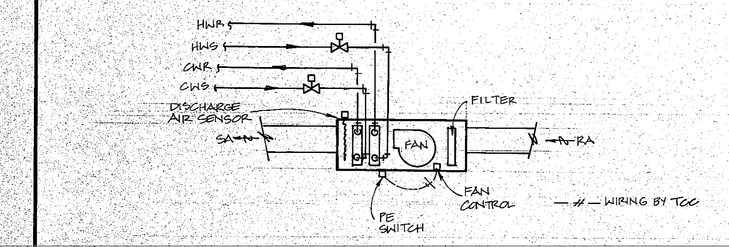


SEQUENCE OF CONTROL

FAN COIL FC-3 AND FC-4

OCCUPIED CYCLE

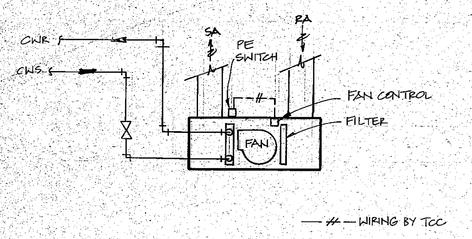
WHEN INDEXED TO THE OCCUPIED CYCLE THE FAN SHALL RUN CONTINUOUSLY.

AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE HEATING CONTROL VALVE SHALL CLOSE.

AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE COOLING CONTROL VALVE SHALL OPEN.

UNOCCUPIED CYCLE

THE CONTROL VALVE ON THE HOT WATER COIL SHALL BE FULL OPEN TO COIL. WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC." SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED. THE COOLING SHALL BE OFF.



SEQUENCE OF CONTROL

FAN COIL FC-2

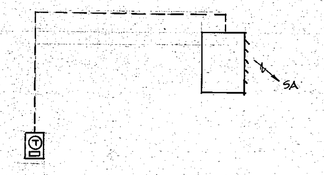
OCCUPIED CYCLE

WHEN INDEXED TO THE OCCUPIED CYCLE THE FAN SHALL RUN CONTINUOUSLY.

AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE COOLING CONTROL VALVE SHALL OPEN.

UNOCCUPIED CYCLE

THE UNIT SHALL BE OFF



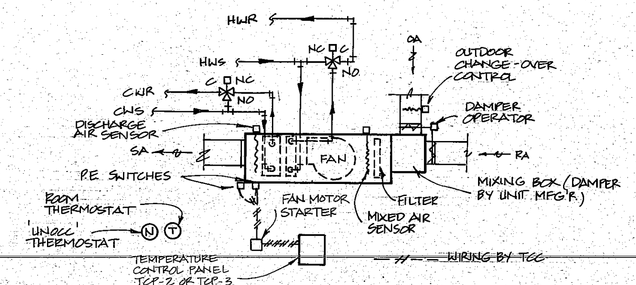
SEQUENCE OF CONTROL

UNIT HEATER

PROVIDE LINE VOLTAGE ROOM THERMOSTAT TO CYCLE FAN "ON-OFF" TO MAINTAIN ROOM TEMPERATURE.

PROVIDE UNIT WITH SEPARATE FAN "ON-AUTO-OFF" SWITCH FOR FAN OPERATION DURING SUMMER.

TURN THERMOSTAT AND SWITCH OVER TO ELECTRICAL TRADE FOR MOUNTING AND WIRING.



SEQUENCE OF CONTROL AIR HANDLING HVAC UNIT AH-1 THRU AH-5

OCCUPIED CYCLE:

THE UNIT FAN SHALL OPERATE CONTINUOUSLY. THE OUTDOOR AND RETURN AIR DAMPERS SHALL OPEN TO THE MINIMUM POSITION AFTER WARMUP CYCLE. AN OUTDOOR THERMOSTAT SET AT 75 DEG. SHALL RETURN THE OUTDOOR AIR DAMPER TO THE MINIMUM POSITION WHEN THE OUTDOOR AIR TEMPERATURE EXCEEDS 75 DEG. ROOM THERMOSTAT THROUGH DISCHARGE THERMOSTAT SHALL MAINTAIN CONTROL POINT TEMPERATURE BY MODULATING HEATING COIL THREE (3) WAY VALVE AND COOLING COIL THREE (3) WAY VALVE IN SEQUENCE WITH OUTDOOR AND RETURN AIR DAMPERS FOR ASHRAE CYCLE II.

UNOCCUPIED CYCLE:

THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED, THE CONTROL VALVE ON THE HOT WATER COIL SHALL BE FULL OPEN TO THE COIL. WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC" SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED.

NOTE:

A DISCHARGE AIR SENSOR SHALL CLOSE THE OUTSIDE AIR DAMPER AND OPEN THE HOT WATER CONTROL VALVE WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 40 DEG. AN EP SWITCH SHALL CLOSE THE OUTSIDE AIR DAMPER ON FAN SHUTDOWN. ONE SAFETY LOW LIMIT THERMOSTAT WITH A 20 FT. SENSING ELEMENT SHALL STOP THE FAN AT ANY TIME THE HEATING DISCHARGE TEMPERATURE FALLS BELOW 35 DEGREES.

TEMPERATURE CONTROL PANEL DESCRIPTION FOR TCP-2

Mixed Air Temperature Indicator for AH-5.
Discharge Air Temperature Indicator for AH-5.

TEMPERATURE CONTROL PANEL DESCRIPTION FOR TCP-3:

Mixed Air Temperature Indicator for AH-1.
Discharge Air Temperature Indicator for AH-1.
Mixed Air Temperature Indicator for AH-2.
Discharge Air Temperature Indicator for AH-2.
Mixed Air Temperature Indicator for AH-3.
Discharge Air Temperature Indicator for AH-3.
Mixed Air Temperature Indicator for AH-4.
Discharge Air Temperature Indicator for AH-4.

TEMPERATURE CONTROL GENERAL NOTES

1. THE SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT THE TEMPERATURE CONTROL CONTRACTOR HAS FAMILIARIZED HIMSELF WITH THE EXISTING BUILDING TEMPERATURE CONTROL SYSTEM. CLAIMS MADE SUBSEQUENT TO THE BID BECAUSE OF DIFFICULTIES WITH THE EXISTING CONDITION OF THE SYSTEM WILL NOT BE RECOGNIZED.

2. TEMPERATURE CONTROL CONTRACTOR SHALL REPLACE OR ADD TO THE EXISTING TEMPERATURE CONTROL AIR COMPRESSORS AS REQUIRED TO MEET THE NEW BUILDING REQUIREMENTS. PROVIDE ALL REQUIRED ELECTRICAL CONNECTIONS, REFRIGERANT AIR DRYERS, DRAIN LINES, CROSSOVER CONNECTIONS, ECT. AS REQUIRED.

3. THE TEMPERATURE CONTROL CONTRACTOR SHALL RECONNECT ALL EXISTING DAY/NIGHT ZONE CONTROLS TO AS REQUIRED TO NEW CONTROL PANEL. EXISTING CONTROLS MAY BE REUSED WHERE APPLICABLE.

TEMPERATURE CONTROL PANEL DESCRIPTION FOR TCP 1

EXISTING POINT OF CONTROL FROM CENTRAL ENERGY MANAGEMENT SYSTEM FOR THE OCCUPIED -UNOCCUPIED CYCLE OF OPERATION FOR FOR ZONE 1

EXISTING POINT OF CONTROL FROM CENTRAL ENERGY MANAGEMENT SYSTEM FOR THE OCCUPIED -UNOCCUPIED CYCLE OF OPERATION FOR FOR ZONE 2

EXISTING POINT OF CONTROL FROM CENTRAL ENERGY MANAGEMENT SYSTEM FOR THE OCCUPIED -UNOCCUPIED CYCLE OF OPERATION FOR FOR ZONE 3

EXISTING POINT OF CONTROL FROM CENTRAL ENERGY MANAGEMENT SYSTEM FOR THE OCCUPIED -UNOCCUPIED CYCLE OF OPERATION FOR FOR ZONE 4

TIME CLOCK: PROVIDE A 7-DAY TIME CLOCK FOR THE OCCUPIED-UNOCCUPIED CYCLE OF OPERATION WITH A 0-6 HOUR MANUAL TIMER TO OVERRIDE THE OCCUPIED-UNOCCUPIED TIME CLOCK FOR ZONE 5

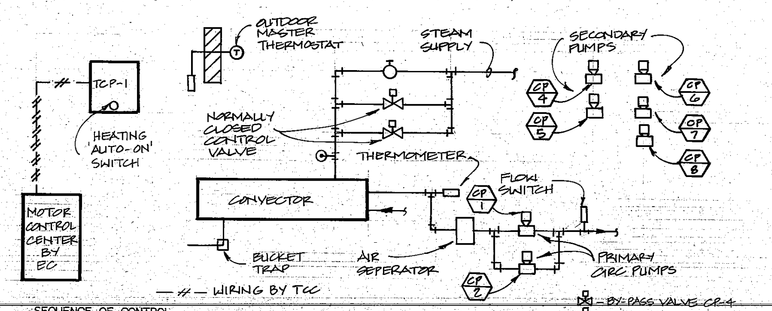
TIME CLOCK: PROVIDE A 7-DAY TIME CLOCK FOR THE OCCUPIED-UNOCCUPIED CYCLE OF OPERATION WITH A 0-6 HOUR MANUAL TIMER TO OVERRIDE THE OCCUPIED-UNOCCUPIED TIME CLOCK FOR ZONE 6

TIME CLOCK: PROVIDE A 7-DAY TIME CLOCK FOR THE OCCUPIED-UNOCCUPIED CYCLE OF OPERATION FOR ALL OUTSIDE AND RETURN AIR DAMPERS IN ALL UNITS WITH A 0-6 HOUR MANUAL TIMER TO OVERRIDE THE OCCUPIED-UNOCCUPIED TIME CLOCK.

TIME CLOCK: PROVIDE A 7-DAY TIME CLOCK FOR THE OCCUPIED-UNOCCUPIED CYCLE OF OPERATION WITH A 0 TO 6 HOUR MANUAL TIMER TO OVERRIDE THE OCCUPIED-UNOCCUPIED TIME CLOCK FOR EXHAUST FAN EF-3.

OUTSIDE AIR TEMPERATURE INDICATOR.
CHILLED WATER SUPPLY TEMPERATURE INDICATOR
CHILLED WATER RETURN TEMPERATURE INDICATOR
HOT WATER SUPPLY TEMPERATURE INDICATOR
HOT WATER RETURN TEMPERATURE INDICATOR

COOLING "ON-AUTO-OFF" SWITCH
HEATING "ON-AUTO" SWITCH



BY-PASS VALVE CP-4
BY-PASS VALVE CP-6
BY-PASS VALVE CP-7
BY-PASS VALVE CP-8

SEQUENCE OF CONTROL

PRIMARY HOT WATER

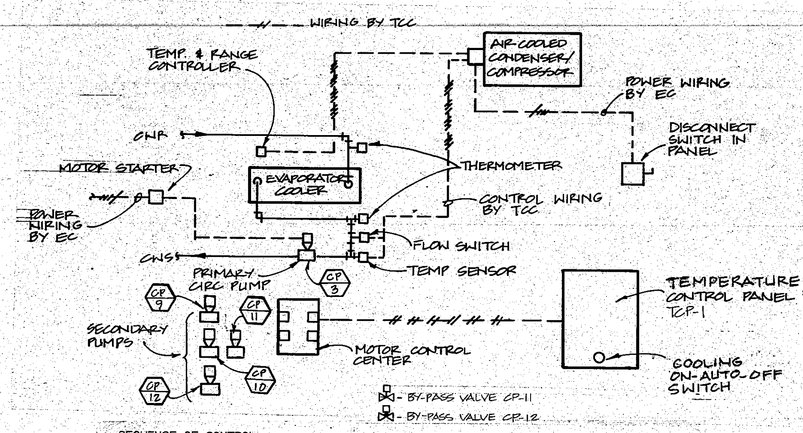
WITH FLOW PROVEN AND THE HEATING SWITCH IN AUTO POSITION, AN OUTDOOR MASTER THERMOSTAT WITH ITS BULB LOCATED OUTDOORS SHALL RESET UPWARDS OR DOWNWARD A SUBMASTER INSTRUMENT WITH ITS BULB LOCATED IN THE PRIMARY HOT WATER SUPPLY. AS OUTDOOR TEMPERATURE INCREASES, HOT WATER TEMPERATURE SHALL DECREASE AND VICE-VERSA. SUBMASTER THERMOSTAT SHALL CONTROL NORMALLY CLOSED 1/3 AND 2/3 CAPACITY STEAM VALVES, TO CONVERTOR, PER OUTSIDE DICTATE. THE INSTRUMENT MUST BE ADJUSTABLE ON THE JOB BOTH IN DIRECTION OF ACTION AND TEMPERATURE SETTINGS. WHEN OUTDOOR TEMPERATURE REACHES APPROXIMATELY 65 DEG., THE PRIMARY AND SECONDARY HEATING CIRCULATING PUMPS SHALL BE STOPPED WITH THE STEAM CONTROL VALVES IN THE CLOSED POSITION.

PROVIDE SYSTEM PRESSURE SWITCH TO MODULATE BY-PASS PUMP VALVE TO MAINTAIN CONSTANT SYSTEM PRESSURE.

CABINET HEATER WITH HOT WATER HEAT

PROVIDE LINE VOLTAGE ROOM THERMOSTAT TO CYCLE FAN "ON-OFF" TO MAINTAIN ROOM TEMPERATURE.

TURN THERMOSTAT OVER TO ELECTRICAL TRADE FOR MOUNTING AND WIRING.



SEQUENCE OF CONTROL

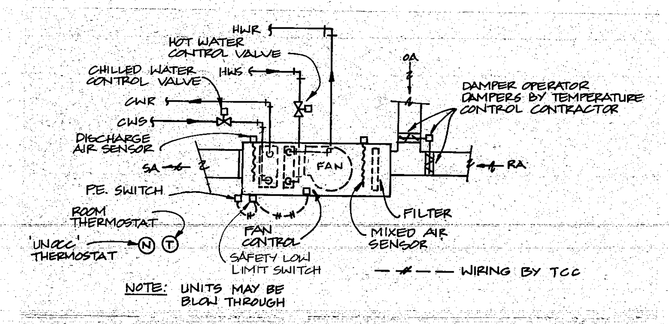
AIR CONDITIONING

POWER TO CHILLER SHALL BE PROVIDED BY MANUALLY SWITCHING THE DISCONNECT SWITCH TO THE ON POSITION.

THE CHILLED WATER PUMPS SHALL BE STARTED FROM A "COOLING ON-AUTO-OFF" SWITCH LOCATED IN THE EXISTING CONTROL PANEL. WITH FLOW THROUGH THE EVAPORATOR COOLER PROVEN, THE CONDENSING UNIT SHALL START AND CYCLE TO MAINTAIN A CONSTANT DISCHARGE WATER TEMPERATURE. THE RANGE FOR THE DISCHARGE WATER TEMPERATURE SENSOR SHALL BE FIELD ADJUSTABLE THROUGH A CONTROL LOCATED NEAR THE EVAPORATOR COOLER.

THE HEATING SHALL BE DEACTIVATED THROUGH THE EXISTING CONTROL SEQUENCE.

PROVIDE SYSTEM PRESSURE SWITCH TO MODULATE BYPASS PUMP VALVE TO MAINTAIN CONSTANT SYSTEM PRESSURE.



NOTE: UNITS MAY BE BLOW THROUGH

SEQUENCE OF CONTROL

FAN COIL FC-1

OCCUPIED CYCLE

WHEN INDEXED TO THE OCCUPIED CYCLE THE FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AND RETURN AIR DAMPERS SHALL MODULATE TO A FIXED MINIMUM POSITION AND THE ROOM THERMOSTAT SHALL CONTROL THE TWO WAY CONTROL VALVE ON THE HOT WATER COIL TO MAINTAIN SPACE TEMPERATURE. AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE HEATING CONTROL VALVE SHALL CLOSE, AND THE ROOM TERMOSTAT SHALL MODULATE THE OUTSIDE AND RETURN AIR DAMPERS TO MAINTAIN SPACE TEMPERATURE. UPON A FURTHER RISE IN TEMPERATURE THE OUTSIDE AND RETURN AIR DAMPERS SHALL GO THE FIXED MINIMUM POSITION AND THE ROOM THERMOSTAT SHALL MODULATE THE TWO WAY CONTROL VALVE ON THE CHILLED WATER COIL TO MAINTAIN SPACE TEMPERATURE.

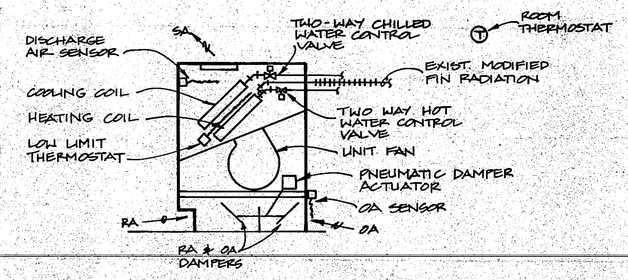
UNOCCUPIED CYCLE

THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. RETURN AIR DAMPER SHALL BE OPEN. THE CONTROL VALVE ON THE HOT WATER COIL SHALL BE FULL OPEN TO THE COIL. WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC." SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED. THE COOLING SHALL BE OFF.

NOTE:

AN EP SWITCH SHALL CLOSE THE OUTSIDE AIR DAMPER ON FAN SHUTDOWN. ONE SAFETY LOW LIMIT THERMOSTAT WITH A 20 FT. SENSING ELEMENT SHALL STOP THE FAN AT ANY TIME THE HEATING DISCHARGE TEMPERATURE FALLS BELOW 35 DEGREES.

A LIMITING DEVICE SHALL PREVENT THE OUTSIDE AND RETURN AIR DAMPERS FROM MODULATING BEYOND THE FIXED MINIMUM POSITION WHEN THE OUTSIDE AIR DROPS BELOW 32 DEG. (FIELD ADJUSTABLE).



SEQUENCE OF CONTROL

CLASSROOM UNIT VENTILATOR (FIN RADIATION ON UV-1 THRU UV-9 ONLY)

OCCUPIED CYCLE

WHEN INDEXED TO THE OCCUPIED CYCLE THE FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AND RETURN AIR DAMPERS SHALL MODULATE TO A FIXED MINIMUM POSITION, AND THE ROOM THERMOSTAT SHALL MODULATE THE HEATING CONTROL VALVE ON THE HOT WATER COIL AND FIN RADIATION TO MAINTAIN SPACE TEMPERATURE. AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE HEATING CONTROL VALVE SHALL CLOSE, AND THE ROOM TERMOSTAT SHALL MODULATE THE OUTSIDE AND RETURN AIR DAMPERS TO MAINTAIN SPACE TEMPERATURE. ON A FURTHER RAISE IN SPACE TEMPERATURE THE OUTSIDE AND RETURN AIR DAMPERS SHALL GO THE FIXED MINIMUM POSITION AND THE ROOM THERMOSTAT SHALL MODULATE THE COOLING COIL TO MAINTAIN SPACE TEMPERATURE.

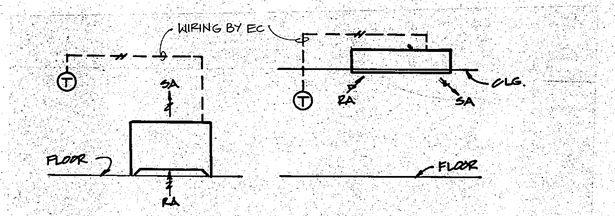
UNOCCUPIED CYCLE

THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. RETURN AIR DAMPER SHALL BE OPEN, AND THE TWO WAY VALVE SHALL BE FULL OPEN TO THE COIL. WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC." SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED. THE COOLING SHALL BE OFF.

NOTE:

A DISCHARGE AIR SENSOR SHALL CLOSE THE OUTSIDE AIR DAMPER AND OPEN THE HOT WATER CONTROL VALVE WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 40 DEG. AN EP SWITCH SHALL CLOSE THE OUTSIDE AIR DAMPER ON FAN SHUTDOWN. ONE SAFETY LOW LIMIT THERMOSTAT WITH A 20 FT. SENSING ELEMENT SHALL STOP THE FAN AT ANY TIME THE HEATING DISCHARGE TEMPERATURE FALLS BELOW 35 DEGREES.

A LIMITING DEVICE SHALL PREVENT THE OUTSIDE & RETURN AIR DAMPERS FROM MODULATING BEYOND THE FIXED MINIMUM POSITION WHEN THE OUTSIDE AIR DROPS BELOW 32 DEGREES (FIELD ADJUSTABLE)



SEQUENCE OF CONTROL - CABINET HEATER

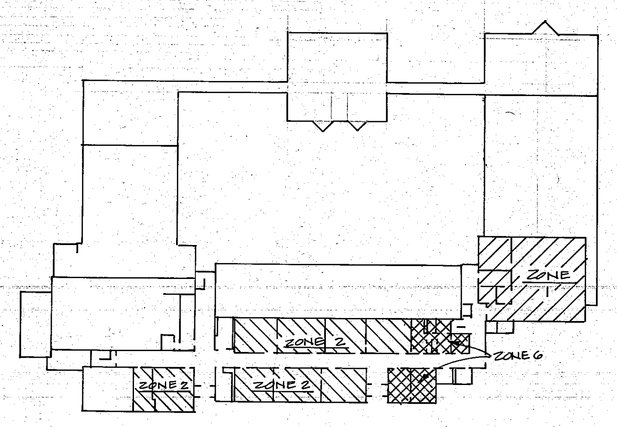
PROVIDE LINE VOLTAGE ROOM THERMOSTAT TO CYCLE FAN "ON-OFF" TO MAINTAIN ROOM TEMPERATURE.

TURN THERMOSTAT OVER TO ELECTRICAL CONTRACTOR FOR MOUNTING AND WIRING.

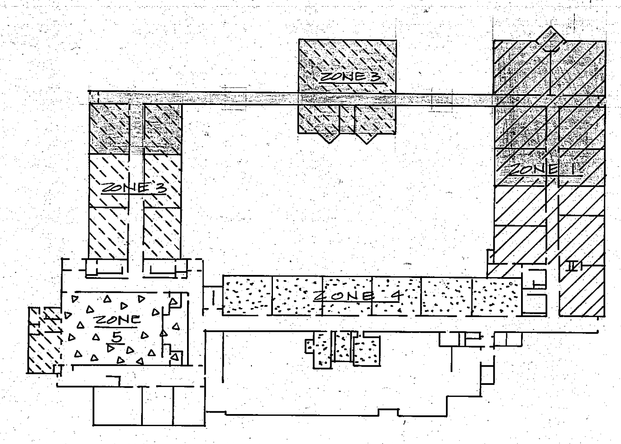
ZONES

ZONE-1 WEST WING CLASSROOM & MEDIA CENTER
ZONE-2 UPPER LEVEL CLASSROOMS
ZONE-3 LOWER LEVEL CLASSROOMS & NEW ART, MUSIC & GYM ADDITION
ZONE-4 LOWER LEVEL CLASSROOMS
ZONE-5 OLD GYM
ZONE-6 OFFICE AREA

NEW ADDITIONS OR MAJOR REMODELING AREAS (AREAS OF MINOR REMODELING ARE NOT IDENTIFIED)



UPPER LEVEL



LOWER LEVEL

ZONE CONTROL DIAGRAM

N.T.S.

M/E DESIGN SERVICES
MECHANICAL/ELECTRICAL CONSULTING ENGINEERS
112 1/2 Lincolnway East
Mishawaka, Indiana 46544
(219) 256-1914

REVISIONS	BY

MECH. SEQUENCE OF CONTROL
1994 BUILDING ADDITIONS & RENOVATION PROJECTS
DUNELAND SCHOOL CORPORATION
CHESTERTON, INDIANA
geometa & kinel architects, inc.

DATE	3-17-94
SCALE	AS SHOWN
DRAWN	KSK
JOB	9315
SHEET	M-7
OF 55 SHEETS	

STOCKDRAFTING FORM NO. 101-96