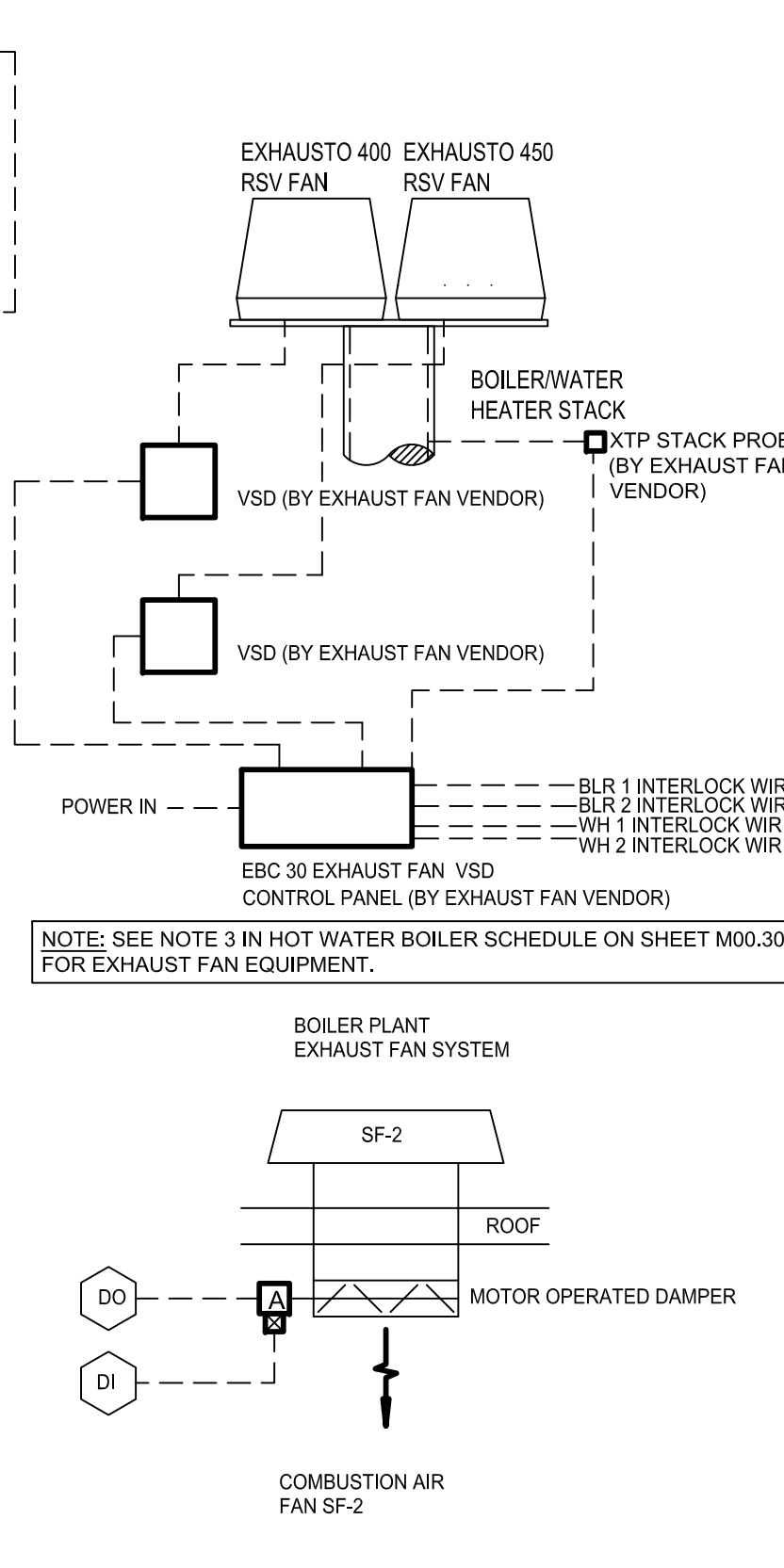
HYDRONIC SYSTEM SUPPLY PUMPS:

THE DDC SYSTEM SHALL ENABLE THE HYDRONIC SYSTEM SUPPLY PUMPS FOR OPERATION WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 50 DEG F. (ADJUSTABLE) THE HYDRONIC SYSTEM SUPPLY PUMPS SHALL BE ARRANGED IN A LEAD/LAG SEQUENCE. IF THE LEAD HYDRONIC SYSTEM SUPPLY PUMP FAILS TO START, THE LAG PUMP WILL BE STARTED AND THE DDC SYSTEM SHALL SEND AN ALARM TO THE DESIGNATED MAINTENANCE REPRESENTATIVE. THE LEAD AND LAG PUMPS SHALL BE SWITCHED OVER ON A WEEKLY BASIS. THE PUMPS SHALL BE FURNISHED WITH VFDs AND THE PUMP RPM SHALL BE MODULATED TO MAINTAIN A SYSTEM SUPPLY/RETURN TEMPERATURE DIFFERENTIAL OF 25 DEG F. (ADJUSTABLE)

HYDRONIC SYSTEM:

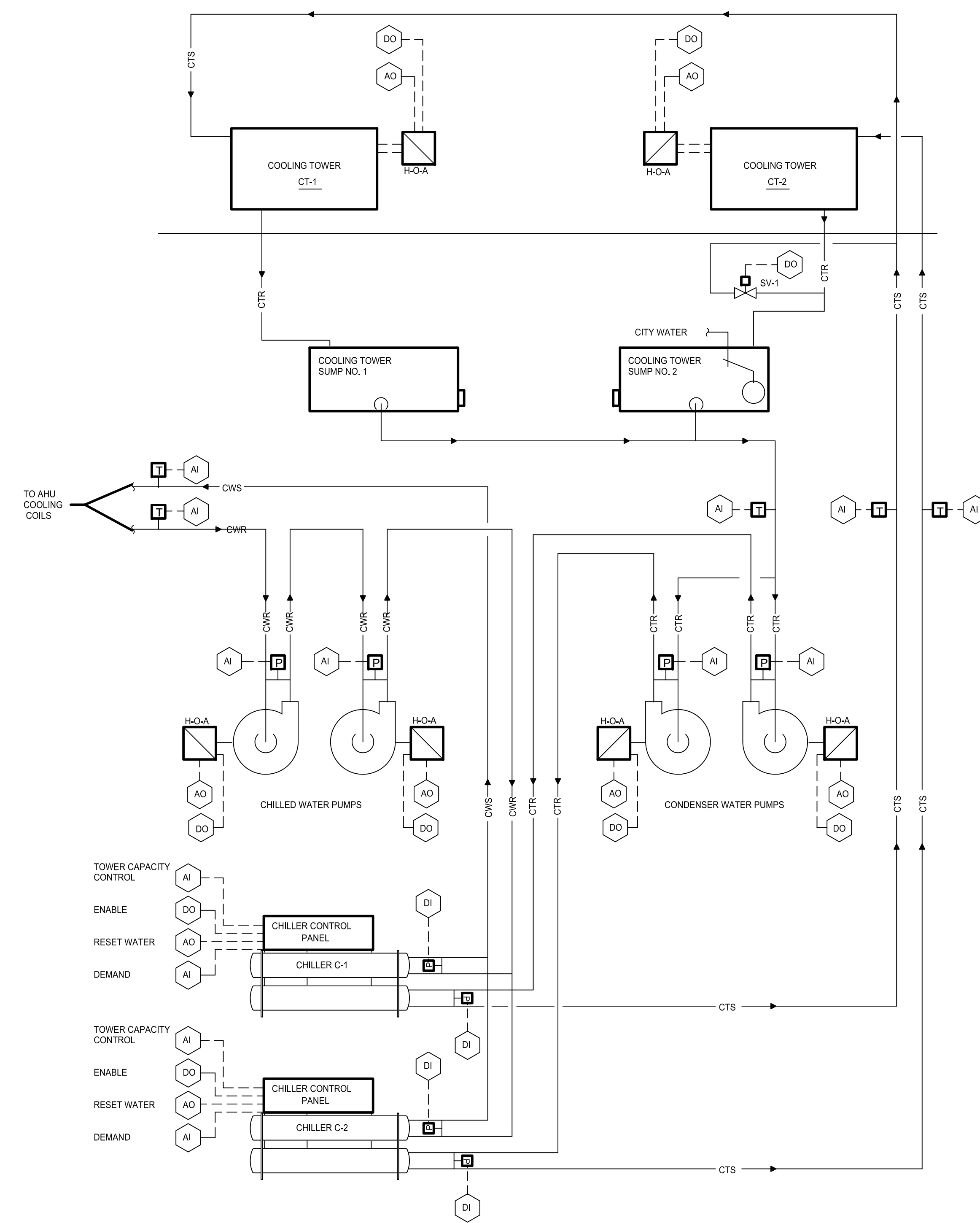
THE DDC SYSTEM SHALL MONITOR THE HYDRONIC SYSTEM SUPPLY TEMPERATURE, RETURN TEMPERATURE, SUPPLY PRESSURE OFF THE PUMPS AND RETURN PRESSURE. JUST BEFORE THE PUMPS, THE HYDRONIC SYSTEM SUPPLY TEMPERATURE SHALL BE RESET FROM THE OUTDOOR AIR TEMPERATURE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

OUTDOOR AIR TEMPERATURE	HYDRONIC WATER SUPPLY TEMPERATURE
50 DEG F (ADJUSTABLE)	140 DEG F (ADJUSTABLE)
0 DEG F (ADJUSTABLE)	190 DEG F (ADJUSTABLE)



BOILER PLANT CONTROL SCHEMATIC
SCALE: NOT TO SCALE

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SEQUENCE OF OPERATION

CHILLERS:

THE DDC SYSTEM SHALL ENABLE THE CHILLERS FOR OPERATION WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 65 DEG F. (ADJUSTABLE) CHILLERS SHALL BE CONTROLLED IN A LEAD/LAG SEQUENCE AS FOLLOWS: THE FIRST CHILLER SHALL RUN AND SHALL MODULATE ITS COMPRESSOR TO FOLLOW THE COOLING LOAD UNTIL THE LOAD REACHES 80% OF THE CHILLER CAPACITY (ADJUSTABLE) AT WHICH POINT THE SECOND CHILLER SHALL START. AS THE COOLING LOAD INCREASES THE CHILLERS SHALL CARRY THE LOAD EQUALLY.

COOLING TOWERS:

ONE COOLING TOWER SHALL BE ASSOCIATED WITH EACH CHILLER. THE TOWER FAN AND PUMP SHALL BE ENABLED WHENEVER THE ASSOCIATED CHILLER IS ENABLED AND THE TOWER SHALL RUN TO REJECT THE CONDENSER WATER HEAT TO ATMOSPHERE. THE TOWER FANS SHALL BE MODULATED BY THE DDC SYSTEM TO MAINTAIN A LEAVING TOWER WATER TEMPERATURE SET POINT EQUAL TO THE AMBIENT WET BULB TEMPERATURE PLUS 5 DEG F. (ADJUSTABLE) WHEN THE OUTDOOR TEMPERATURE DROPS BELOW 40 DEG F, THE COOLING TOWERS SHALL BE LOCKED OUT.

CONDENSER PUMPS:

THE CONDENSER WATER PUMPS SHALL BE ARRANGED IN A LEAD/LAG SEQUENCE. BEFORE EITHER CHILLER CAN START, CONDENSER BARREL FLOW MUST BE PROVIDED. IF THE LEAD CONDENSER WATER PUMP FAILS TO START, THE LAG PUMP WILL BE STARTED AND THE DDC SYSTEM SHALL SEND AN ALARM TO THE DESIGNATED MAINTENANCE REPRESENTATIVE. THE LEAD AND LAG PUMPS SHALL BE SWITCHED OVER ON A WEEKLY BASIS.

CHILLED WATER PUMPS:

EACH CHILLER HAS AN ASSOCIATED CONSTANT RPM SUPPLY PUMP. BEFORE A CHILLER CAN START, EVAPORATOR BARREL FLOW MUST BE PROVIDED. IF THE SUPPLY PUMP FOR THE CHILLER FAILS TO START, THE OTHER CHILLER SUPPLY PUMP WILL BE STARTED AND THE ASSOCIATED CHILLER STARTUP SEQUENCE INITIATED. THE DDC SYSTEM SHALL SEND AN ALARM TO THE DESIGNATED MAINTENANCE REPRESENTATIVE.

THE CHILLED WATER SYSTEM SUPPLY PUMPS SHALL BE ARRANGED IN A LEAD/LAG SEQUENCE. IF THE LEAD CHILLED WATER SYSTEM SUPPLY WATER PUMP FAILS TO START, THE LAG PUMP WILL BE STARTED AND THE DDC SYSTEM SHALL SEND AN ALARM TO THE DESIGNATED MAINTENANCE REPRESENTATIVE. THE LEAD AND LAG PUMPS SHALL BE SWITCHED OVER ON A WEEKLY BASIS. EACH PUMP SHALL BE EQUIPPED WITH A VFD AND THE PUMP RPM SHALL BE MODULATED TO MAINTAIN A CHILLED WATER RETURN TEMPERATURE SET POINT OF 56 DEG F. (ADJUSTABLE)

CHILLED WATER SYSTEM (CHWS):

THE CHILLED WATER SYSTEM SHALL SERVE TWO NEW AIR HANDLING UNIT (AHU) CHILLED WATER COILS AND SHALL BE PIPED FOR PROVISION TO SERVE ADDITIONAL AHU IN A FUTURE ADDITION. THE CHWS SHALL BE PIPED TO THE CHILLED WATER COILS WITH TWO-WAY CONTROL VALVES. A MODULATING CONTROL VALVE WILL SERVE AS A BYPASS WHEN THE CHILLED WATER FLOW DROPS TO 500 GPM.

CHILLER PLANT SCHEMATIC
SCALE: NOT TO SCALE

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SHEET NOTES

GENERAL NOTES

A SEE SHEET M00.00 FOR LEGEND AND GENERAL NOTES.

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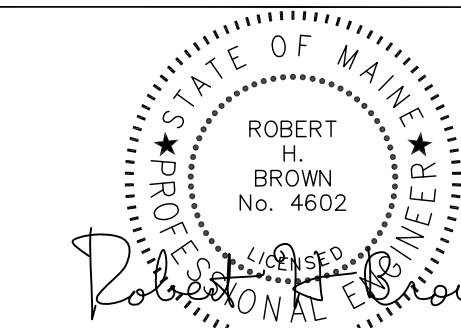
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Issue	Date & Issue Description	By	Check
01	12/03/08	PWZ	RHB
02	01/23/09	PWZ	RHB
02	10/26/09	PWZ	RHB

Seal/Signature



Project Name: PWM Terminal Enhancement
Date: 10/26/09

Project Number: 09-6395-000
CAD File Name: T:\6330101\Sheets\M12.05.dwg
Description: MECHANICAL CONTROL DIAGRAMS

Scale: NOT TO SCALE

M12.05

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