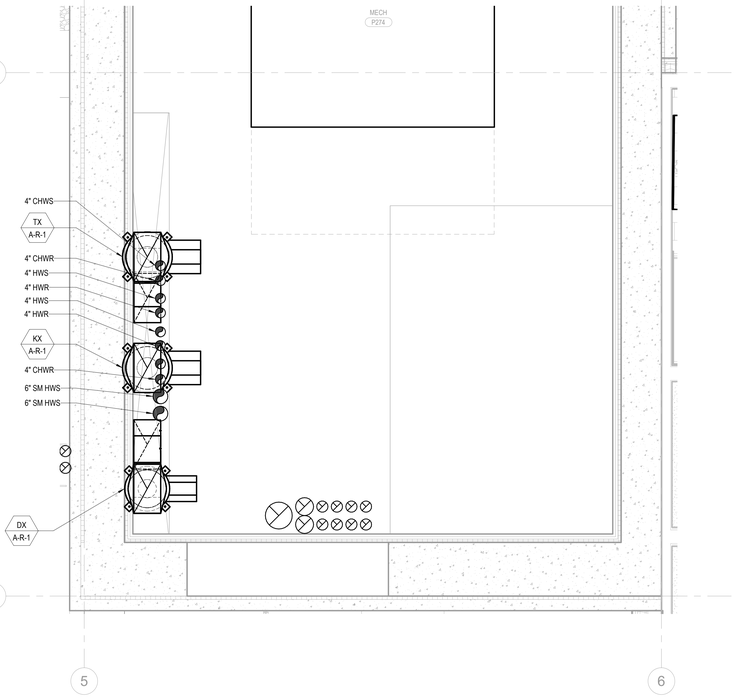
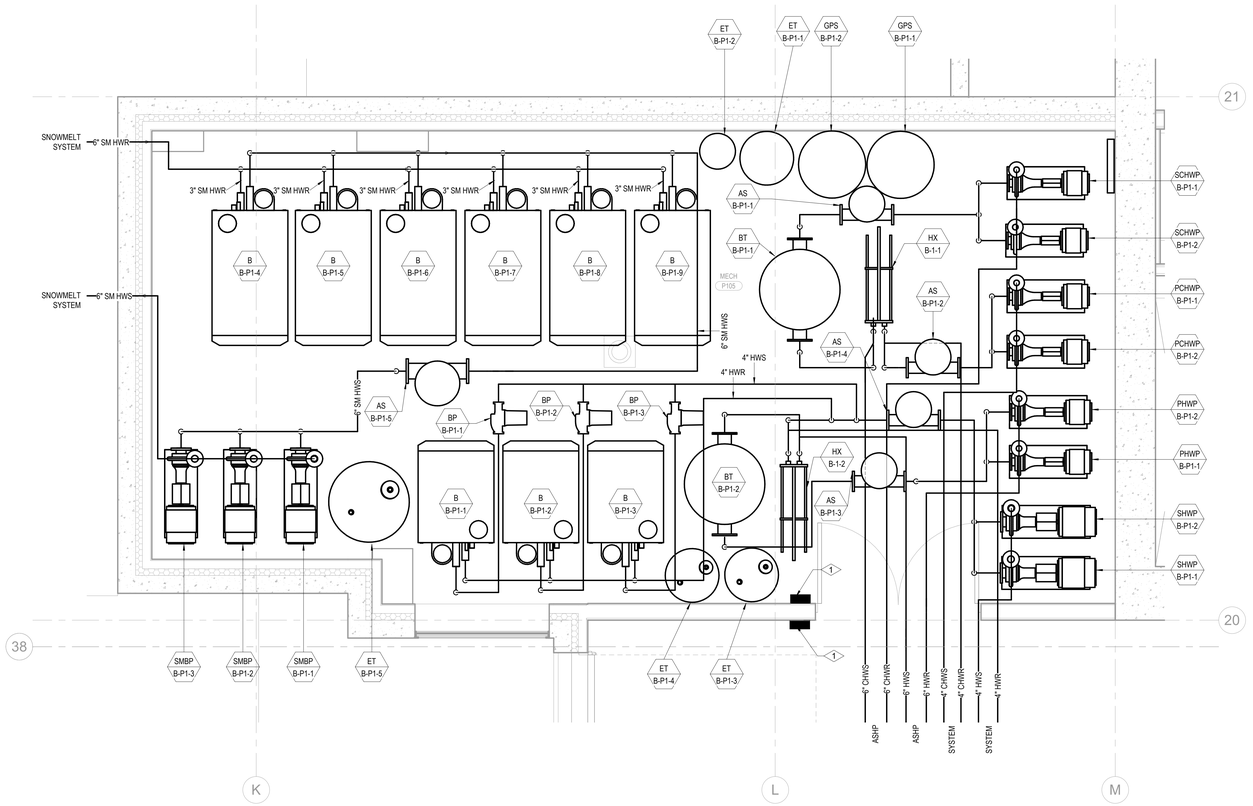
NUMBERED NOTES:

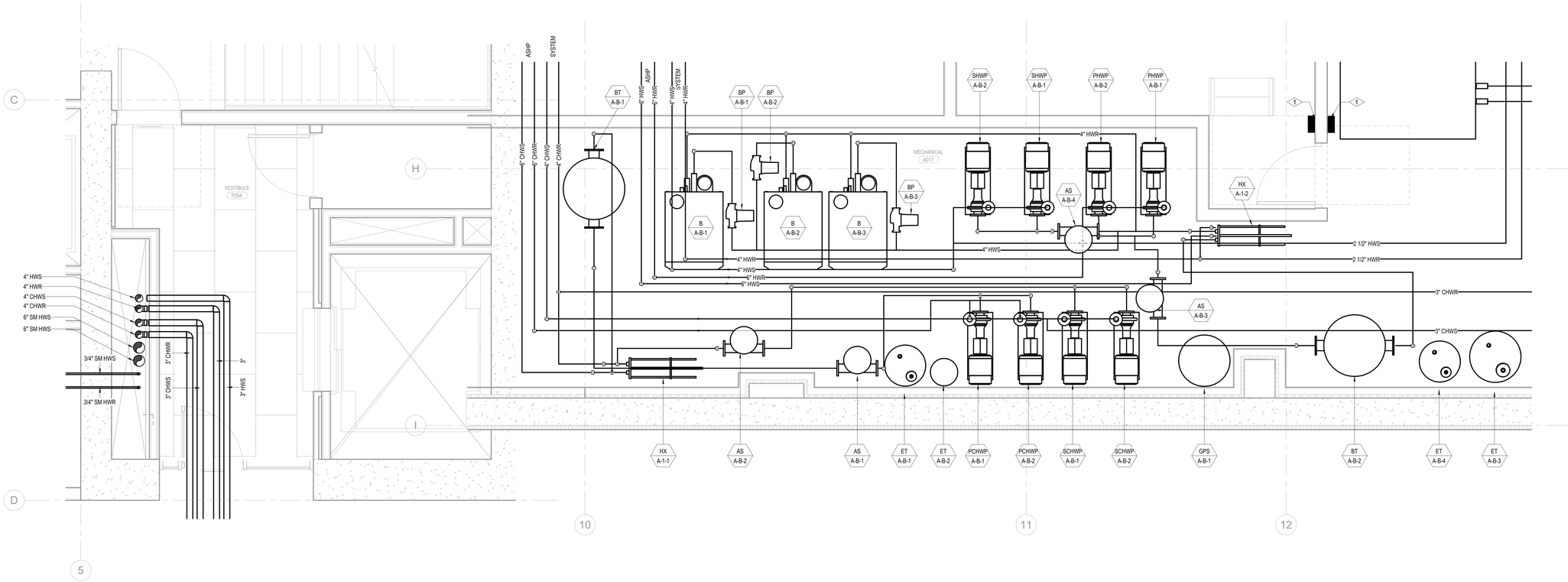
1 PROVIDE EMERGENCY BOILER SHUTOFF SWITCH WITH AUDIBLE/VISUAL ALARM ON BOTH INTERIOR AND EXTERIOR OF ROOM.



3 TOWER A - LEVEL 6 MECHANICAL PIPING PLAN - Callout 1
SCALE: 1/2" = 1'-0"



4 TOWER B - PARKING LEVEL 1 BOILER ROOM ENLARGED PLAN
SCALE: 1/2" = 1'-0"



2 TOWER A - PARKING LEVEL 2 MECHANICAL PIPING PLAN - Callout 1
SCALE: 1/2" = 1'-0"

1 TOWER A - LEVEL A BOILER ROOM ENLARGED PLAN
SCALE: 1/2" = 1'-0"

N 0 2' 4' 6' 8' 16' 24'

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: (206) 624-5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O:
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

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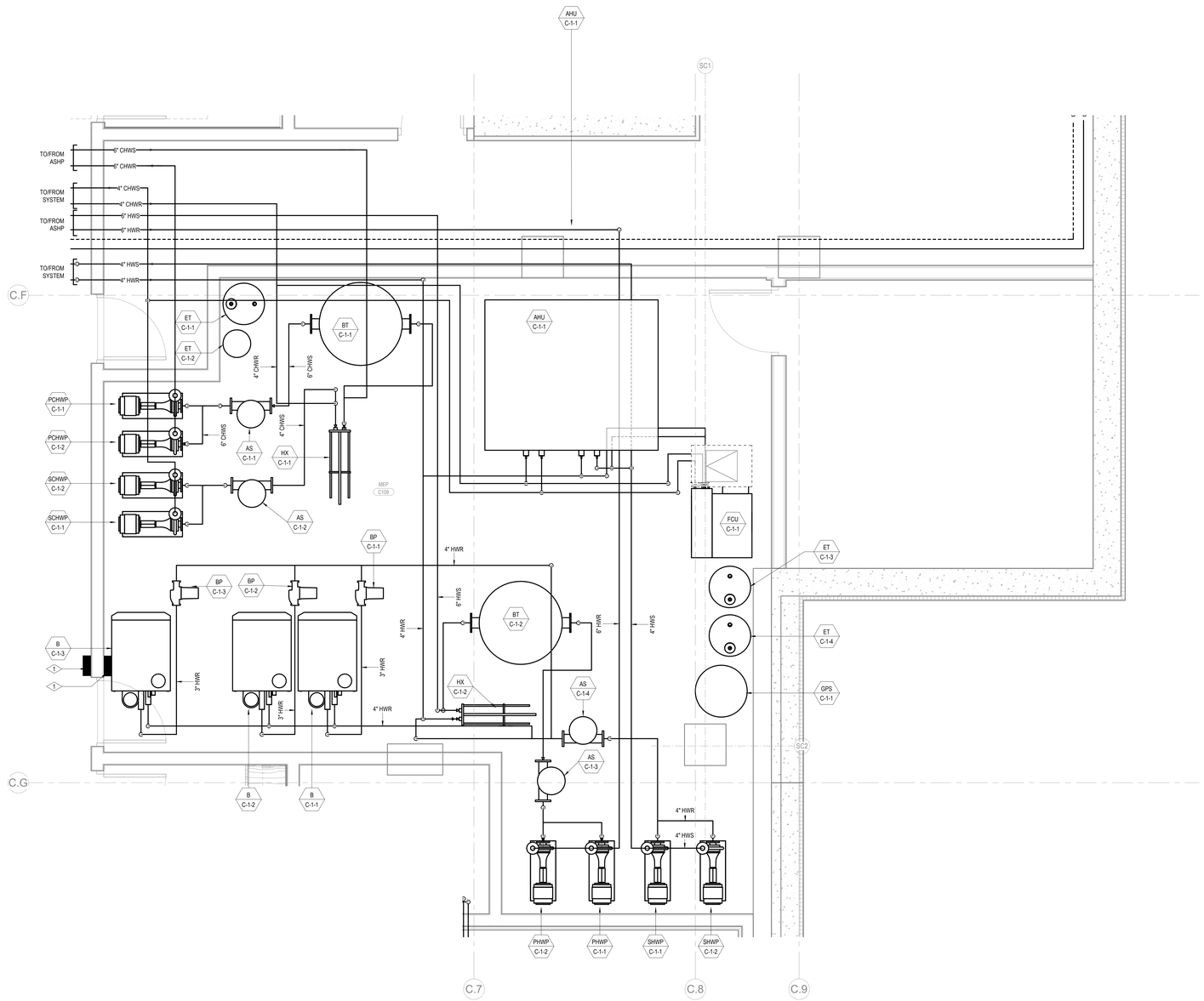
MECHANICAL ENLARGED PLANS
M4.01



1 TOWER C - LEVEL 1 ENLARGED MECHANICAL PIPING PLAN

SCALE: 1/2" = 1'-0"

Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104
+1 206 624 5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (82 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
15515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

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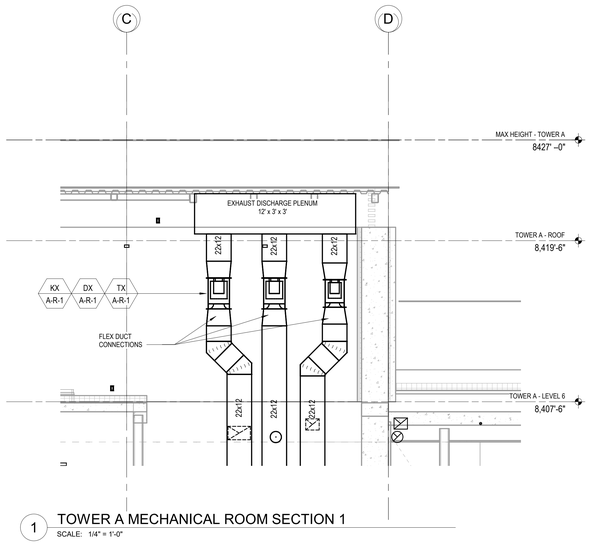
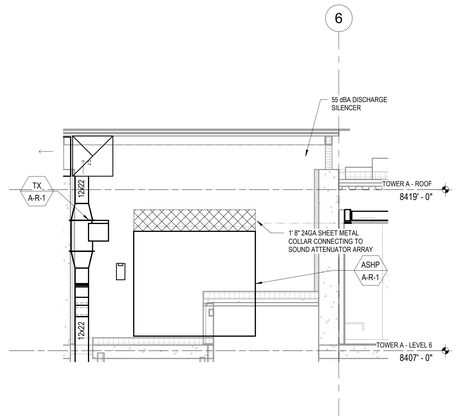
MECHANICAL ENLARGED PLANS

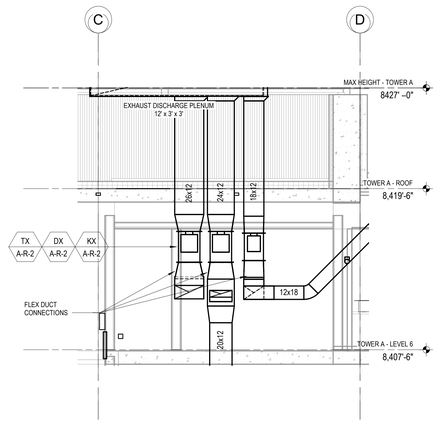
M4.02



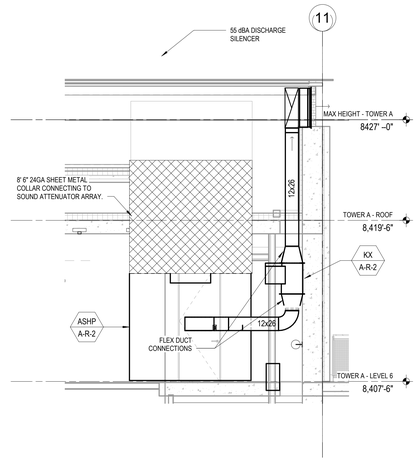
1 TOWER A MECHANICAL ROOM SECTION 1
SCALE: 1/4" = 1'-0"



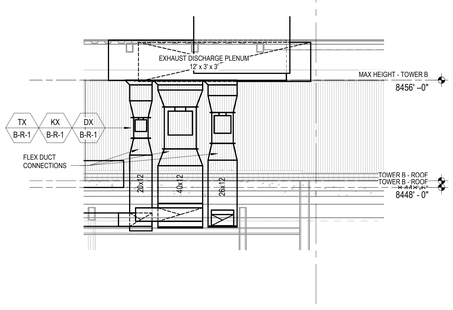
2 TOWER A MECHANICAL ROOM SECTION 2
SCALE: 1/4" = 1'-0"



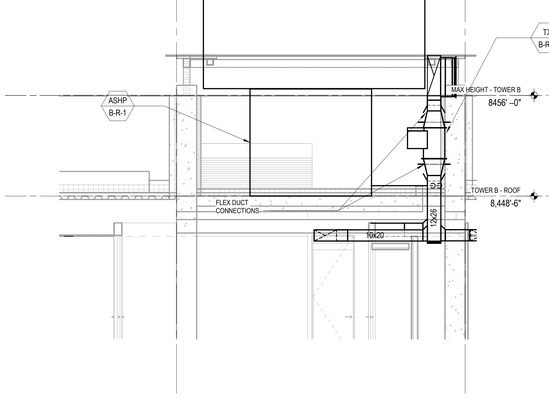
3 TOWER A ELECTRICAL ROOM SECTION 1
SCALE: 1/4" = 1'-0"



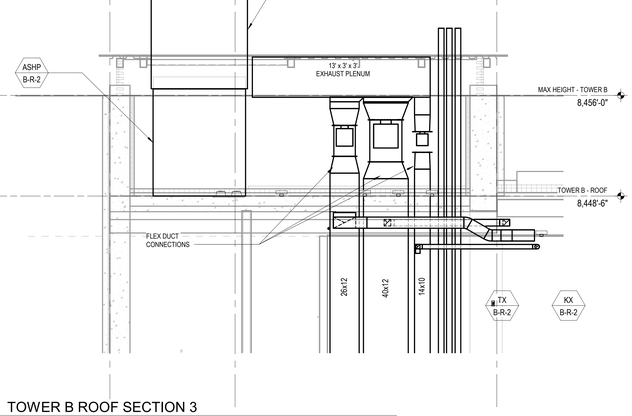
4 TOWER A ELECTRICAL ROOM SECTION 2
SCALE: 1/4" = 1'-0"



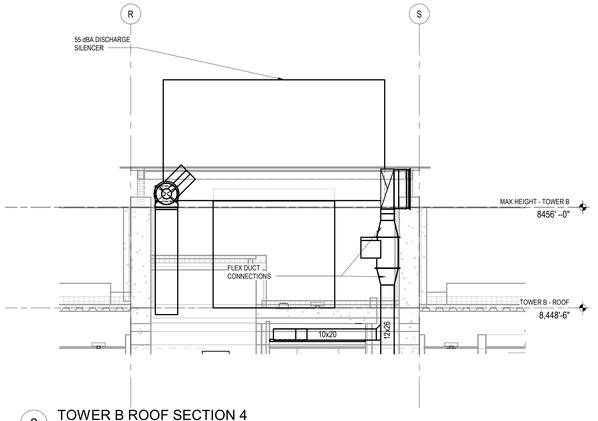
5 TOWER B ROOF SECTION 1
SCALE: 1/4" = 1'-0"



6 TOWER B ROOF SECTION 2
SCALE: 1/4" = 1'-0"



7 TOWER B ROOF SECTION 3
SCALE: 1/4" = 1'-0"



8 TOWER B ROOF SECTION 4
SCALE: 1/4" = 1'-0"

Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

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EPG Design
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Midvale, Utah 84047

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88 Mainelli Road
Middlebury, VT

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Fire Protection Engineer
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One Research Drive, Suite 305C
Westborough, MA 01581

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Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
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Building Envelope Consultant
RDH
2101 N 34th St
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Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
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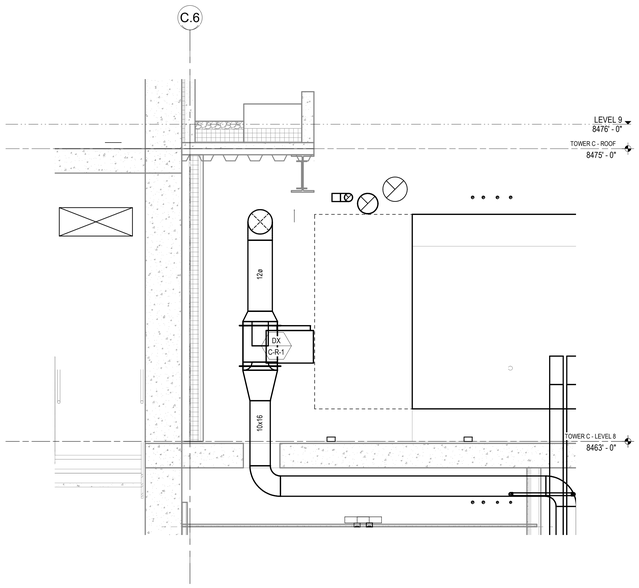
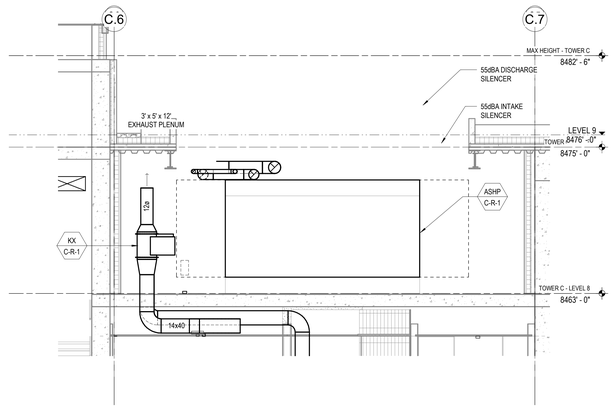
MECHANICAL SECTIONS
M4.03



1 TOWER C MECHANICAL ROOM SECTION 1
SCALE: 1/2" = 1'-0"



2 TOWER C MECHANICAL ROOM SECTION 2
SCALE: 1/4" = 1'-0"

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104
+1 206 624 5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (82 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
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Cloward H20
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Seattle, WA 98104

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Bothell, WA 98011

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O-
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RDH
2101 N 34th St
Seattle, WA 98103

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Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
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1001 Fourth Ave., Suite 3100
Seattle, WA 98154

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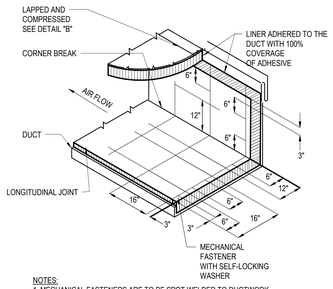
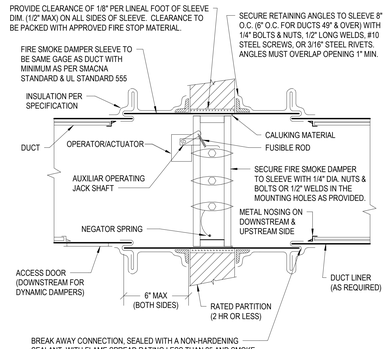
MECHANICAL SECTIONS

M4.04



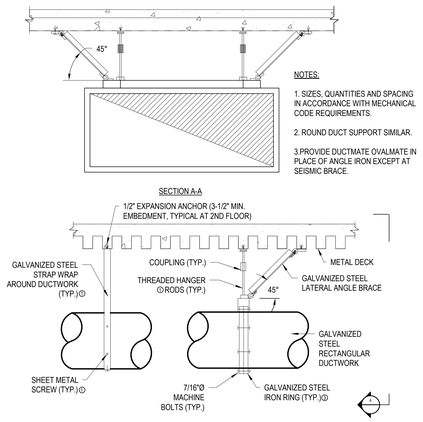
NOTES:
1. MECHANICAL FASTENERS ARE TO BE SPOT WELDED TO DUCTWORK.
2. PROVIDE SHEET METAL NOSING AS DESCRIBED IN SPECIFICATIONS.

1 ACOUSTICAL DUCT LINING DETAIL
SCALE: NTS

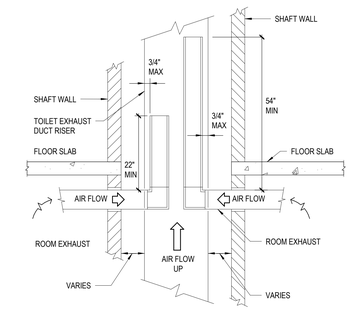


NOTES
1. THE FIRE SMOKE DAMPER MANUFACTURERS' INSTILLATION DETAILS AND INSTRUCTIONS AS TESTED AND APPROVED BY UL MUST BE USED IN LIEU OF THE ABOVE DETAILS WHERE APPLICABLE.

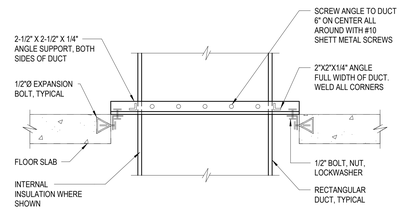
2 COMBINATION FIRE&SMOKE DAMPER 1.5 HR FR LEAK CLASS 1
SCALE: NTS



3 DUCT SUPPORT DETAIL - A
SCALE: NTS

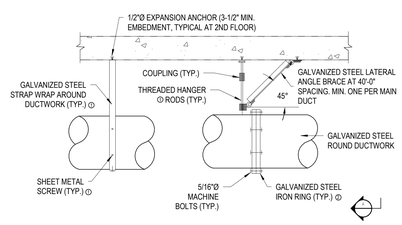


4 DOUBLE EXHAUST RISER CONNECTION
SCALE: NTS

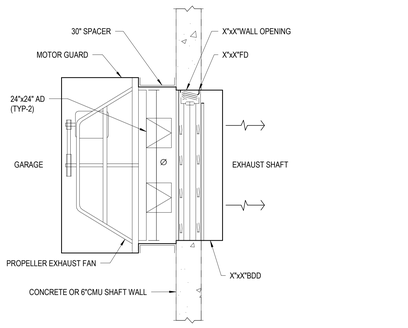


NOTES:
1. SUPPORT EACH FLOOR.
2. SUPPORT OF ROUND DUCT SIMILAR EXCEPT SCREW CLAMP TO DUCT SAMESIZE AS DUCT OUTSIDE DIAMETER AND BOLT CLAMP TO ANGLE SUPPORTS.
3. SIZE SUPPORT ANGLES AND DUCT CLAMPS AS REQUIRED TO SUPPORT WEIGHT OF DUCTWORK.
4. OMIT SCREWS AT FUME EXHAUST DUCTS AND BOLT ANGLES TO DUCT COMPANION ANGLE FLANGES.

5 DUCT RISER SUPPORT - A
SCALE: NTS

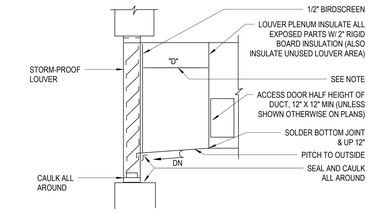


6 DUCT SUPPORT DETAIL - B
SCALE: NTS



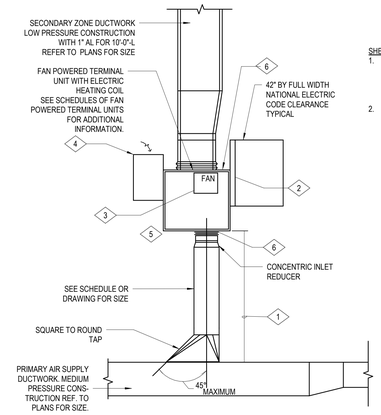
NOTE:
THE WALL OPENING, FD AND BDD ARE SQUARE AND SIZED TO MATCH THE FAN WHEEL DIAMETER SHOWN ON THE FAN SCHEDULE.

7 GARAGE PROPELLER EXHAUST FAN MOUNTING DETAIL
SCALE: NTS



NOTE:
WHEN "D" IS OVER 24" PROVIDE 3/4" DRAIN AT 5'-0" CENTERS (IF DEPTH INTO PAPER IS GREATER THAN 5'-0"), 6" FROM LOUVER WITH TRAP

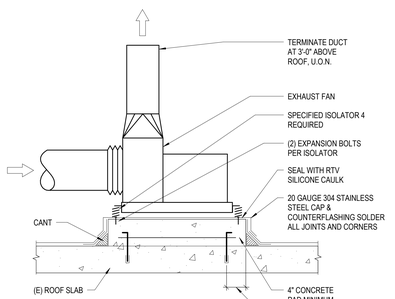
8 LOUVER CONNECTION DETAIL
SCALE: NTS



SHEET NOTES
1. REFER TO FLOOR PLANS FOR DUCTWORK CONFIGURATION FOR EACH INDIVIDUAL FAN POWERED TERMINAL (FPT). REFER TO SCHEDULES FOR SPECIFIC FAN POWERED TERMINAL UNIT, ELECTRIC HEATING COILS, PRIMARY AIR SUPPLY, SECONDARY AIR SUPPLY AND FAN POWERED TERMINAL INSTALLATION REQUIREMENTS.
2. FAN POWERED TERMINAL (FPT) TO BE INSTALLED AS HIGH AS POSSIBLE IN BEAM SPACE, COORDINATE FAN POWERED UNIT LOCATION WITH STRUCTURE AND ARCHITECTURAL ELEMENTS TO MAINTAIN REQUIRED ACCESS TO MOTORS, FILTERS, ELECTRICAL CONTROL PANEL ON UNIT. CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING WORKING CLEARANCES FREE OF PIPING, CONDUITS, DUCTS AND OTHER OBSTRUCTIONS.

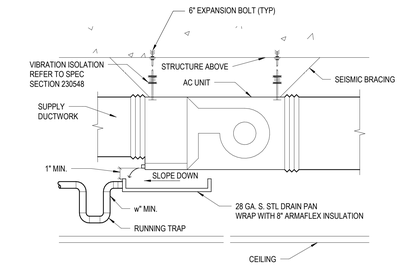
NUMBERED NOTES
1. MAINTAIN MINIMUM STRAIGHT DISTANCE AS RECOMMENDED BY MANUFACTURER OF FAN POWERED TERMINAL DEVICES. (4x INLET DIAMETER MINIMUM.)
2. VERIFY UNIT CONTROL POWER AND ELECTRICAL HEATER POWERED JUNCTION BOX LOCATIONS WITH UNIT MANUFACTURER.
3. MAINTENANCE AND SERVICE ACCESS CLEARANCE GENERAL CONTRACTOR IS RESPONSIBLE FOR KEEPING UNDERSIDE OF FAN POWERED UNIT CLEAR OF CONSTRUCTION FOR BOTTOM ACCESS PANEL REMOVAL
MANUFACTURER SHALL PROVIDE WARNING LABEL ON TOP AND BOTTOM OR WIRE.
4. INDUCED AIR OPENING, CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING A MINIMUM OF 20" CLEAR, FREE OF PIPING, CONDUIT, DUCTS AND OTHER OBSTRUCTIONS.
5. MINIMUM SIDE CLEARANCE SHALL BE 1'-0" (FOR MOTOR SERVICE ACCESS AS PER MANUFACTURER RECOMMENDATIONS.
6. PROVIDE FLEXIBLE CONNECTION PER SPECIFICATION

9 FAN POWER BOX
SCALE: NTS



NOTES:
1. COORDINATE PAD SIZE TO EXTEND 6" BEYOND FAN ISOLATOR BASE PLATE AT ALL CORNERS AND 6" BEYOND FILTER SUPPORT.
PROVIDE DRAIN AT BOTTOM OF FAN HOUSING.
2.SEE ARCHITECTURAL DRAWINGS FOR ATTACHMENT DETAIL.
3. COORDINATE LOCATION PAD SIZE AND ATTACHEMENT TO
4. STRUCTURE WITH ARCHITECT.

10 ROOF MOUNTED EXHAUST FAN - A
SCALE: NTS



11 HORIZONTAL AC UNIT MOUNTING
SCALE: NTS

Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project
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Park City, Utah 84060

ASPEN GROUP
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O-
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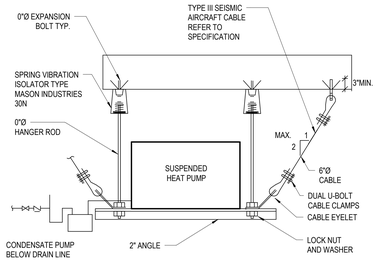
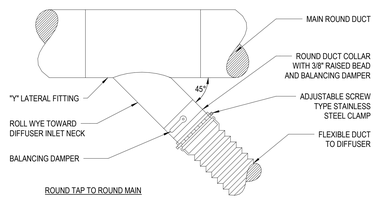
MECHANICAL DETAILS
M5.01

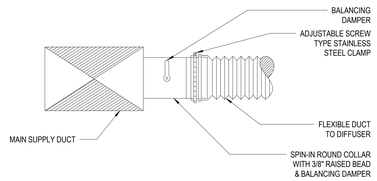


NOTES:
1. HANGER SPACING ALONG LENGTH OF UNIT TO BE AS FOLLOWS: MINIMUM - 2 HANGERS MAXIMUM SPACING 6'-0"
2. PROVIDE ADEQUATE SEISMIC CABLE BRACING TO RESIST MOTION IN ALL LATERAL DIRECTIONS
3. REFER TO SMACNA SEISMIC RESTRAINT MANUAL GUIDELINES (LATEST EDITION) FOR MECHANICAL SYSTEMS.
4. PROVIDE CABLE SWAY BRACING IN LONGITUDINAL AND TRANSVERSE DIRECTION AT ALL FOUR CORNERS.

1 SUSPENDED EQUIPMENT WITH SEISMIC CABLES - A
SCALE: NTS

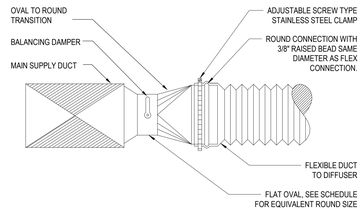


ROUND TAP TO ROUND MAIN



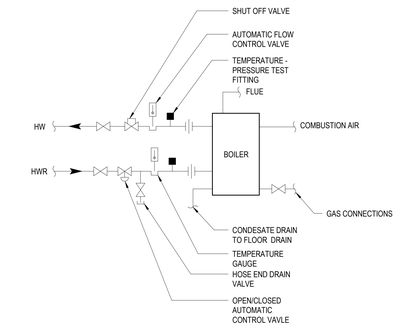
ROUND TAP TO RECTANGULAR MAIN (TAP SMALLER THAN MAIN)

2 LOW PRESSURE BRANCH DUCT CONNECTIONS
SCALE: NTS

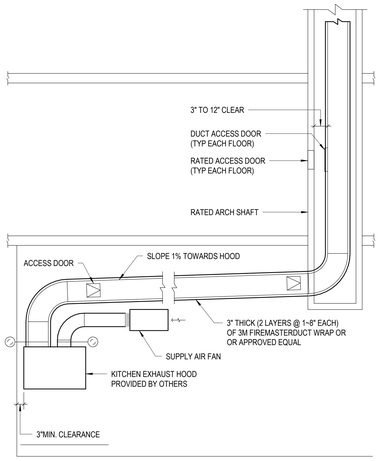


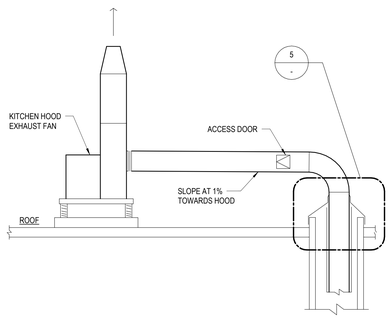
FLAT OVAL EQUIVALENT ROUND	
ROUND Ø	FLAT OVAL INCHES
6"	4x9
7"	5x10
8"	6x11
10"	6x11
12"	7x20
14"	8x22
16"	8x30

ROUND TAP TO RECTANGULAR MAIN (TAP LARGER THAN MAIN)

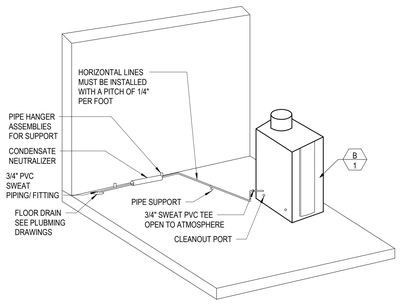


3 BOILER CONNECTION DETAIL
SCALE: NTS

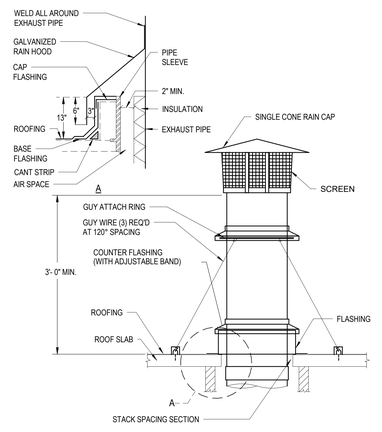




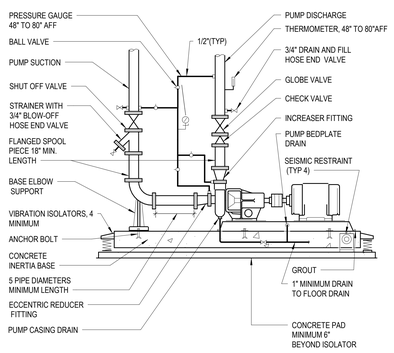
4 KITCHEN HOOD EXHAUST RISER DETAIL
SCALE: NTS



5 BOILER CONDENSATE DRAIN DETAIL
SCALE: NTS

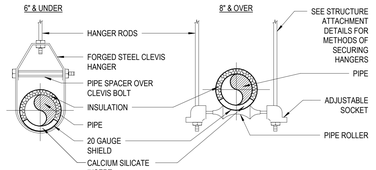


6 CONDENSING BOILER FLUE THRU ROOF
SCALE: NTS



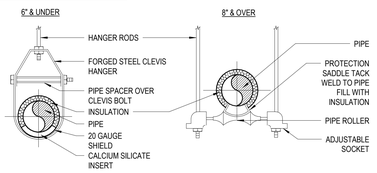
7 END SUCTION PUMP
SCALE: NTS

TYPICAL HANGERS FOR CHILLED AND CONDENSER WATER PIPES

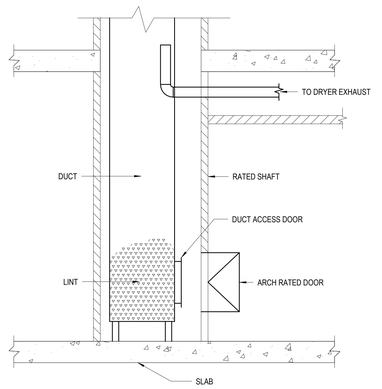


NOTE: OMIT INSULATION & CALCIUM SILICATE FOR NON-INSULATED PIPES.

TYPICAL HANGERS FOR HOT WATER PIPES



8 HOT AND CHILLED WATER PIPE HANGER SINGLE PIPE
SCALE: NTS



9 DRYER EXHAUST LINT TRAP
SCALE: NTS

Reserved for permit stamp

Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Marrelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
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One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
project manager
drawn by
checked by Checker
job no.
date 11/18/2022

revisions:

no. date by

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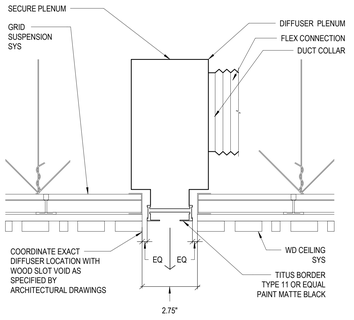
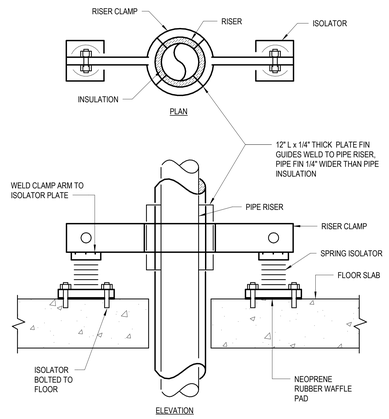
11/18/2022

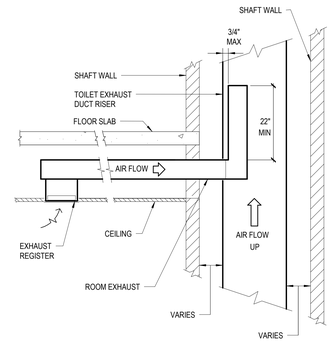
MECHANICAL DETAILS
M5.02



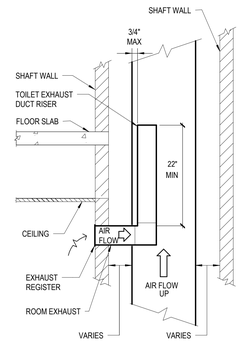
1 LINEAR DIFFUSER IN WOOD SLAT CEILING
SCALE: NTS



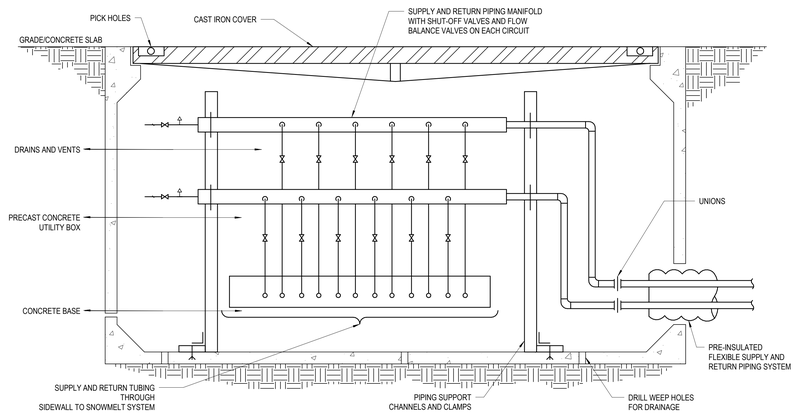
2 PIPE RISER ISOLATORS
SCALE: NTS



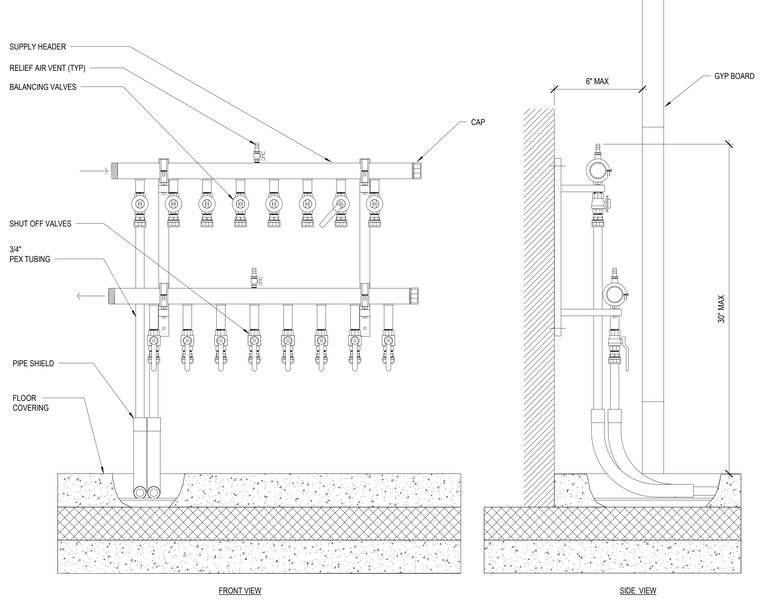
3 SINGLE EXHAUST RISER CONNECTION - B
SCALE: NTS



4 SINGLE KITCHEN EXHAUST RISER CONNECTION - A
SCALE: NTS



5 SNOWMELT MAINFOLD AND SIDEWALK BOX
SCALE: NTS



6 RADIANT FLOOR MANIFOLD
SCALE: NTS

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
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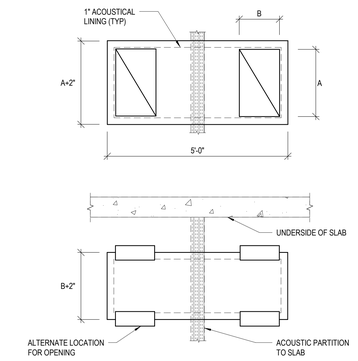
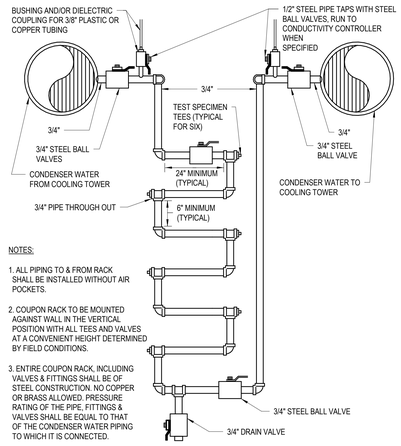
MECHANICAL DETAILS
M5.03



NOTE:

SEE PLAN FOR DUCT SIZE, DUCT DIMENSIONS ON PLANS ARE CLEAR, INSIDE DIMENSIONS.

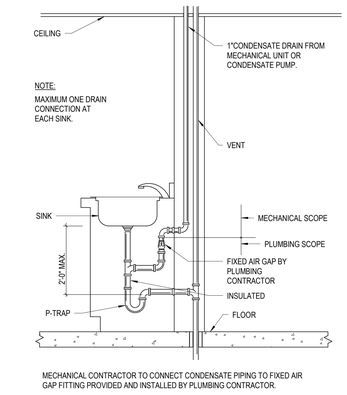
1 ACOUSTICAL TRANSFER DUCT - A
SCALE: NTS



NOTES:

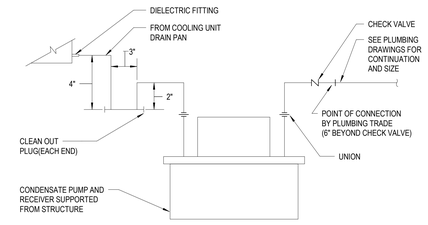
1. ALL PIPING TO & FROM RACK SHALL BE INSTALLED WITHOUT AIR POCKETS.
2. COUPON RACK TO BE MOUNTED AGAINST WALL IN THE VERTICAL POSITION WITH ALL TEES AND VALVES AT A CONVENIENT HEIGHT DETERMINED BY FIELD CONDITIONS.
3. ENTIRE COUPON RACK, INCLUDING VALVES & FITTINGS SHALL BE OF STEEL CONSTRUCTION. NO COPPER OR BRASS ALLOWED. PRESSURE RATING OF THE PIPE, FITTINGS & VALVES SHALL BE EQUAL TO THAT OF THE CONDENSER WATER PIPING TO WHICH IT IS CONNECTED.

2 COUPON RACK
SCALE: NTS

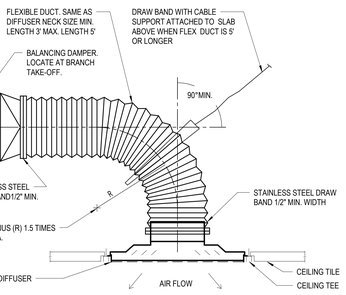


MECHANICAL CONTRACTOR TO CONNECT CONDENSATE PIPING TO FIXED AIR GAP FITTING PROVIDED AND INSTALLED BY PLUMBING CONTRACTOR.

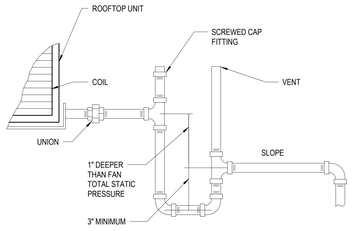
3 CONDENSATE DRAIN CONNECTION TO SINK AIR GAP FITTING
SCALE: NTS



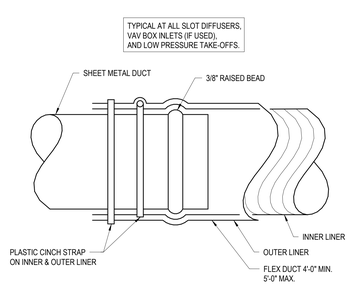
4 CONDENSATE PUMP PIPING DETAIL
SCALE: NTS



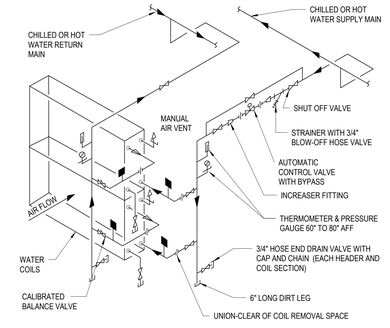
5 DIFFUSER CONNECTION DETAIL
SCALE: NTS



6 CONDENSATE DRAIN
SCALE: NTS



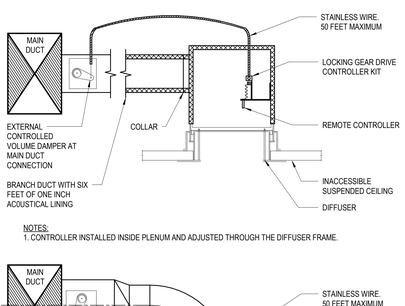
7 FLEXIBLE DUCT CONNECTION
SCALE: NTS



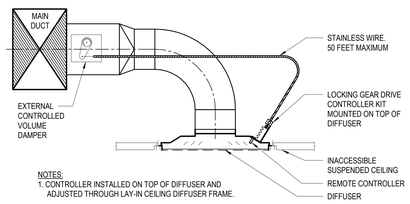
NOTES:

1. ALL BRANCH PIPING, SUPPLY, RETURN AND VERTICAL HEADERS TO BE FULL SIZE BOTTOM CONNECTION FROM MAIN. (REFER TO DRAWINGS FOR PIPE SIZE).
2. ALL HORIZONTAL CONNECTIONS TO COIL FROM VERTICAL HEADERS TO BE SIZE OF COIL CONNECTION OUTLET/INLET, U.O.N.
3. COIL BANKS HIGHER THAN 2 COILS TO HAVE SAME VALVING AND TRIM PER COIL.
4. BYPASS LINE TO BE SAME SIZE AS AUTOMATIC CONTROL VALVE.

8 MULTIPLE COIL PIPING 2-WAY CONTROL VALVE
SCALE: NTS

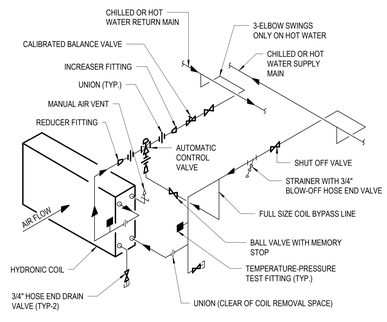


NOTES:
1. CONTROLLER INSTALLED INSIDE PLENUM AND ADJUSTED THROUGH THE DIFFUSER FRAME.



NOTES:
1. CONTROLLER INSTALLED ON TOP OF DIFFUSER AND ADJUSTED THROUGH LAY-IN CEILING DIFFUSER FRAME.

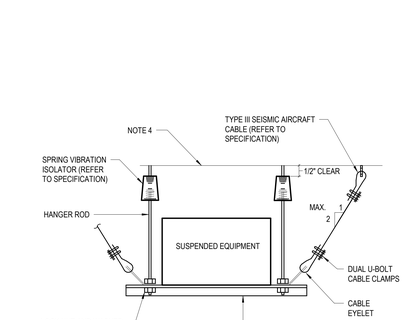
9 REMOTE CABLE DAMPER CONTROLLER
SCALE: NTS



NOTES:

1. ALL BRANCH PIPING, SUPPLY, RETURN AND VERTICAL HEADERS TO BE FULL SIZE BOTTOM CONNECTION FROM MAIN (REFER TO DRAWINGS FOR PIPE SIZE).
2. ALL HORIZONTAL CONNECTIONS TO COIL FROM VERTICAL HEADERS TO BE SIZE OF COIL CONNECTION OUTLET/INLET, U.O.N.

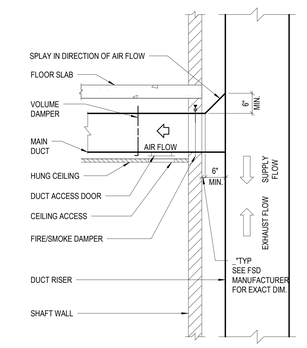
10 SINGLE HYDRONIC COIL PIPING 3-WAY CONTROL VALVE
SCALE: NTS



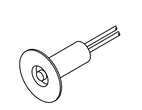
NOTES:

1. HANGER SPACING ALONG LENGTH OF UNIT TO BE AS FOLLOWS: MINIMUM - 2 HANGERS MAXIMUM SPACING 6'-0".
2. PROVIDE ADEQUATE SEISMIC CABLE BRACING TO RESIST MOTION IN ALL LATERAL DIRECTIONS.
3. REFER TO SMACNA SEISMIC RESTRAINT MANUAL GUIDELINES (LATEST EDITION) FOR MECHANICAL SYSTEMS.
4. ATTACH TO STRUCTURE ABOVE.

11 SUSPENDED EQUIPMENT WITH SEISMIC CABLES - B
SCALE: NTS



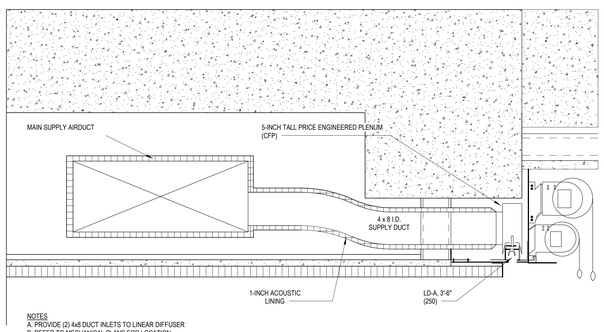
12 SUPPLY OR EXHAUST AIR RISER CONNECTION
SCALE: NTS



NOTES:
THIS SENSOR IS SUSPENDED IN A ROUND BUTTON SIZE ENCLOSURE SHELL SO THAT ROOM AIR CAN SURROUND THE SENSING ELEMENT FOR A FAST AND ACCURATE TEMPERATURE READING. THE SENSOR IS ISOLATED FROM THE MASS WALL TEMPERATURE WITH INTERNAL INSULATORS. THE UNIT CAN BE PAINTED BUT CARE SHOULD BE TAKEN NOT TO FILL THE CAVITY WITH EXCESS PAINT. THE UNIT SHOULD NOT BE COVERED WITH ANY MATERIAL SUCH AS WALL PAPER.

INSTALLATION:
1. SELECT A LOCATION WITH A FLAT SURFACE ON AN INTERIOR WALL APPROXIMATELY 5' OFF THE FLOOR.
DRILL A 3/8" HOLE WHERE YOU WANT THE SENSOR MOUNTED.
3. PULL ZONE WIRE THROUGH THE HOLE AND TERMINATE THE SENSOR USING A FLYING LEAD CONNECTOR (CRIMP OR WIRE NUT). A CRIMP-ON SEALANT FILLED CONNECTOR IS RECOMMENDED FOR PROTECTION FROM IN WALL MOISTURE.
4. TEST THE SENSOR AT THE CONTROLLER TO BE SURE OF YOUR CONNECTIONS AND SENSOR OPERATION.
NOTE: ONCE INSTALLED THE SENSOR IS DIFFICULT TO REMOVE AND MAY DAMAGE THE WALL.
5. BE SURE THE WALL INTERIOR IS INSULATED BEHIND THE SENSOR. IN-WALL DRAFTS CAN AFFECT THE TEMPERATURE READING.
6. CLEAN THE WALL SURFACE FROM ANY DUST OR FILINGS TO MAKE A CLEAN MOUNTING SURFACE.
7. REMOVE THE MOUNTING TAPE FROM THE BACK OF THE SENSOR RIM AND PUSH THE SENSOR FIRMLY INTO THE 3/8" HOLE UNTIL THE DOUBLE STICK TAPE ADHERES FIRMLY TO THE WALL.

13 TEMPERATURE SENSOR BUTTON TYPE
SCALE: NTS



NOTES
A. PROVIDE (2) 4x8 DUCT INLETS TO LINEAR DIFFUSER
B: REFER TO MECHANICAL PLANS FOR LOCATION
C. REFER TO ARCHITECT FOR EXACT LOCATION OF DIFFUSER

14 LINEAR DIFFUSER DETAIL AT SHADE POCKETS WITH REDUCED HEIGHT
SCALE: NTS

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

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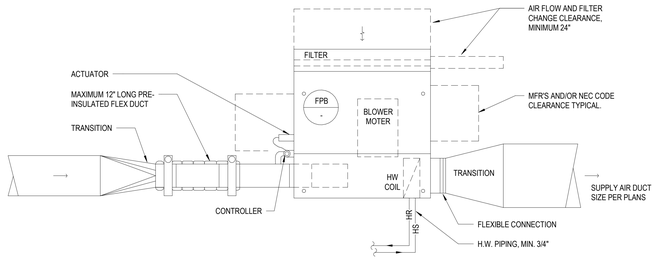
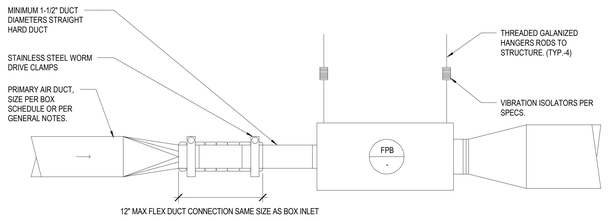
MECHANICAL DETAILS
M5.04

DESIGN NOTES:

1. COORDINATE THE SIZING OF THE BOX INLET DUCT. SOME GENERAL NOTES HAVE SOME VAV BOX SCHEDULES HAVE SIZING INFORMATION. SOME PREVIOUS PROJECTS HAVE HAD DISCREPANCIES AMONG THESE ITEMS. IN GENERAL, THIS INLET DUCT SHOULD MATCH VAV BOX INLET CONNECTION SIZE; HOWEVER, IF THE RUNOUT IS MORE THAN SAY 10 FEET LONG AND/OR HAS MULTIPLE ELLS IN THE RUNOUT. THEN THIS DUCT SIZE SHOULD BE INCREASED BY TWO INCHES. THIS REQUIREMENT NEEDS TO SHOWN CLEARLY ON THE DOCUMENTS.
2. FILTER IS REQUIRED BY MECHANICAL CODE. BE SURE TO SCHEDULE IT BY NOTE IN THE FAN POWERED BOX SCHEDULE OR IN THE SPECS.
3. CONSIDER WHEATHER A RA PLENUM IS NEEDED UPSTREAM OF THE FILTER FOR NOISE ATTENUATION. IT SHOULD BE LINED IF ALLOWED BY CODE; AND IT IS NOT ALLOWED FOR MOST LOCATIONS IN A HOSPITAL. FOR AN MOB PROJECT LINER SHOULD BE OKAY AND IS RECOMMENDED.
4. HW COIL: BE SURE SCHEDULED BOX SHOWS THIS COIL ON THE DISCHARGE SIDE OF THE FAN. NOTE THAT THE HEATING COIL HAS TO HEAT THE MIXTURE OF THE FAN RA FROM THE PLENUM AND THE 55F MINIMUM SACFM FROM THE VAV VALVE.



PLAN VIEW



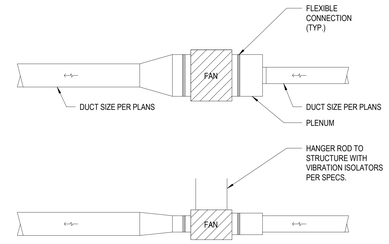
ELEVATION VIEW

1 FAN POWERED BOX WITH HEATING WATER COIL

SCALE: NTS

DESIGNER NOTES: NOT FOR PUBLICATION:

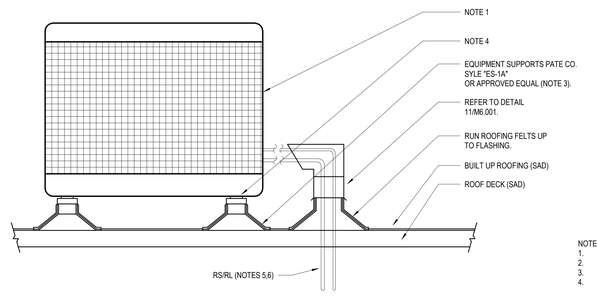
1. FAN ACCESSORIES SHOULD BE IN FAN SCHEDULE, NOT IN THIS DETAIL.
2. THIS DETAIL CAN BE ADAPTED TO OTHER SITUATIONS. EDIT AS REQUIRED.
3. THIS DETAIL IS FOR A SMALL CABINET FAN, SAY 200 TO 3000 CFM, WITH RECTANGULAR INLET; FORWARD CURVED FAN SUITABLE FOR 1" ESP. DO NOT USE THIS DETAIL FOR VANE AXIAL, MIXED FLOW, OR IN-LINE PROPELLER FANS.
4. THE LARGER FANS MAY HAVE DUAL FAN OUTLETS. IF SO, USE A PANTS LEG DISCHARGE DUCT DESIGN ON THE FLOOR PLAN. EDIT AS REQUIRED.



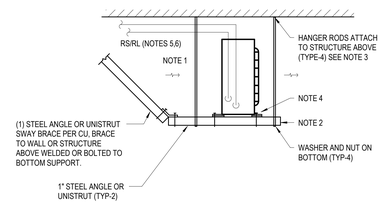
2 EXHAUST FAN-IN-LINE CABINET

SCALE: NTS

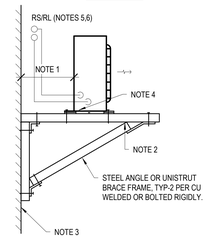
ROOF OR FLOOR MOUNTING



SUSPENDED MOUNTING



WALL MOUNTING



NOTES:

1. IN ALL CONFIGURATIONS, NAMUFACTURER'S CLEARANCES FOR SERVICE AND AIRFLOW SHALL BE PROVIDED.
2. PROVIDE PLASTIC OR VINYL END CAPS ON ALL EXPOSED ANGLE OR UNISTRUT ENDS.
3. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ATTACHMENT DETAILS.
4. THROUGH BOLT HARDWARE W/ NEOPENE WAFFLE PAD AND ISOLATOR BUSHING, MASON WAND HG, OR EQUAL NO METAL TO METAL CONTACT PATH PERMITTED (TYP-4)
5. RS/RL PIPING SHALL BE SUPPORTED INDEPENDENTLY OF THE CU. REFER TO SPECIFICATION 230529.
6. INSULATED REFRIGERANT LINES TO DX EVAPORATOR COIL (FCU). PIPE SIZES SHALL BE DETERMINED BY SPLIT SYSTEM MANUFACTURER AND SHALL ACCOUNT FOR EXACT ROUTING LENGTH NEEDED IN FIELD.

3 SPLIT-SYSTEM CONDENSER MOUNTING DETAILS

SCALE: NTS

Reserved for permit stamp

Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect_____
project manager_____
drawn by_____
_____
checked by Checker
job no.
date 11/18/2022

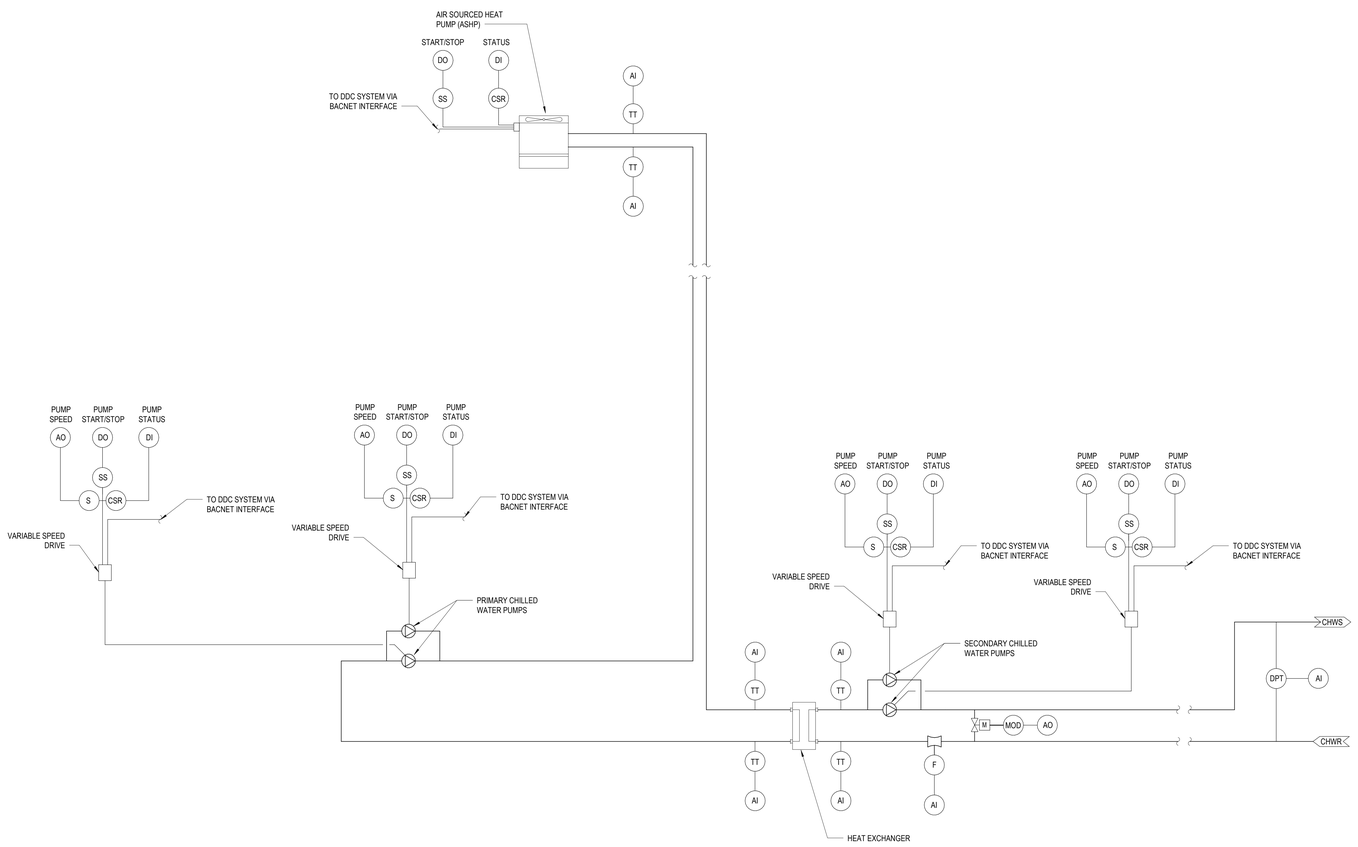
revisions:

no. date by

ISSUE FOR CONSTRUCTION
11/18/2022

MECHANICAL DETAILS

M5.05



2 CHILLED WATER SYSTEM CONTROL DIAGRAM - TOWER C

SCALE: NTS

SEQUENCE OF OPERATIONS

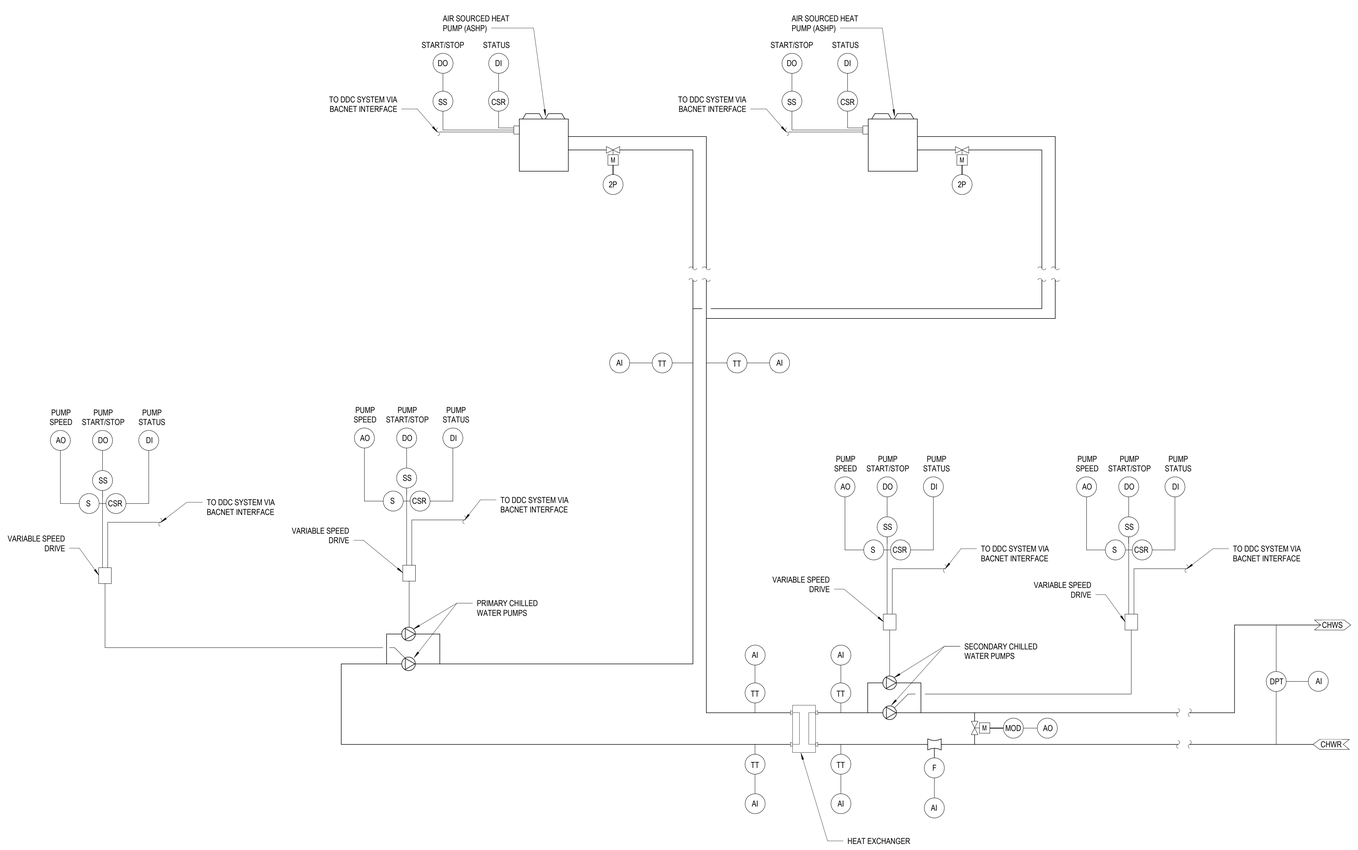
A. SYSTEM OFF:
1. CHILLED WATER PRIMARY AND SECONDARY WATER PUMPS OFF.
2. CHILLER OFF.
3. DIFFERENTIAL PRESSURE BYPASS CONTROL VALVE OPEN.
4. CONTROL LOOPS INACTIVE.

B. SYSTEM START:
1. OPERATOR ENTERED COMMAND AT THE BMS.
2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES (OCCUPIED MODE OR COOL-DOWN MODE). AND THERE IS A COOLING LOAD DEMAND.

C. SYSTEM OPERATION
1. PRIMARY CHILLED WATER SYSTEM:
   a. BOTH PRIMARY CHILLED WATER PUMP SHALL START AND EVAPORATOR ISOLATION CONTROL VALVES SHALL OPEN. AFTER FLOW IS PROVEN THROUGH THE EVAPORATOR START THE CHILLER THROUGH ITS UNIT MOUNTED STARTER AND CONTROLLER.
   b. CHILLER SHALL BE CONTROLLED THROUGH UNIT MOUNTED CONTROLLER TO MAINTAIN THE SECONDARY CHILLED WATER SUPPLY TEMPERATURE.
2. SECONDARY CHILLED WATER SYSTEM:
   a. SECONDARY PUMP SPEED SHALL BE MODULATED TO MAINTAIN A PRE-DETERMINED DIFFERENTIAL PRESSURE SETPOINT. ADDITIONAL SECONDARY PUMPS SHALL START IF PRESSURE DIFFERENTIAL SETPOINT CANNOT BE MAINTAINED FOR A DEFINED TIME PERIOD OR IF THE OPERATING PUMPS ARE AT 100 PERCENT SPEED. OPERATING PUMPS SHALL BE REDUCED BY ONE PUMP IF OPERATING SPEED FALLS BELOW 40 PERCENT. FIRST PUMP STARTED SHALL BE FIRST PUMP STOPPED.
   b. BYPASS VALVE SHALL BE MODULATED OPEN TO MAINTAIN THE MINIMUM FLOWRATE MEASURED BY THE FLOW METER.
3. PUMPS:
   a. IF MULTIPLE PUMP ARE OPERATING IN PARALLEL THE LEAD PUMP SHALL BE OPERATING AT 95 PERCENT OF FULL FLOWRATE WHEN THE SECOND STAGE PUMP IS STARTED. BOTH PUMPS SHALL THEN SHARE THE LOAD EQUALLY.
   b. LEAD PUMP SHALL BE STARTED WHENEVER THE CHILLED WATER SYSTEM IS IN OPERATION. ALTERNATE LEAD PUMPS.
   c. IF THE LEAD PUMP FAILS TO START, THE LAG PUMP SHALL START.

D. SYSTEM STOP:
1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SAFETIES:
1. PUMP OR CHILLER FAILS TO START.
2. LOW OR NO FLOW IN OPERATING CHILLER.
3. MINIMUM FLOW METER IS INACTIVE OR OUT OF RANGE.
4. CHILLER ALARM.
5. PUMP VARIABLE FREQUENCY DRIVE ALARM.



1 CHILLED WATER SYSTEM CONTROL DIAGRAM - TOWER A&B

SCALE: NTS

SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
1. CHILLED WATER PRIMARY AND SECONDARY WATER PUMPS OFF.
2. CHILLERS OFF.
3. CHILLER EVAPORATOR AUTOMATIC ISOLATION VALVES CLOSED.
4. DIFFERENTIAL PRESSURE BYPASS CONTROL VALVE OPEN.
5. CONTROL LOOPS INACTIVE.

B. SYSTEM START:
1. OPERATOR ENTERED COMMAND AT THE BMS.
2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES (OCCUPIED MODE OR COOL-DOWN MODE). AND THERE IS A COOLING LOAD DEMAND.

C. SYSTEM OPERATION
1. PRIMARY CHILLED WATER SYSTEM:
   a. BOTH PRIMARY CHILLED WATER PUMP SHALL START AND EVAPORATOR ISOLATION CONTROL VALVES SHALL OPEN. AFTER FLOW IS PROVEN THROUGH THE EVAPORATOR START THE CHILLER THROUGH ITS UNIT MOUNTED STARTER AND CONTROLLER.
   b. CHILLER SHALL BE CONTROLLED THROUGH UNIT MOUNTED CONTROLLER TO MAINTAIN THE SECONDARY CHILLED WATER SUPPLY TEMPERATURE.
   c. THE LEAD CHILLER IS MORE THAN 95 PERCENT LOAD AND CHILLED WATER SUPPLY TEMPERATURE SETPOINT CANNOT BE MAINTAINED, THE NEXT CHILLER IN THE GROUP SHALL START AND THE CHILLERS SHALL SHARE LOAD EQUALLY. CONTINUE TO ADD CHILLER CAPACITY AS REQUIRED TO SATISFY REQUIREMENTS ABOVE.
   d. ON A REDUCTION IN LOAD AND THE BYPASS FLOW RATE IS GREATER THAN THE FLOW OF THE SMALLEST OPERATING CHILLED WATER PUMP AND THE OPERATING CHILLERS ARE LOADED LESS THAN THE CAPACITY REQUIREMENTS OF ALL OPERATING CHILLERS AND THE CHILLED WATER SUPPLY TEMPERATURE IS BELOW SETPOINT, THE SMALLEST CHILLER SHALL STOP. CONTINUE TO DELETE CHILLER CAPACITY AS REQUIRED.
2. SECONDARY CHILLED WATER SYSTEM:
   a. SECONDARY PUMP SPEED SHALL BE MODULATED TO MAINTAIN A PRE-DETERMINED DIFFERENTIAL PRESSURE SETPOINT. ADDITIONAL SECONDARY PUMPS SHALL START IF PRESSURE DIFFERENTIAL SETPOINT CANNOT BE MAINTAINED FOR A DEFINED TIME PERIOD OR IF THE OPERATING PUMPS ARE AT 100 PERCENT SPEED. OPERATING PUMPS SHALL BE REDUCED BY ONE PUMP IF OPERATING SPEED FALLS BELOW 40 PERCENT. FIRST PUMP STARTED SHALL BE FIRST PUMP STOPPED.
   b. BYPASS VALVE SHALL BE MODULATED OPEN TO MAINTAIN THE MINIMUM FLOWRATE MEASURED BY THE FLOW METER.
3. PUMPS:
   a. IF MULTIPLE PUMP ARE OPERATING IN PARALLEL THE LEAD PUMP SHALL BE OPERATING AT 95 PERCENT OF FULL FLOWRATE WHEN THE SECOND STAGE PUMP IS STARTED. BOTH PUMPS SHALL THEN SHARE THE LOAD EQUALLY.
   b. LEAD PUMP SHALL BE STARTED WHENEVER THE CHILLED WATER SYSTEM IS IN OPERATION. ALTERNATE LEAD PUMPS.
   c. IF THE LEAD PUMP FAILS TO START, THE LAG PUMP SHALL START.

D. SYSTEM STOP:
1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SAFETIES:
1. PUMP OR CHILLER FAILS TO START.
2. LOW OR NO FLOW IN OPERATING CHILLER.
3. MINIMUM FLOW METER IS INACTIVE OR OUT OF RANGE.
4. CHILLER ALARM.
5. PUMP VARIABLE FREQUENCY DRIVE ALARM.

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
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Structural Engineer
Magnusson Klemencic Associates
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Building Envelope Consultant
RDH
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Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
project manager
drawn by
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revisions:

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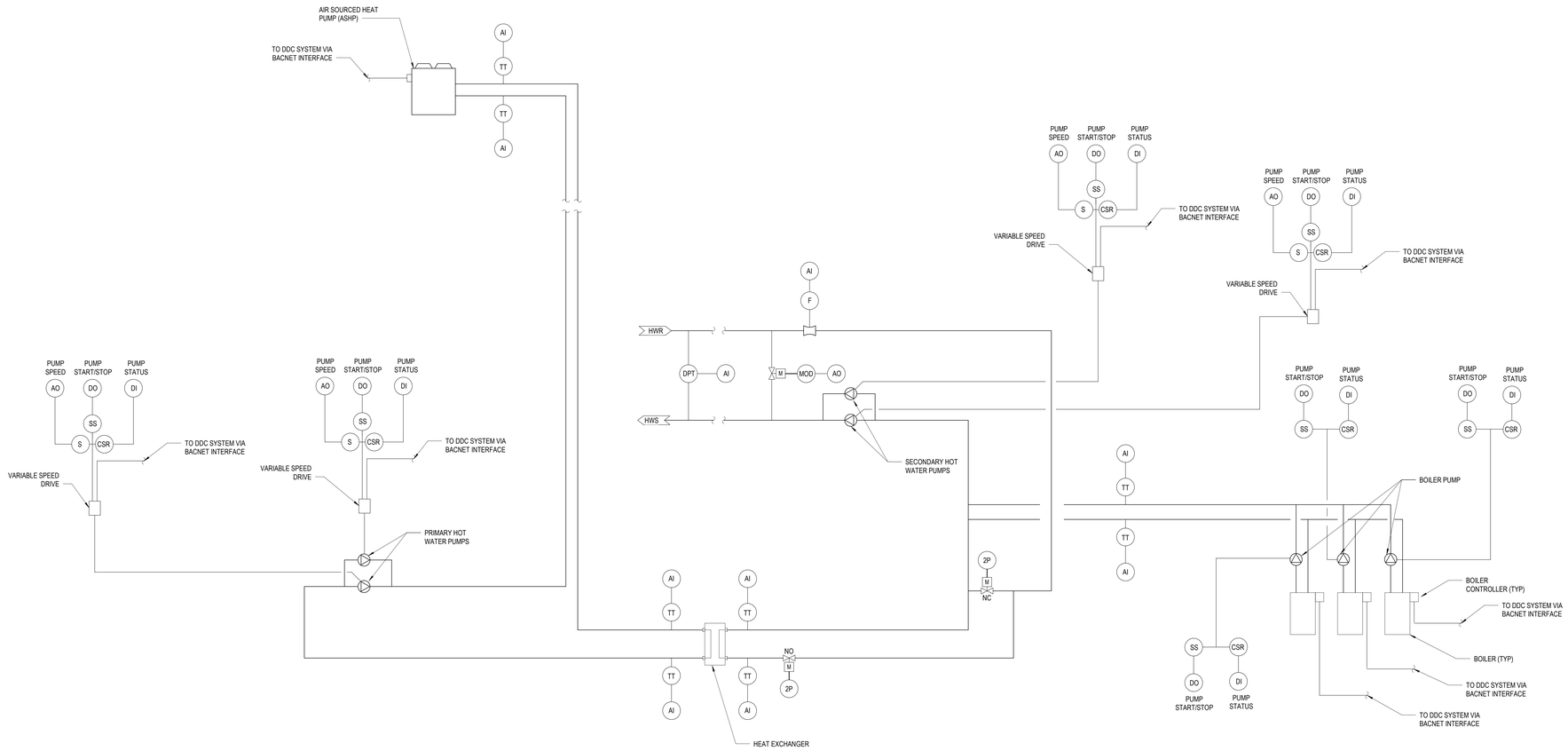
MECHANICAL CONTROL DIAGRAM

M5.06



2 HOT WATER SYSTEM CONTROL DIAGRAM - TOWER C

SCALE: NTS

SEQUENCE OF OPERATIONS

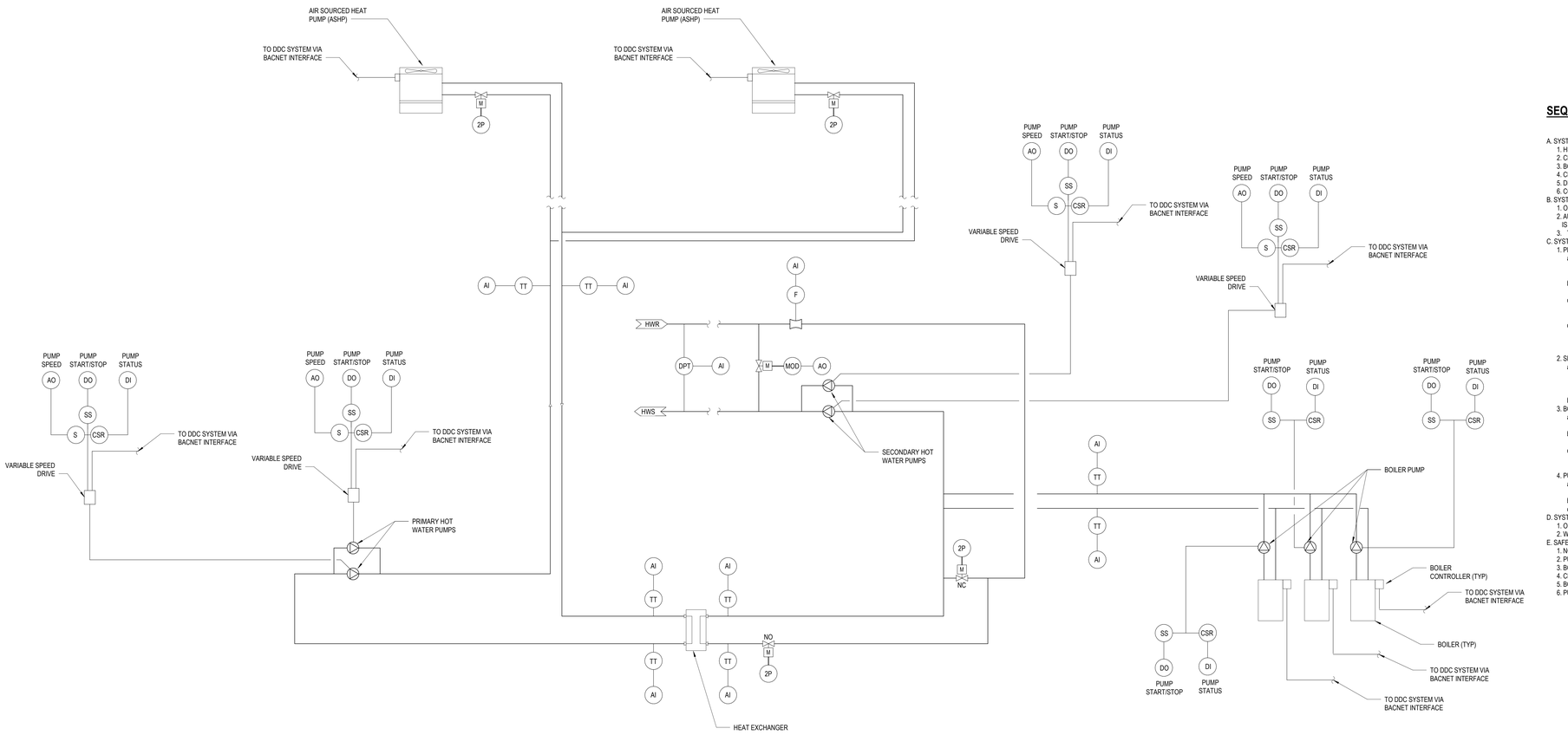
A. SYSTEM OFF:
1. HEATING WATER PRIMARY AND SECONDARY WATER PUMPS OFF.
2. CHILLER OFF.
3. BOILERS OFF.
4. DIFFERENTIAL PRESSURE BYPASS CONTROL VALVE OPEN.
5. CONTROL LOOPS INACTIVE.

B. SYSTEM START:
1. OPERATOR ENTERED COMMAND AT THE BMS.
2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES (OCCUPIED MODE OR COOL-DOWN MODE), AND THERE IS A HEATING LOAD DEMAND.
3. THE OUTSIDE AIR TEMPERATURE IS BELOW 45 DEGREES F.

C. SYSTEM OPERATION
1. PRIMARY HEATING WATER SYSTEM:
   a. BOTH PRIMARY HEATING WATER PUMP SHALL START AND EVAPORATOR ISOLATION CONTROL VALVES SHALL OPEN. AFTER FLOW IS PROVEN THROUGH THE EVAPORATOR START THE CHILLER THROUGH ITS UNIT MOUNTED STARTER AND CONTROLLER.
   b. CHILLER SHALL BE CONTROLLED THROUGH UNIT MOUNTED CONTROLLER TO MAINTAIN THE SECONDARY HEATING WATER SUPPLY TEMPERATURE.
2. SECONDARY HEATING WATER SYSTEM:
   a. SECONDARY PUMP SPEED SHALL BE MODULATED TO MAINTAIN A PRE-DETERMINED DIFFERENTIAL PRESSURE SETPOINT. ADDITIONAL SECONDARY PUMPS SHALL START IF PRESSURE DIFFERENTIAL SETPOINT CANNOT BE MAINTAINED FOR A DEFINED TIME PERIOD OR IF THE OPERATING PUMPS ARE AT 100 PERCENT SPEED. OPERATING PUMPS SHALL BE REDUCED BY ONE PUMP IF OPERATING SPEED FALLS BELOW 40 PERCENT. FIRST PUMP STARTED SHALL BE FIRST PUMP STOPPED.
   b. BYPASS VALVE SHALL BE MODULATED OPEN TO MAINTAIN THE MINIMUM FLOWRATE MEASURED BY THE FLOW METER.
3. BOILERS:
   a. IF THE CHILLERS ARE OPERATING AT FULL LOAD AND THE SECONDARY HEATING SUPPLY TEMPERATURE STILL CANNOT BE MAINTAINED, Pump associated to the lead boiler shall start After flow is proven start the boiler through its unit-mounted controller.
   b. IF HEATING WATER SUPPLY TEMPERATURE SETPOINT CANNOT BE MAINTAINED, THE NEXT BOILER IN THE GROUP SHALL START AND THE BOILERS SHALL SHARE LOAD EQUALLY.
   c. ON A REDUCTION IN LOAD AND THE BYPASS FLOW RATE IS GREATER THAN THE FLOW OF THE SMALLEST OPERATING BOILER WATER PUMP AND THE HEATING WATER SUPPLY TEMPERATURE IS ABOVE SETPOINT, THE SMALLEST BOILER SHALL STOP. CONTINUE TO REDUCE NUMBER OF OPERATING BOILER CAPACITY AS REQUIRED.
4. PUMPS:
   a. IF MULTIPLE PUMP ARE OPERATING IN PARALLEL THE LEAD PUMP SHALL BE OPERATING AT 95 PERCENT OF FULL FLOWRATE WHEN THE SECOND STAGE PUMP IS STARTED. BOTH PUMPS SHALL THEN SHARE THE LOAD EQUALLY.
   b. LEAD PUMP SHALL BE STARTED WHENEVER THE CHILLED WATER SYSTEM IS IN OPERATION. ALTERNATE LEAD PUMPS.
   c. IF THE LEAD PUMP FAILS TO START, THE LAG PUMP SHALL START.

D. SYSTEM STOP:
1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SAFETIES:
1. NO FLOW IN OPERATING BOILER.
2. PUMP OR CHILLER FAILS TO START.
3. BOILER FAILS TO START.
4. CHILLER ALARM.
5. BOILER ALARM.
6. PUMP VARIABLE FREQUENCY DRIVE ALARM.



1 HOT WATER SYSTEM CONTROL DIAGRAM - TOWER A&B

SCALE: NTS

SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
1. HEATING WATER PRIMARY AND SECONDARY WATER PUMPS OFF.
2. CHILLERS OFF.
3. BOILERS OFF.
4. CHILLER EVAPORATOR AUTOMATIC ISOLATION VALVES CLOSED.
5. DIFFERENTIAL PRESSURE BYPASS CONTROL VALVE OPEN.
6. CONTROL LOOPS INACTIVE.

B. SYSTEM START:
1. OPERATOR ENTERED COMMAND AT THE BMS.
2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES (OCCUPIED MODE OR COOL-DOWN MODE), AND THERE IS A HEATING LOAD DEMAND.
3. THE OUTSIDE AIR TEMPERATURE IS BELOW 45 DEGREES F.

C. SYSTEM OPERATION
1. PRIMARY HEATING WATER SYSTEM:
   a. BOTH PRIMARY HEATING WATER PUMP SHALL START AND EVAPORATOR ISOLATION CONTROL VALVES SHALL OPEN. AFTER FLOW IS PROVEN THROUGH THE EVAPORATOR START THE CHILLER THROUGH ITS UNIT MOUNTED STARTER AND CONTROLLER.
   b. CHILLER SHALL BE CONTROLLED THROUGH UNIT MOUNTED CONTROLLER TO MAINTAIN THE SECONDARY HEATING WATER SUPPLY TEMPERATURE.
   c. THE LEAD CHILLER IS MORE THAN 95 PERCENT LOAD AND HEATING WATER SUPPLY TEMPERATURE SETPOINT CANNOT BE MAINTAINED, THE NEXT CHILLER IN THE GROUP SHALL START AND THE CHILLERS SHALL SHARE LOAD EQUALLY. CONTINUE TO ADD CHILLER HEATING CAPACITY AS REQUIRED TO SATISFY REQUIREMENTS ABOVE.
   d. ON A REDUCTION IN LOAD AND THE BYPASS FLOW RATE IS GREATER THAN THE FLOW OF THE SMALLEST OPERATING CHILLED WATER PUMP AND THE OPERATING CHILLERS ARE LOADED LESS THAN THE CAPACITY REQUIREMENTS OF ALL OPERATING CHILLERS AND THE HEATING WATER SUPPLY TEMPERATURE IS BELOW SETPOINT, THE SMALLEST CHILLER SHALL STOP. CONTINUE TO DELETE CHILLER CAPACITY AS REQUIRED.
2. SECONDARY HEATING WATER SYSTEM:
   a. SECONDARY PUMP SPEED SHALL BE MODULATED TO MAINTAIN A PRE-DETERMINED DIFFERENTIAL PRESSURE SETPOINT. ADDITIONAL SECONDARY PUMPS SHALL START IF PRESSURE DIFFERENTIAL SETPOINT CANNOT BE MAINTAINED FOR A DEFINED TIME PERIOD OR IF THE OPERATING PUMPS ARE AT 100 PERCENT SPEED. OPERATING PUMPS SHALL BE REDUCED BY ONE PUMP IF OPERATING SPEED FALLS BELOW 40 PERCENT. FIRST PUMP STARTED SHALL BE FIRST PUMP STOPPED.
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3. BOILERS:
   a. IF THE CHILLERS ARE OPERATING AT FULL LOAD AND THE SECONDARY HEATING SUPPLY TEMPERATURE STILL CANNOT BE MAINTAINED, Pump associated to the lead boiler shall start After flow is proven start the boiler through its unit-mounted controller.
   b. IF HEATING WATER SUPPLY TEMPERATURE SETPOINT CANNOT BE MAINTAINED, THE NEXT BOILER IN THE GROUP SHALL START AND THE BOILERS SHALL SHARE LOAD EQUALLY.
   c. ON A REDUCTION IN LOAD AND THE BYPASS FLOW RATE IS GREATER THAN THE FLOW OF THE SMALLEST OPERATING BOILER WATER PUMP AND THE HEATING WATER SUPPLY TEMPERATURE IS ABOVE SETPOINT, THE SMALLEST BOILER SHALL STOP. CONTINUE TO REDUCE NUMBER OF OPERATING BOILER CAPACITY AS REQUIRED.
4. PUMPS:
   a. IF MULTIPLE PUMP ARE OPERATING IN PARALLEL THE LEAD PUMP SHALL BE OPERATING AT 95 PERCENT OF FULL FLOWRATE WHEN THE SECOND STAGE PUMP IS STARTED. BOTH PUMPS SHALL THEN SHARE THE LOAD EQUALLY.
   b. LEAD PUMP SHALL BE STARTED WHENEVER THE CHILLED WATER SYSTEM IS IN OPERATION. ALTERNATE LEAD PUMPS.
   c. IF THE LEAD PUMP FAILS TO START, THE LAG PUMP SHALL START.

D. SYSTEM STOP:
1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SAFETIES:
1. NO FLOW IN OPERATING BOILER.
2. PUMP OR CHILLER FAILS TO START.
3. BOILER FAILS TO START.
4. CHILLER ALARM.
5. BOILER ALARM.
6. PUMP VARIABLE FREQUENCY DRIVE ALARM.

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
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ASPEN GROUP
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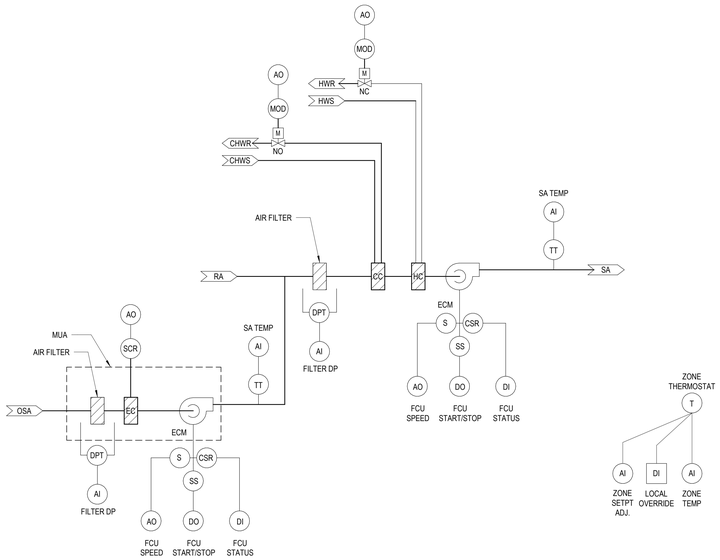
MECHANICAL CONTROL DIAGRAM

M5.07



3 FAN COIL UNIT DIAGRAM - COOLING AND HEATING WITH MUA

SCALE: NTS

SEQUENCE OF OPERATIONS

A. SYSTEM OFF:

1. FCU SUPPLY FAN OFF.
2. MUA SUPPLY FAN OFF.
3. CHILLED WATER CONTROL VALVE CLOSED.
4. HEATING WATER CONTROL VALVE CLOSED.
5. ELECTRIC HEATING COIL DE-ENERGIZED.
6. CONTROL LOOPS INACTIVE.

B. SYSTEM START:

1. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE.
2. OPERATOR ENTERED COMMAND AT THE BMS.
3. LOCAL SWITCH.
4. LOCAL TEMPERATURE SENSOR.

C. SYSTEM OPERATION:

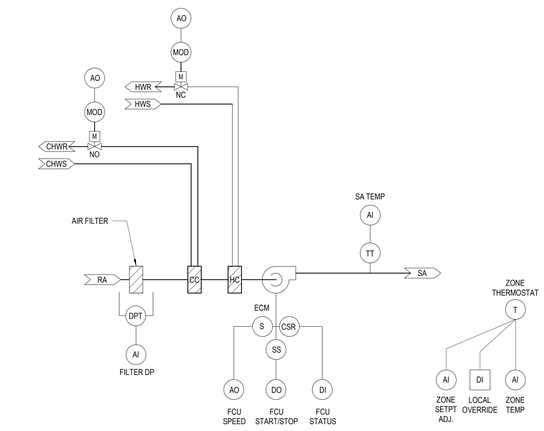
1. THE FCU SUPPLY FAN SHALL RUN.
2. THE MUA SUPPLY FAN SHALL BE INTERLOCKED RUN WITH FCU SUPPLY FAN AT MINIMUM AIRFLOW.
3. COOLING:
   ON A CALL FOR COOLING, THE COOLING COIL VALVE WILL BEGIN TO MODULATE OPEN. AS THE COOLING DEMAND INCREASES, THE VALVE WILL CONTINUE TO OPEN UNTIL THE DISCHARGE AIR TEMPERATURE REACHES 52°F (ADJ). ON CONTINUED CALL FOR COOLING, THE FAN WILL BEGIN TO MODULATE TOWARD THE MAXIMUM COOLING FAN AIRFLOW AS THE CHILLED WATER VALVE CONTINUES TO MODULATE OPEN MAINTAINING A 52°F (ADJ) DISCHARGE AIR TEMPERATURE. THIS PROCESS WILL CONTINUE UNTIL THE FAN REACHES THE COOLING MAXIMUM AIRFLOW AND THE CHILLED WATER VALVE REACHES MAXIMUM FLOW. UPON A DECREASE IN COOLING DEMAND, THE SEQUENCE WILL REVERSE.
4. DEAD BAND:
   WITH NO DEMAND IN THE SPACE, THERE WILL BE NO CALL FOR COOLING OR HEATING. THE FAN WILL BE AT MINIMUM AIRFLOW. THE HEATING COIL VALVE AND COOLING COIL VALVE WILL BE OFF.
5. HEATING:
   ON A CALL FOR HEATING, THE HEATING COIL VALVE WILL BEGIN TO MODULATE OPEN. AS THE HEATING DEMAND INCREASES, THE VALVE WILL CONTINUE TO MODULATE OPEN UNTIL THE DISCHARGE AIR TEMPERATURE REACHES 90°F (ADJ). ON CONTINUED CALL FOR HEATING, THE FAN BEGINS TO MODULATE FROM DEAD BAND TOWARDS THE MAXIMUM HEATING FAN AIRFLOW. THIS PROCESS WILL CONTINUE UNTIL THE FAN REACHES THE HEATING MAXIMUM AIRFLOW AND THE HOT WATER VALVE REACHES MAXIMUM FLOW. UPON A DECREASE IN HEATING DEMAND, THE SEQUENCE WILL REVERSE.
6. THE MUA ELECTRIC COIL SHALL MODULATE TO MAINTAIN MUA DISCHARGE AIR TEMPERATURE.
7. MUA UNIT NORMALLY OPERATE AT 200 CFM. INTERLOCK WITH RANGE HOOD AND INCREASE TO 750 CFM WHEN RANGE HOOD TURNED ON.

D. SYSTEM STOP:

1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON A PREPROGRAMMED SCHEDULE.
2. MANUAL OFF AT LOCAL SWITCH.
3. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

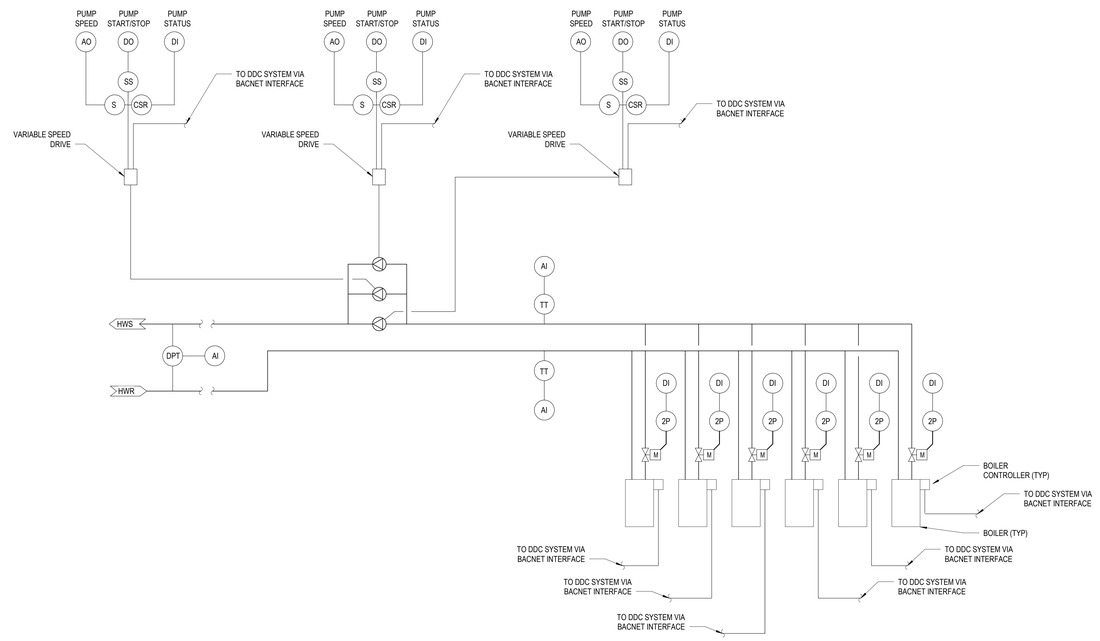
E. SETPOINTS:

1. SPACE TEMPERATURE 70°F HEATING AND 75°F COOLING. ALARM AT BMS AT +/- 2°F FROM SETPOINT.



2 FAN COIL UNIT DIAGRAM - COOLING AND HEATING

SCALE: NTS



SEQUENCE OF OPERATIONS

A. GENERAL:

1. THE VARIABLE VOLUME SYSTEM IS DESIGNED TO PROVIDE GLYCOL HOT WATER TO SNOWMELT MANIFOLDS.
2. SOURCE WATER TEMPERATURES SHALL BE MAINTAINED BY THE HEATING WATER SYSTEM CONTROLS.

B. SYSTEM OPERATION:

1. SYSTEM SHALL BE ENABLED:
   a. WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 35°F (ADJ.), AND THE HUMIDITY SENSOR IS ABOVE 80% RH, OR
   b. BY THE OPERATOR ENTERED COMMAND AT THE BMS, OR
   c. VIA MOISTURE AND TEMPERATURE SENSORS LOCATED FOR LOCAL SNOWMELT ZONE CONTROL.
2. ONCE ENABLED, SYSTEM SHALL REMAIN ENABLED FOR AT LEAST ONE HOUR (ADJ.).
3. SYSTEM SHALL BE DISABLED:
   a. WHEN THE PAVEMENT TEMPERATURE IS ABOVE 50°F AND AND HUMIDTY DROPS BELOW 50%, OR
   b. THE OUTSIDE AIR TEMPERATURE RISES ABOVE 40°F (ADJ.), OR
   c. BY THE OPERATOR ENTERED COMMAND AT THE BMS..

C. GHW DISTRIBUTION PUMP :

1. GLYCOL HEATING WATER DISTRIBUTION PUMP SHALL BE STARTED TO SUPPLY HEATING HOT WATER THROUGH THE SYSTEM UPON ACTIVATION BY THE SNOWMELT CONTROL SYSTEM. BMS SHALL PROVE OPERATION OF THE PUMP. UPON PUMP FAILURE, THE BMS SHALL ALARM. THE VARIABLE FREQUENCY DRIVE MODULATES PUMP SPEED TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE SETPOINT AS SENSED NEAR THE END OF THE MAIN PIPING RUN.

D. GHW TEMPERATURE CONTROL :

1. THE HEATING HOT WATER SYSTEM VALVE SHALL MODULATE TO MAINTAIN THE GHW SUPPLY TEMPERATURE OF 110°F (ADJ.) SETPOINT.

1 SNOWMELT HOT WATER SYSTEM CONTROL DIAGRAM

SCALE: NTS

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206 624 5670 olsonkundig.com

project:
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect _____
project manager _____
drawn by _____
_____
checked by Checker
job no.
date 11/18/2022

revisions:

no. date by

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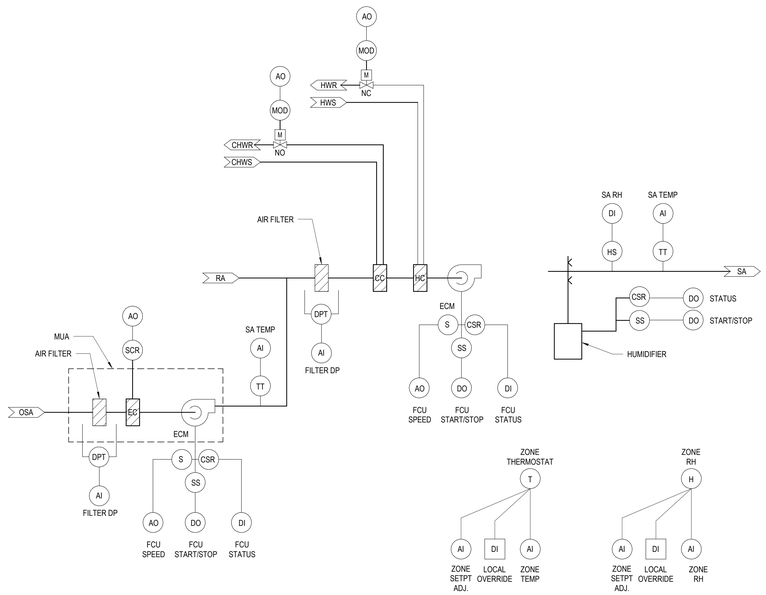
11/18/2022

MECHANICAL CONTROL DIAGRAM

M5.08



2 FAN COIL UNIT DIAGRAM - COOLING AND HEATING WITH MUA AND HUMIDIFIER

SCALE: NTS

SEQUENCE OF OPERATIONS

A. SYSTEM OFF:

1. FCU SUPPLY FAN OFF.
2. MUA SUPPLY FAN OFF.
3. CHILLED WATER CONTROL VALVE CLOSED.
4. HEATING WATER CONTROL VALVE CLOSED.
5. ELECTRIC HEATING COIL DE-ENERGIZED.
6. HUMIDIFIER OFF.
7. CONTROL LOOPS INACTIVE.

B. SYSTEM START:

1. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE.
2. OPERATOR ENTERED COMMAND AT THE BMS.
3. LOCAL SWITCH.
4. LOCAL TEMPERATURE SENSOR.

C. SYSTEM OPERATION:

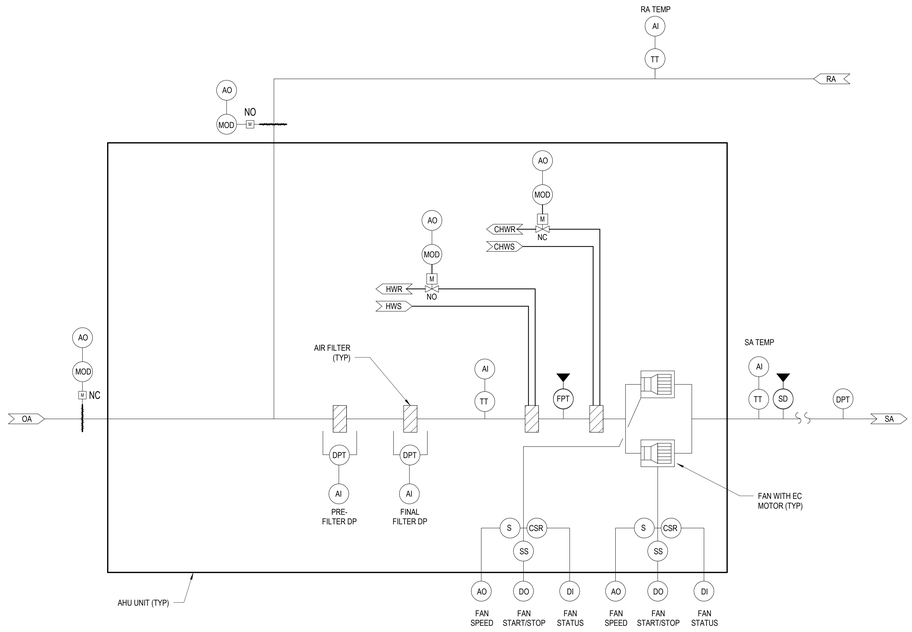
1. THE FCU SUPPLY FAN SHALL RUN.
2. THE MUA SUPPLY FAN SHALL BE INTERLOCKED RUN WITH FCU SUPPLY FAN AT MINIMUM AIRFLOW.
3. COOLING:
   ON A CALL FOR COOLING, THE COOLING COIL VALVE WILL BEGIN TO MODULATE OPEN. AS THE COOLING DEMAND INCREASES, THE VALVE WILL CONTINUE TO OPEN UNTIL THE DISCHARGE AIR TEMPERATURE REACHES 52°F (ADJ). ON CONTINUED CALL FOR COOLING, THE FAN WILL BEGIN TO MODULATE TOWARD THE MAXIMUM COOLING FAN AIRFLOW AS THE CHILLED WATER VALVE CONTINUES TO MODULATE OPEN MAINTAINING A 52°F (ADJ) DISCHARGE AIR TEMPERATURE. THIS PROCESS WILL CONTINUE UNTIL THE FAN REACHES THE COOLING MAXIMUM AIRFLOW AND THE CHILLED WATER VALVE REACHES MAXIMUM FLOW. UPON A DECREASE IN COOLING DEMAND, THE SEQUENCE WILL REVERSE.
4. DEAD BAND:
   WITH NO DEMAND IN THE SPACE, THERE WILL BE NO CALL FOR COOLING OR HEATING. THE FAN WILL BE AT MINIMUM AIRFLOW. THE HEATING COIL VALVE AND COOLING COIL VALVE WILL BE OFF.
5. HEATING:
   ON A CALL FOR HEATING, THE HEATING COIL VALVE WILL BEGIN TO MODULATE OPEN. AS THE HEATING DEMAND INCREASES, THE VALVE WILL CONTINUE TO MODULATE OPEN UNTIL THE DISCHARGE AIR TEMPERATURE REACHES 90°F (ADJ). ON CONTINUED CALL FOR HEATING, THE FAN BEGINS TO MODULATE FROM DEAD BAND TOWARDS THE MAXIMUM HEATING FAN AIRFLOW. THIS PROCESS WILL CONTINUE UNTIL THE FAN REACHES THE HEATING MAXIMUM AIRFLOW AND THE HOT WATER VALVE REACHES MAXIMUM FLOW. UPON A DECREASE IN HEATING DEMAND, THE SEQUENCE WILL REVERSE.
6. THE MUA ELECTRIC COIL SHALL MODULATE TO MAINTAIN MUA DISCHARGE AIR TEMPERATURE.
7. MUA UNIT NORMALLY OPERATE AT 200 CFM. INTERLOCK WITH RANGE HOOD AND INCREASE TO 750 CFM WHEN RANGE HOOD TURNED ON.
8. CONTROL THE HUMIDIFIER FROM A HUMIDITY SENSOR LOCATED IN THE SPACE AS FOLLOWS:
   a. UPON A DROP IN HUMIDITY SENSED, THE HUMIDIFIER CONTROL VALVE SHALL BE MODULATED OPEN AS REQUIRED TO MAINTAIN THE HUMIDITY AT SETPOINT.
   b. A HIGH LIMIT, DUCT MOUNTED, HUMIDISTAT LOCATED TEN FEET DOWNSTREAM OF THE HUMIDIFIER SHALL OVERRIDE THE HUMIDIFIER CONTROL AND STOP THE HUMIDIFIER OPERATION WHENEVER THE HUMIDITY LEVELS SENSED ARE ABOVE ITS SETPOINT, INITIALLY 85 PERCENT. THE HIGH LIMIT HUMIDISTAT SHALL BE HARDWIRED TO INTERRUPT THE CONTROL LOOP.

D. SYSTEM STOP:

1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON A PREPROGRAMMED SCHEDULE.
2. MANUAL OFF AT LOCAL SWITCH.
3. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SETPOINTS:

1. SPACE TEMPERATURE 70°F HEATING AND 75°F COOLING. ALARM AT BMS AT +/- 2°F FROM SETPOINT.



1 AIR HANDLING UNIT CONTROL DIAGRAM

SCALE: NTS

SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
1. MINIMUM OUTSIDE AIR DAMPERS CLOSED.
2. RETURN AIR DAMPER OPEN.
3. SUPPLY FAN OFF.
4. CHILLED WATER VALVE CLOSED.
5. ALL OTHER CONTROL LOOPS INACTIVE.

B. SYSTEM START:
1. OPERATOR ENTERED COMMAND AT THE BMS.
2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.

C. SYSTEM OPERATION:
1. FAN VOLUME CONTROL:
   a. SUPPLY FAN VOLUME SHALL BE VARIED BY SENSING AIRFLOW DEMAND FROM ALL TERMINAL BOXES AND INCREASING OR DECREASING FAN SPEED TO SATISFY AIRFLOW REQUIREMENTS BASED ON RESET OF THE DUCT SYSTEM STATIC PRESSURE BETWEEN THE MINIMUM ½ INCH (ADJ.) AND THE MAXIMUM 1½ INCH (ADJ.)].
   b. IF MULTIPLE VARIABLE VOLUME FANS ARE OPERATING IN PARALLEL THE LEAD FAN SHALL BE OPERATING AT 95 PERCENT OF FULL VOLUME WHEN THE SECOND STAGE FAN IS STARTED. BOTH FANS SHALL THEN SHARE THE LOAD EQUALLY. IF ADDITIONAL FANS ARE IN THE GROUP FOLLOW SIMILAR SEQUENCE FOR OTHER FANS. ALTERNATE THE LEAD FAN AUTOMATICALLY AT EACH SYSTEM START-UP.
   SUPPLY AIR DUCT STATIC PRESSURE RESET CONTROL:
   DUCT STATIC PRESSURE SENSOR LOCATED TWO-THIRDS DOWN THE MAIN DUCT SHALL, THROUGH THE BMS, MODULATE THE FAN SPEED DRIVE TO MAINTAIN THE DUCT SYSTEM STATIC PRESSURE SETPOINT AS RESET BY ZONE AIR FLOW DEMAND. THE CONTROLLER SHALL MEASURE DUCT STATIC PRESSURE AND SHALL MODULATE THE SUPPLY FAN VFD SPEED TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT OF BETWEEN 0.50 IN H_2O (ADJ.) AND 1.50 IN H_2O (ADJ.) BASED ON AIR FLOW DEMAND. THE SUPPLY FAN VFD SPEED SHALL NOT DROP BELOW 30 PERCENT (ADJ.).
   THE DUCT STATIC PRESSURE RESET SHALL OPERATE AS FOLLOWS:
   a. ON SUPPLY FAN START UP, THE DUCT STATIC PRESSURE SETPOINT SHALL BE SET TO 0.50 IN H_2O (ADJ.) FOR THE FIRST TWO (2) MINUTES OF OPERATION.
   b. IF THREE (3) (ADJ.) OR MORE VAV BOXES ARE OPERATING AT 95 PERCENT OR GREATER AIR FLOW/DAMPER POSITION, THE DUCT STATIC PRESSURE SHALL BE INCREASED AT A RATE OF 0.10 IN H_2O PER MINUTE (ADJ.) UNTIL NO MORE THAN THREE (3) VAV BOXES (ADJ.) ARE OPERATING AT 95 PERCENT OR GREATER AIR FLOW/DAMPER POSITION.
   c. IF FEWER THAN THREE (3) (ADJ.) VAV BOXES ARE OPERATING AT 95 PERCENT OR GREATER AIR FLOW/DAMPER POSITION, THE DUCT STATIC PRESSURE SHALL BE DECREASED AT A RATE OF 0.05 ON H_2O PER MINUTE (ADJ.).
   d. ALLOW FOR A MINIMUM FIVE (5) MINUTE (ADJ.) PERIOD OF OPERATION BEFORE A CHANGEOVER BETWEEN INCREASING AND DECREASING THE DUCT STATIC PRESSURE SETPOINT ADJUSTMENT.
   e. ON A CALL FOR THE SYSTEM TO STOP UNDER NORMAL CONDITIONS, THE DUCT STATIC PRESSURE SETPOINT SHALL BE RESET TO THE INITIAL START-UP STATIC PRESSURE SETPOINT (0.50 IN H_2O) AT A RATE OF 0.20 IN H_2O PER MINUTE (ADJ.).
   f. NOTE THAT ANY VAV BOXES SET TO OPERATE AT 100 PERCENT AT ALL TIMES ARE EXCLUDED FROM THE STATIC PRESSURES RESET SCHEDULE.
1. WARM-UP AND COOL-DOWN MODES:
   a. DURING THE WARM-UP MODE, THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN DAMPER SHALL BE OPEN, THE COOLING VALVE SHALL BE CLOSED AND THE PREHEAT VALVES SHALL BE MODULATED TO MAINTAIN THE MINIMUM SUPPLY AIR TEMPERATURE SETPOINT.
   b. DURING THE COOL-DOWN MODE IF OUTSIDE AIR TEMPERATURE AND ENTHALPY IS GREATER THAN THE RETURN AIR TEMPERATURE AND ENTHALPY, THE DAMPERS SHALL BE POSITIONED AS DESCRIBED UNDER WARM-UP MODE, OTHERWISE THE DAMPERS SHALL BE CONTROLLED AS DESCRIBED IN THE OCCUPIED MODE. ALL OTHER CONTROLS SHALL OPERATE AS DESCRIBED UNDER OCCUPIED MODE.
   c. THE FAN VOLUMES SHALL BE CONTROLLED AS DESCRIBED IN THE OCCUPIED MODE, EXCEPT THAT THE DIFFERENTIAL VOLUME SETPOINT SHALL BE 0 CUBIC FEET PER MINUTE.
4. OCCUPIED MODE:
   a. THE MINIMUM OUTSIDE AIR DAMPER SHALL MODULATE TO MINIMUM AIRFLOW SETPOINT AS NOTED ON THE SCHEDULES. IF DAMPER IS FULLY OPEN AND CANNOT MAINTAIN AIRFLOW SETPOINT, MODULATE RETURN AIR DAMPER CLOSED TO ACHIEVE MINIMUM OUTSIDE AIRFLOW SETPOINT. MINIMUM AIR FLOW SHALL BE A DIRECT MEASURED VALUE AND BE CONSTANT OVER THE ENTIRE RANGE OF SUPPLY AIR FLOW MODULATION.
   b. MODULATE THE HEATING VALVE, ECONOMIZER DAMPERS AND COOLING VALVE IN SEQUENCE TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT.
   c. THE HEATING VALVES SHALL BE CONTROLLED TO MAINTAIN A LOW LIMIT DISCHARGE TEMPERATURE OF 50 DEGREES F.
   d. WHEN THE RETURN AIR TEMPERATURE AND ENTHALPY IS GREATER THAN THE OUTSIDE AIR TEMPERATURE AND ENTHALPY THE ECONOMIZER DAMPERS SHALL MODULATE ACCORDING TO TEMPERATURE CONTROLS SEQUENCE DESCRIBED ABOVE. WHEN THE RETURN AIR TEMPERATURE AND ENTHALPY IS LESS THAN THE OUTSIDE AIR TEMPERATURE AND ENTHALPY THE ECONOMIZER DAMPERS SHALL BE POSITIONED TO THE MINIMUM OUTSIDE AIR POSITION.
   e. WHEN THE SUPPLY AIR TEMPERATURE CANNOT BE MAINTAINED [THROUGH THE USE OF AIR ECONOMIZER SEQUENCE] MODULATE THE COOLING COIL CONTROL VALVE AS REQUIRED TO MAINTAIN SETPOINT.

5. UNOCCUPIED MODE:
   a. THE HEATING VALVES SHALL BE CONTROLLED TO MAINTAIN A PLENUM TEMPERATURE OF 50 DEGREES F.
   b. THE SYSTEM SHALL BE OFF.

D. SYSTEM STOP:
1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

E. SAFETIES:
1. A FREEZESTAT WITH ITS ELEMENT SERPENTINED ACROSS THE DISCHARGE SIDE OF THE HEATING COIL WILL STOP THE SUPPLY FAN, CLOSE THE OUTSIDE AIR DAMPER, OPEN THE HEATING COIL VALVE FULLY AND ALARM THE BMS. FREEZESTAT SHALL BE THE AUTOMATIC RESET TYPE. WHENEVER THE ALARM IS ACTUATED, THE POINT WILL BE HELD BY THE BMS UNTIL MANUALLY RELEASED BY THE BMS OPERATOR.
2. A DIFFERENTIAL PRESSURE SWITCH WITH INDICATOR GAUGE INSTALLED ACROSS THE FILTER SHALL INDICATE WHENEVER THE FILTER IS OBSTRUCTED AND INITIATE A NON-CRITICAL ALARM AT THE BMS.
3. VARIABLE FREQUENCY DRIVES ALARMS.

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
8200 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
project manager
drawn by
checked by Checker
job no.
date 11/18/2022

revisions:

no. date by

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11/18/2022

MECHANICAL CONTROL DIAGRAM

M5.09

6.3 Mechanical Draft System for a Wood-fired Fireplace with Safety System per NFPA211/IMC-2000 edition (and after)

Application

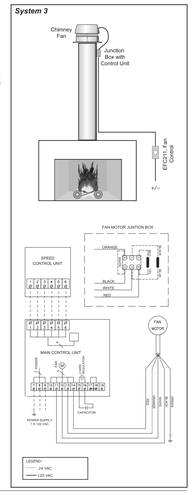
In jurisdictions where the 2000 or later edition of the NFPA211 has been adopted, there are new requirements for the use of mechanical draft systems in conjunction with solid fuel. The installation requires a safety control such as the EFC 211 Fan Control.

Sequence of Operation

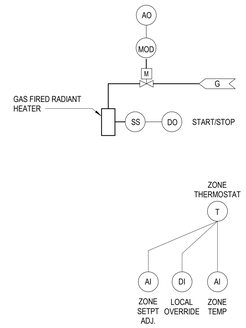
1. Turn the control on by turning the knob clockwise. A "click" indicates the control is turned on. Adjust the knob to the desired speed. The speed must be set so no smoke spills from the solid fuel heating appliance (fireplace, stove, wood-fired oven etc.) through the opening into a room. The smoke should be safely exhausted through the chimney.
2. The chimney fan will start with a 15 second boost to ensure proper fan operation. and the green LED on the speed control unit cover will flash. After 15 seconds, the fan speed will be reduced to the preset level and continue to operate at this speed.
3. During appliance operation the speed setting can be adjusted if needed. This is especially true if logs are added.
4. The control constantly monitors the chimney fan operation. It automatically measures the fan speed every minute and if necessary, it increases the fan speed. This can be heard as quiet "hick-up" from the fan. If necessary, the control increases the fan speed to 100% for 15 seconds (green LED flashes), after which it will slow the fan speed down to set speed.
5. If the green LED flashes during operation (after the 15 seconds initiation) the fan speed is set too low or the fan wheel is somehow obstructed. If the red LED flashes and the buzzer sounds, the following may be the cause:
   - Blocked flue.
   - Defect chimney fan
   - Disconnected thermo-couple
   - Disconnected power supply The control can be reset, and the alarm turned off, by pressing the RESET button for 1-2 seconds.

Please see important note on page 24.

System 3



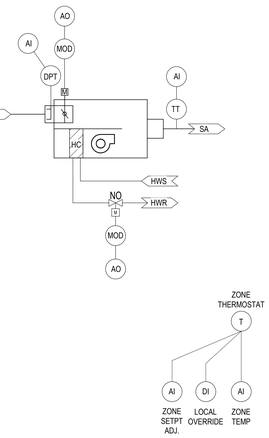
66 WOOD-FIRED FIREPLACE
SCALE: NTS



3 GAS FIRED RADIANT HEATER DIAGRAM
SCALE: NTS

DDC SEQUENCE OF OPERATIONS

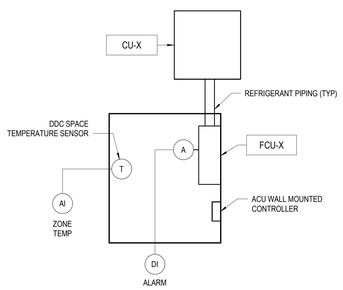
1. GENERAL:
   A. EACH RADIANT HEATER IS PROVIDED WITH ITS OWN WALL THERMOSTAT AND PACKAGED CONTROLS. A DDC SPACE TEMPERATURE SENSOR IS TO BE PROVIDED FOR EACH UNIT MOUNTED ADJACENT TO THE UNIT THERMOSTAT FOR MONITORING.
   B. WHEN HEATING IS REQUIRED AS DESCRIBED IN THE DIFFERENT OPERATING MODES, DDC SYSTEM ENABLES THE RADIANT HEATER AND IT OPERATES ITS PACKAGED CONTROLS TO MAINTAIN THE SPACE TEMPERATE HEATING SETPOINT PER ITS THERMOSTAT.
   C. ABOVE OA TEMPERATURE OF 60 DEG F (ADJ) HEATERS ARE DISABLED.
2. DDC SYSTEM SHALL OPERATE THE SYSTEM IN WARM UP, OCCUPIED, OR UNOCCUPIED MODE PER THE OWNER'S OCCUPANCY SCHEDULE.
3. WARMUP MODE: PLACE THE SYSTEM IN WARM-UP MODE BASED ON AN OPTIMIZED ALGORITHM WHICH COMPARES OUTDOOR AIR TEMPERATURE AND ZONE TEMPERATURE TO DETERMINE THE AMOUNT OF TIME PRIOR TO OCCUPIED MODE REQUIRED TO HEAT THE BUILDING TO OCCUPIED SETPOINT.
   A. ENABLE THE RADIANT HEATING SYSTEM CONTROLS.
4. OCCUPIED MODE: PLACE THE SYSTEM IN OCCUPIED MODE IF SCHEDULED TO BE OCCUPIED.
   A. ENABLE THE RADIANT HEATING SYSTEM CONTROLS.
5. UNOCCUPIED MODE: PLACE THE SYSTEM IN UNOCCUPIED MODE IF SCHEDULED TO BE UNOCCUPIED.
   A. DISABLE THE RADIANT HEATING SYSTEM CONTROLS.
6. TEMPORARY OCCUPANCY MODE: PLACE THE SYSTEM IN TEMPORARY OCCUPANCY MODE IF SCHEDULED TO BE UNOCCUPIED AND ANY ZONE PUSH BUTTON IS ENGAGED. OPERATE THE SYSTEM THE SAME AS OCCUPIED MODE. AFTER TWO HOURS (ADJ), RESTORE THE SYSTEM TO UNOCCUPIED MODE.
7. UNOCCUPIED HEATING MODE: PLACE THE SYSTEM IN UNOCCUPIED HEATING MODE IF SCHEDULED TO BE UNOCCUPIED AND THE ZONE TEMPERATURE FALLS BELOW 55 DEG F. OPERATE THE SYSTEM THE SAME AS IN WARM-UP MODE UNTIL THE ZONE TEMPERATURE REACHES 60 DEG F. ONCE THE ZONE TEMPERATURE REACHES 60 DEG F, PLACE THE SYSTEM BACK IN UNOCCUPIED MODE. PREVENT THE SYSTEM FROM CYCLING MORE THAN ONCE PER HOUR.
8. MONITORING AND ALARMS: PROVIDE MONITORING AND ALARMS AS SHOWN ON THE POINTS LIST.



SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
   1. FAN OFF.
   2. PRIMARY AIR DAMPER CLOSED.
   3. HEATING WATER CONTROL VALVE CLOSED.
B. SYSTEM START:
   1. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
   2. OPERATOR ENTERED COMMAND AT THE BMS.
   3. AUTOMATICALLY ON LOW SPACE TEMPERATURE ALARM.
   4. AUTOMATICALLY BY TENANT OVERRIDE PUSHBUTTON.
C. SYSTEM OPERATION:
   1. FAN CONTROL:
      a. OCCUPIED AND WARM-UP/COOL-DOWN MODES – THE FAN SHALL RUN CONTINUOUSLY.
      b. THE FAN DISCHARGE FLOW RATE SHALL BE CONTROLLED TO TRACK WITH THE PRIMARY AIR FLOW RATE. WHEN THE PRIMARY AIR IS AT THE MAXIMUM COOLING FLOW RATE, THE FAN SHALL OPERATE AT THE MAXIMUM COOLING DISCHARGE FLOW RATE. WHEN THE PRIMARY AIR IS AT THE MINIMUM COOLING FLOW RATE, THE FAN SHALL OPERATE AT THE MINIMUM COOLING DISCHARGE FLOW RATE.
      c. UPON THE REQUIREMENT TO GO TO THE HEATING MODE, THE PRIMARY FAN DISCHARGE FLOW RATE SHALL BE RAMPED UP OVER AN OPERATOR DEFINED PERIOD OF TIME UNTIL THE HEATING FLOW RATE IS REACHED.
      d. WHEN THE SPACE TEMPERATURE IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE FAN DISCHARGE FLOW RATE SHALL BE RAMPED DOWN TO THE MINIMUM COOLING FAN DISCHARGE FLOW RATE AND THE HEATING COIL VALVE SHALL BE CLOSED.
      e. THE MAXIMUM AND MINIMUM COOLING FAN DISCHARGE FLOW RATES AND THE HEATING FAN DISCHARGE FLOW RATES SHALL BE AS SCHEDULED. THE MAXIMUM AND MINIMUM PRIMARY AIR FLOW RATES SHALL BE AS SCHEDULED.
      f. THE BMS SHALL BE ABLE TO COMMAND:
         - AN INDIVIDUAL FAN TO OPERATE AT A CONSTANT DISCHARGE FLOW RATE, REGARDLESS OF THE SPACE TEMPERATURE. THIS DISCHARGE FLOW RATE SHALL BE THE MAXIMUM COOLING FAN DISCHARGE FLOW RATE.
         - ALL FANS ASSOCIATED WITH A PARTICULAR AIR SYSTEM TO OPERATE AT A CONSTANT DISCHARGE FLOW RATE BY ENTERING A SINGLE COMMAND. THIS DISCHARGE FLOW RATE SHALL BE THE MAXIMUM COOLING FAN DISCHARGE FLOW RATE.
   2. PRIMARY AIR DAMPER CONTROL:
      a. OCCUPIED AND COOL-DOWN MODES – DAMPER SHALL MODULATE TO PROVIDE PRIMARY AIRFLOW BETWEEN MINIMUM (20 PERCENT (ADJ.)) OF COOLING MAXIMUM), AND COOLING MAXIMUM AIRFLOW SETPOINT TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON HEATING DEMAND, PRIMARY AIR FLOW SHALL BE AT MINIMUM. ON COOLING DEMAND, INCREASE AIR FLOW FROM MINIMUM UP TO MAXIMUM AIR FLOW TO MAINTAIN SPACE SETPOINT.
      b. FOR DEMAND CONTROLLED VENTILATION (DCV), A SPACE CO_2 SENSOR SHALL OVERRIDE THE MINIMUM PRIMARY AIRFLOW SETPOINT AND INCREASE AIR FLOW TO MEET CO_2 CONCENTRATION SETPOINT OF 1,000 PPM OR LOWER. FAILURE OF CO_2 SENSOR SHALL REVERT TO STANDARD PRIMARY DAMPER MINIMUM POSITION. MONITOR AND RECORD THE CO_2 CONCENTRATION VALUES AT THE BMS.
      c. WARM-UP MODE – DAMPER SHALL BE CLOSED.
   3. HOT WATER HEATING COIL:
      a. OCCUPIED MODE: WHEN THE SPACE TEMPERATURE SENSOR IS CALLING FOR HEATING AND THE PRIMARY AIR DAMPER IS AT MINIMUM POSITION OR DCV POSITION, THE VALVE SHALL MODULATE TO INCREASE THE TERMINAL UNIT DISCHARGE AIR TEMPERATURE UP TO THE MAXIMUM HEATING AIR TEMPERATURE SETPOINT OF 85 DEGREES F (ADJ.). ON FURTHER DEMAND FOR HEATING, THE VALVE SHALL CONTINUE TO MODULATE TO MAINTAIN HEATING AIR SETPOINT AS FAN AIRFLOW INCREASES FROM MINIMUM TO THE HEATING AIRFLOW MAXIMUM.
      b. WARM-UP MODE: THE VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AT THE HEATING SETPOINT.
   4. UNOCCUPIED MODE: THE SYSTEM SHALL BE OFF.
D. SYSTEM STOP:
   1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
   2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.
E. SAFETIES: FAN SHALL STOP IF ASSOCIATED PRIMARY AIR SYSTEM IS SHUT OFF BY THE FIRE ALARM SYSTEM.

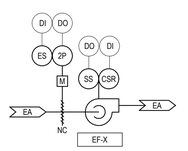
5 FAN POWERED TERMINAL UNIT CONTROL DIAGRAM
SCALE: NTS



SEQUENCE OF OPERATIONS – TYPICAL AIR CONDITIONING UNIT

1. SERVER ROOM UNITS:
   A. TWO FULL SIZE UNITS ARE PROVIDED (ONE AS BACK UP)
   B. THE LEAD ACU CONTROLS THE ROOM TEMPERATURE AT ALL TIMES VIA ITS PACKAGED CONTROLS AND THERMOSTAT.
   C. DDC MONITORS THE ACU SUMMARY ALARM AND ENABLES THE LAG ACU IF THE LEAD ACU FAILS.
   D. ROTATE THE LEAD ACU ON A WEEKLY BASIS (ADJ).
   E. DDC MONITORS THE ROOM TEMPERATURE WITH ITS OWN INDEPENDENT ROOM SENSOR.
2. OTHER MISCELLANEOUS UNITS:
   A. THE ACU CONTROLS THE ROOM TEMPERATURE AT ALL TIMES VIA ITS PACKAGED CONTROLS AND THERMOSTAT.
   B. DDC MONITORS THE ROOM TEMPERATURE WITH ITS OWN INDEPENDENT ROOM SENSOR.
3. SAFETIES:
   A. UPON A LOSS OF POWER, PERFORM AN ORDERLY SHUTDOWN OF THE SYSTEM. ONCE POWER IS RESTORED, RESTORE THE SYSTEM TO ITS SCHEDULED MODE OF OPERATION.
4. MONITORING AND ALARMS: PROVIDE MONITORING AND ALARMS AS SHOWN ON THE POINTS LIST.

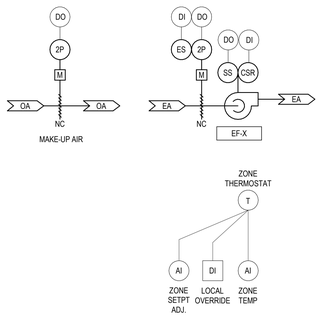
4 DUCTLESS AIR CONDITIONING UNIT SYSTEM DIAGRAM
SCALE: NTS



SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
   1. FAN OFF.
   2. DAMPERS CLOSED
B. SYSTEM START:
   1. THE EXHAUST FAN OPERATES ACCORDING TO THE OWNER'S OCCUPANCY SCHEDULE.
   2. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE.
   3. OPERATOR ENTERED COMMAND AT THE BMS.
A. SYSTEM OPERATION:
   1. DAMPERS OPEN.
   2. FANS START AFTER PROOF OF DAMPER OPENING.
A. SYSTEM STOP:
   1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES.
   2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.

2 SCHEDULED EXHAUST FAN DIAGRAM
SCALE: NTS



SEQUENCE OF OPERATIONS

A. SYSTEM OFF:
   1. FAN OFF.
   2. DAMPERS CLOSED
B. SYSTEM START:
   1. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE.
   2. OPERATOR ENTERED COMMAND AT THE BMS.
   3. SPACE THERMOSTAT.
C. SYSTEM OPERATION:
   1. DAMPERS OPEN.
   2. FANS START AFTER PROOF OF DAMPER OPENING.
   3. SPACE THERMOSTAT SHALL ENERGIZE THE EXHAUST FAN ON A RISE IN TEMPERATURE ABOVE 80°F.
D. SYSTEM STOP:
   1. OPERATOR ENTERED COMMAND AT THE BMS.
   2. IF ROOM TEMPERATURE IS BELOW SETPOINT REVERT TO SYSTEM OFF STATUS.

1 TEMPERATURE CONTROLLED EXHAUST FAN DIAGRAM
SCALE: NTS

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
project manager
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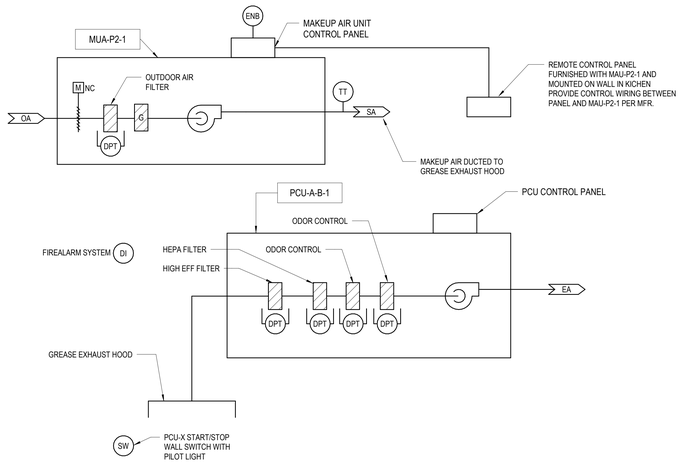
MECHANICAL CONTROL DIAGRAM

M5.10



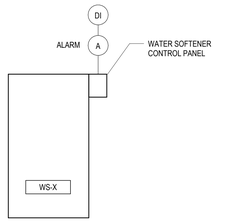
SEQUENCE OF OPERATION FOR KITCHEN MAKEUP AIR UNIT AND GREASE HOOD EXHAUST FAN

A. THE SYSTEM CONSISTS OF A 100% OUTSIDE AIR MAKEUP AIR UNIT (MAU-P2-1) WITH CONSTANT SPEED SUPPLY FAN, GAS FIRED HEATING SECTION AND FACTORY PACKAGED CONTROLS, AND A CONSTANT SPEED GREASE HOOD EXHAUST FAN.

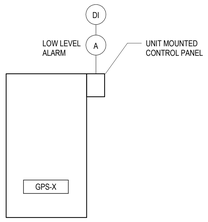
B. DDC CONTROLS PERFORM THE FOLLOWING FUNCTIONS:
1. PROVIDE A MANUAL WALL SWITCH (WITH PILOT LIGHT) WHICH SIGNALS THE DDC SYSTEM TO START AND STOP THE GREASE HOOD EXHAUST FAN (PCU-B-1).
2. WHENEVER THE GREASE HOOD EXHAUST FAN IS SIGNALLED TO START, SIGNAL THE MAKEUP AIR UNIT TO PERATE.
3. IF THE GREASE HOOD EXHAUST FAN IS LEFT ON AT THE EXPIRATION OF THE OCCUPIED MODE, PROVIDE A DDC STATUS ALARM.
4. UPON A SIGNAL FROM THE FIRE ALARM SYSTEM THAT THE FIRE ALARM SYSTEM IS IN ALARM, DDC SYSTEM SHALL OVERRIDE THE MANUAL WALL SWITCH AND START THE GREASE HOOD EXHAUST FAN (WHICH ALSO SIGNALS MAU-P2-1 TO BE ENABLED).

C. MAU-P2-1 PACKAGED CONTROLS PERFORM THE FOLLOWING FUNCTIONS:
1. ON AN ENABLE COMMAND FROM THE DDC SYSTEM, PACKAGED CONTROLS OPEN THE UNIT INLET DAMPER, STARTS THE SUPPLY FAN AND CONTROL THE GAS BURNER TO MAINTAIN THE UNIT DISCHARGE TEMPERATURE.
2. DISCHARGE AIR TEMPERATURE SETPOINT WILL BE RESET BY A SIGNAL FROM THE CONTROLLER PROVIDED WITH MAU-P2-1.
3. FIRE: UPON ACTIVATION OF THE HOOD FIRE SUPPRESSION SYSTEM, THE EXHAUST FAN WILL COME ON OR CONTINUE TO RUN, THE HOOD MAKEUP AIR UNIT WILL SHUTDOWN.

6 KITCHEN MAKEUP AIR SYSTEM DIAGRAM
SCALE: NTS



5 WATER SOFTNER CONTROL DIAGRAM
SCALE: NTS

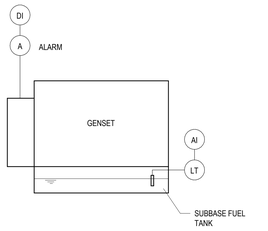


SEQUENCE OF OPERATIONS

A. UNIT TO RUN WHEN PRESSURE IN THE SYSTEM DECREASES TO THE MINIMUM ALLOWABLE FILL PRESSURE

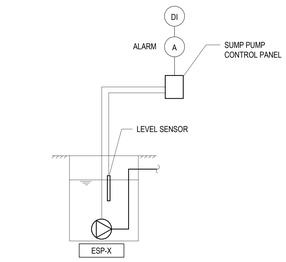
B. PUMP RUNS UNTIL PRESSURE SWITCH REACHES THE CUT-OUT PRESSURE.

C. IF THE GLYCOL SOLUTION IN THE RESERVOIR FALLS BELOW THE LOW LEVEL POINT IN THE RESERVOIR, THE LOW LEVEL SWITCH WILL TURN PUMP OFF, AN ALARM LIGHT WILL BE SIGNALED LOCALLY AND ALARM WILL BE SENT TO BMS SYSTEM AS WELL.



7 GENERATOR MONITORING
SCALE: NTS

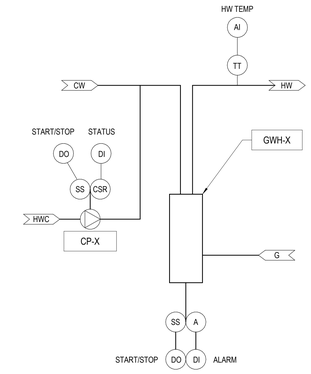
4 GLYCOL PUMP SUPPLY UNIT CONTROL DIAGRAM
SCALE: NTS



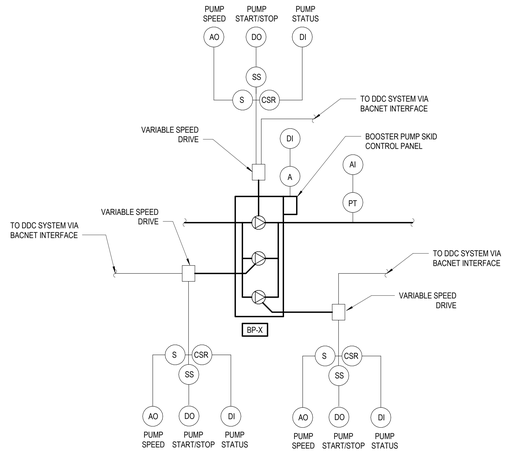
NOTES:

1) REFER TO PLUMBING DRAWINGS FOR EXACT LOCATION AND QUANTITY OF SUMP PUMP.

3 SUMP PUMP CONTROL DIAGRAM
SCALE: NTS



2 GAS FIRED DOMESTIC HOT WATER HEATER SYSTEM DIAGRAM
SCALE: NTS



SEQUENCE OF OPERATIONS

A. UNIT TO RUN BASED ON INTERNAL LOGIC AT THE CONTROL PANEL. PUMPS TO STAGE ON & OFF BASED ON DOMESTIC WATER DEMAND.

1 BOOSTER PUMP CONTROL DIAGRAM
SCALE: NTS

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Olson Kundig
159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP
Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
project manager
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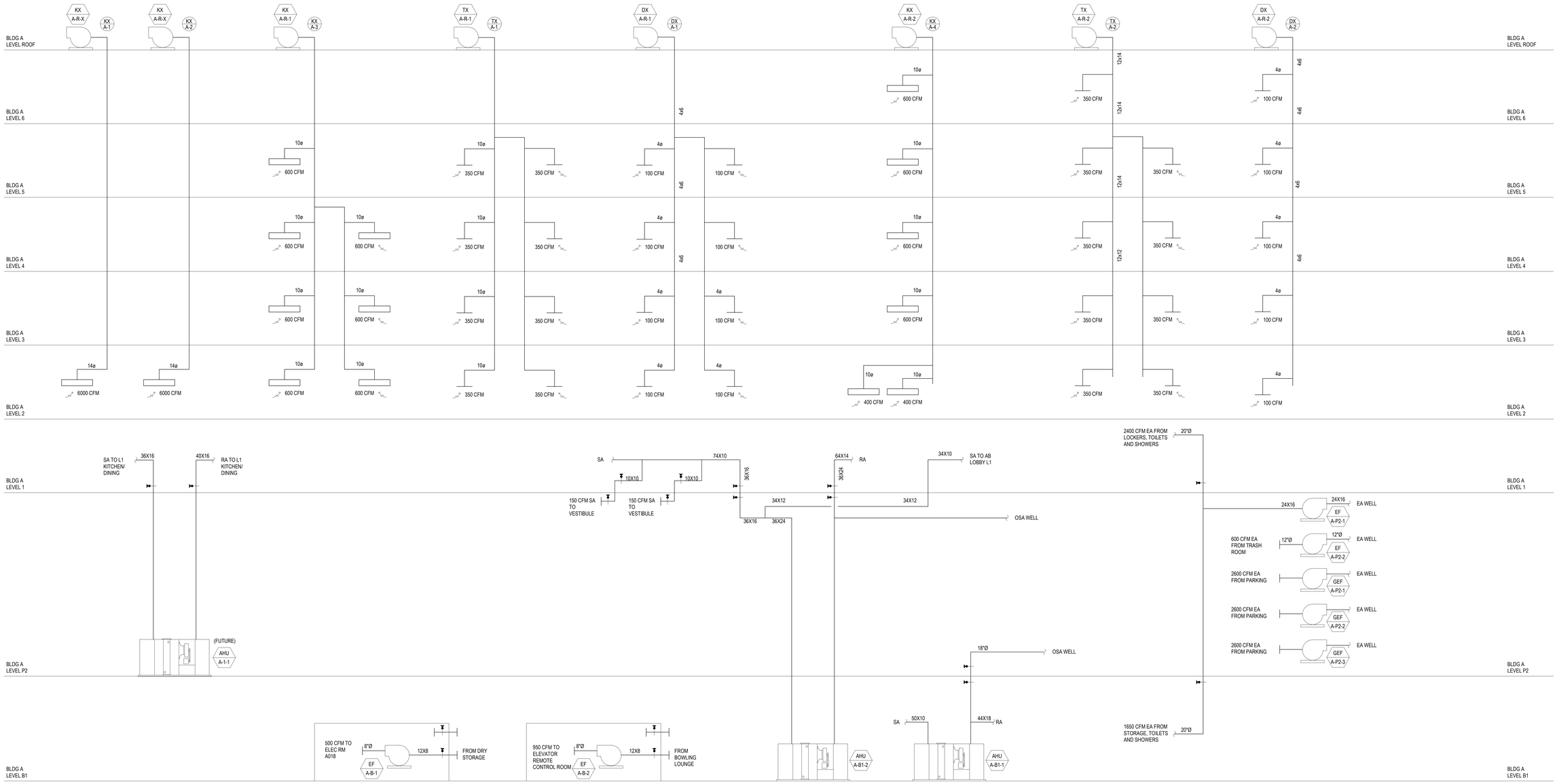
MECHANICAL CONTROL DIAGRAM

M5.11



1 MECHANICAL AIR RISER DIAGRAM - TOWER A

SCALE: 1/8" = 1'-0"

Olson Kundig

159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP

Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

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MECHANICAL AIR RISER DIAGRAM - TOWER A

M6.01A

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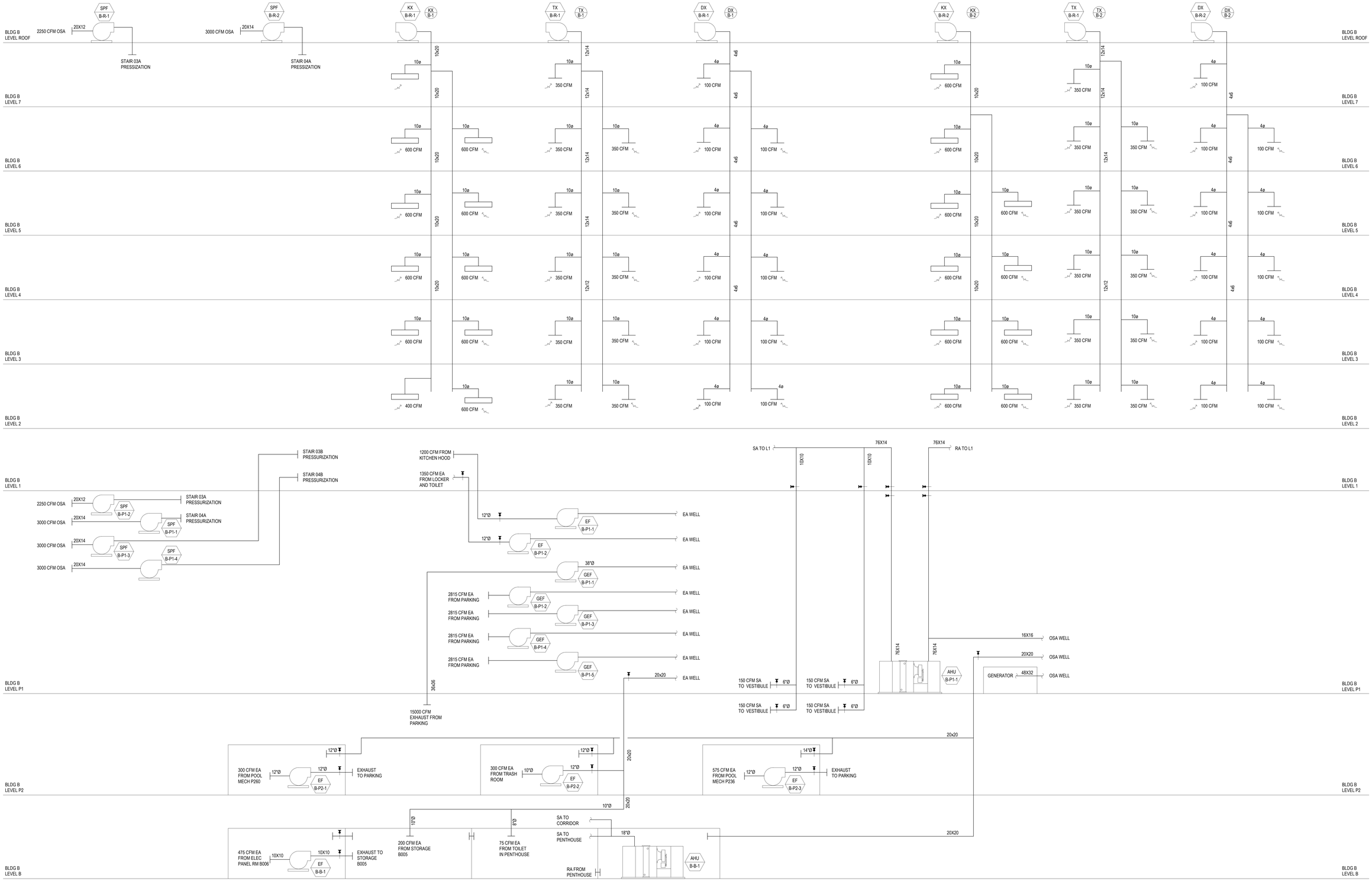

1 MECHANICAL AIR RISER DIAGRAM - TOWER B

SCALE: 1/8" = 1'-0"

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Olson Kundig

159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
+1 206 624 5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP

Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
O.
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

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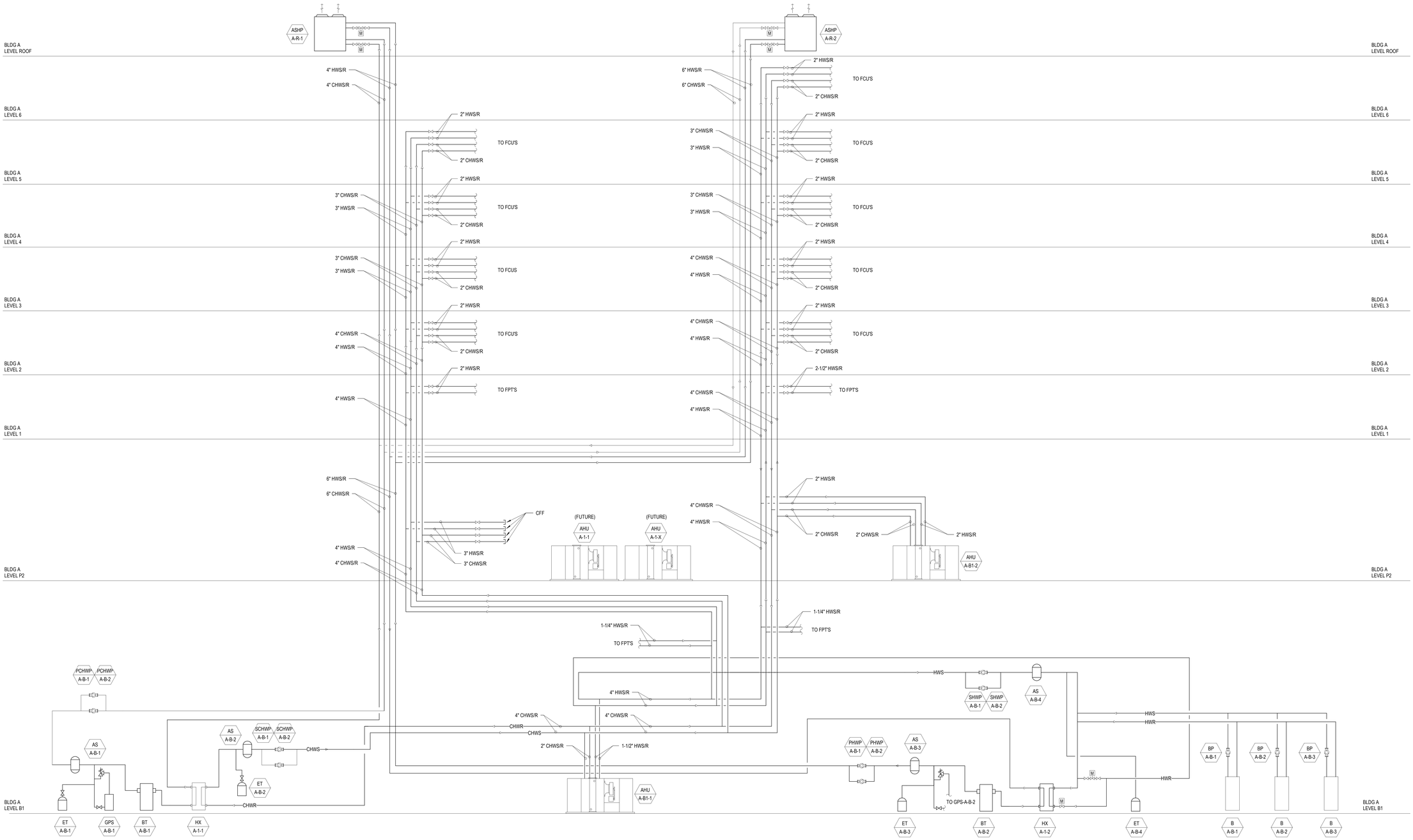
MECHANICAL AIR RISER DIAGRAM - TOWER B

M6.01B



1 MECHANICAL HYDRONIC RISER DIAGRAM - TOWER A

SCALE: NTS

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Olson Kundig

159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project:
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

ASPEN GROUP

Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

Vertical Transportation Consulatant
Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
1301 5th Ave, Suite 3200
Seattle, WA 98101

Lighting Designer
Oi
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
Studio Pacifica
2144 Westlake Ave N, Suite F
Seattle, WA 98109

MEP Engineer
WSP USA
1001 Fourth Ave., Suite 3100
Seattle, WA 98154

principal architect
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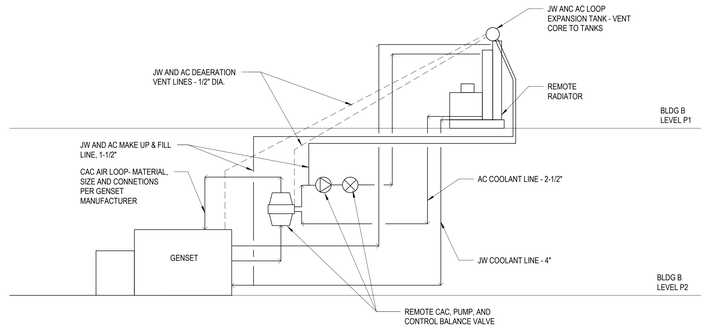
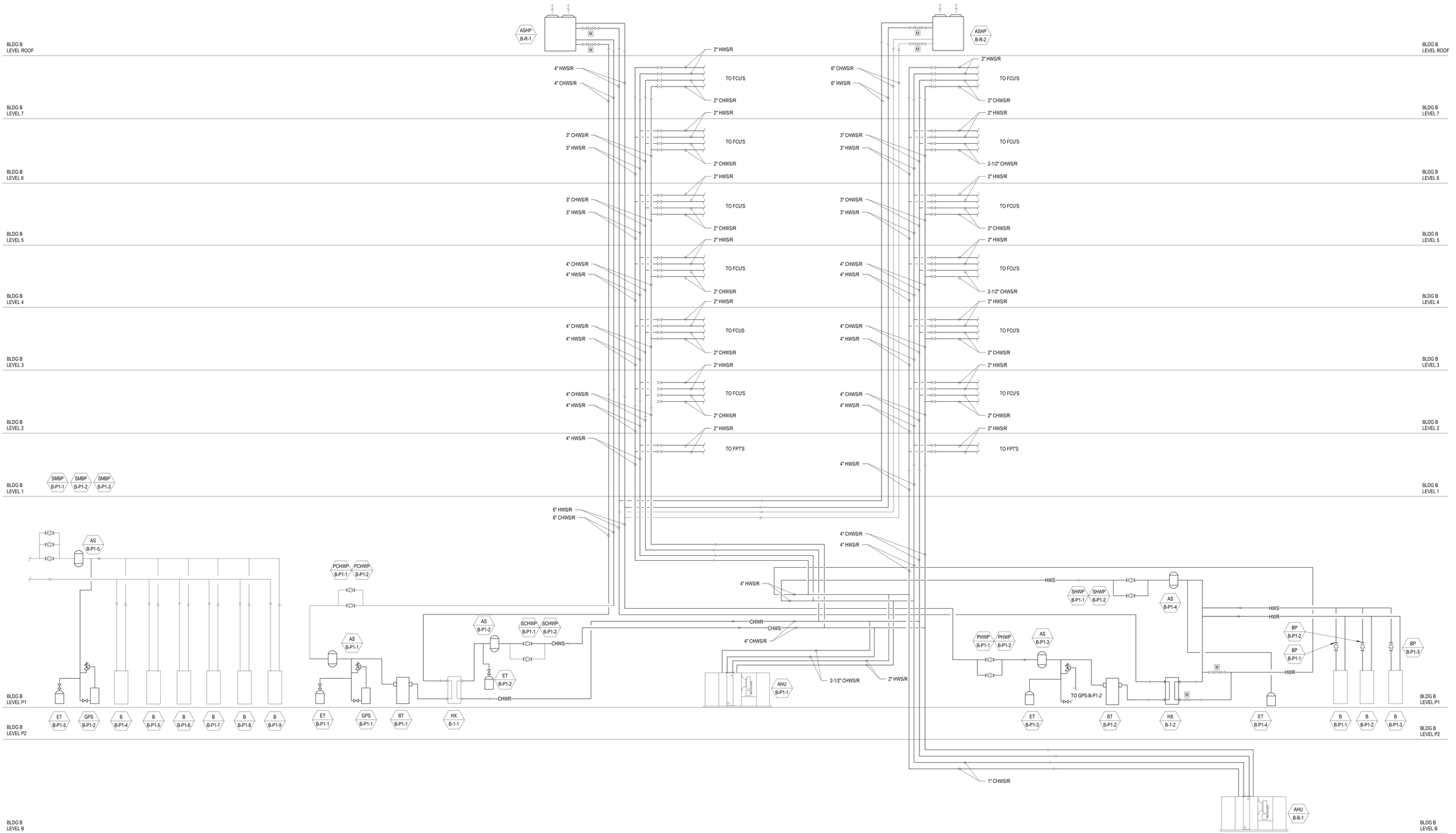
MECHANICAL HYDRONIC RISER DIAGRAM - TOWER A

M6.02A



2 MECHANICAL GENSET REMOTE RADIATOR RISER DIAGRAM - TOWER B

SCALE: NTS



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Olson Kundig

159 South Jackson St, Suite 600
Seattle, Washington 98104 USA
t: 206.624.5670 olsonkundig.com

project
SOMMET BLANC
9300 Marsac Ave (B2 East Parcel)
Park City, Utah 84060

Reserved for permit stamp

ASPEN GROUP

Aspen Group USA, LLC
PO Box 980022
Park City, Utah 84098

Pool Consultant
Cloward H20
2696 N University Ave, Suite 290
Provo, UT 84604

Landscape Architect
EPG Design
6949 South High Tech Drive, Suite 100
Midvale, Utah 84047

Specifications Writer
Friday Group
88 Mainelli Road
Middlebury, VT

Code Consultant
Holmes
600 1st Avenue, Suite 200A
Seattle, WA 98104

Fire Protection Engineer
Jensen Hughes
One Research Drive, Suite 305C
Westborough, MA 01581

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Lerch Bates
19515 North Creek Parkway, Suite 304
Bothell, WA 98011

Structural Engineer
Magnusson Klemencic Associates
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Seattle, WA 98101

Lighting Designer
O-
1319 SE MLK Blvd, Suite 210
Portland, Oregon 97219

Building Envelope Consultant
RDH
2101 N 34th St
Seattle, WA 98103

Accessibility Consultant
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Seattle, WA 98109

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MECHANICAL HYDRONIC RISER DIAGRAM - TOWER B

M6.02B