ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AD	ACCESS DOOR
AC	AIR CONDITIONING UNIT
ACCU	AIR COOLED CONDENSING UNIT
AFS	AIR FLOW SENSOR
AHU	AIR HANDLING UNIT
AM	AIR MEASURING DEVICE
AS	AIR SEPARATOR
ALUM	ALUMINUM
APPROX	APPROXIMATE
AAV	AUTOMATIC AIR VENT
ATC	AUTOMATIC TEMPERATURE CONTROL
BDD	BACK DRAFT DAMPER
BSMT	BASEMENT
B	BOILER
BT	BOTTOM REGISTER
BHP	BRAKE HORSE POWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BLDG	BUILDING
CUH	CABINET UNIT HEATER
CAP	CAPACITY
FIC	CARBON FILTER
CLG	CEILING
CD	CEILING DIFFUSER
CG	CEILING GRILLE
CR	CEILING REGISTER
℄	CENTER LINE
CF	CHEMICAL FEED UNIT
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CH	CHILLER
CO	CLEAN OUT
COL	COLUMN
CAF	COMPRESSED AIR FILTER
CAFM	COMPRESSED AIR FLOW METER
CHE	COMPRESSED AIR HEAT EXCHANGER
CAR	COMPRESSED AIR RECEIVER
COMP	COMPRESSOR
CONC	CONCRETE
COND	CONDENSATE
CU	CONDENSING UNIT
SC-25	CONDENSTATE FROM 25 PSIG STEAM
CONN	CONNECTION
CAV	CONSTANT AIR VOLUME
CV	CONSTANT VOLUME
CONT	CONTINUATION
CONTR	CONTRACTOR
CV	CONTROL VALVE
CVS	CONTROL VALVE STATION
CC	COOLING COIL
CT	COOLING TOWER
CTF	COOLING TOWER FILTER
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
° F	DEGREES FAHRENHEIT
DI	DEIONIZER
DAD	DESICCANT AIR DRYER
DET	DETAIL
DIAG	DIAGRAM
DIA	DIAMETER
DIFF	DIFFUSER
DX	DIRECT EXPANSION
DISCH	DISCHARGE
DWH	DOMESTIC WATER HEATER
DN	DOWN
DWG	DRAWING
DT	DRIP AND TRAP
DB	DRY BULB
DTPR	DUAL TEMPERATURE PIPE RISER
DTR	DUAL TEMPERATURE RETURN
DTS	DUAL TEMPERATURE SUPPLY
DC	DUST COLLECTOR
ELEC	ELECTRIC
EDH	ELECTRIC DUCT HEATER
EHC	ELECTRIC HEATING COIL
EC	ELECTRICAL CONTRACTOR
ELEV	ELEVATION
ENT	ENTERING
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULD TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
EQUIP	EQUIPMENT
EXH	EXHAUST
EA	EXHAUST AIR
EAV	EXHAUST AIR VALVE
EF	EXHAUST FAN
ER	EXHAUST REGISTER
E	EXISTING
EXIST	EXISTING
ETR	EXISTING TO REMAIN
EXP	EXPANSION
ET	EXPANSION TANK
EXT	EXTERNAL
ESP	EXTERNAL STATIC PRESSURE
FV	FACE VELOCITY
FCU	FAN COIL UNIT
FT	FEET
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
F	FILTER
FIN	FINISHED FLOOR
FTR	FINNED TUBE RADIATOR
FPI	FINS PER INCH
FD	FIRE DAMPER
FP	FIRE PROTECTION
FT	FLASH TANK
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FLEX	FLEXIBLE
FC	FLEXIBLE CONNECTION
FL	FLOOR
FD	FLOOR DRAIN
FM	FLOW METER
EG	FOR EXAMPLE
FLA	FULL LOAD AMPS
FH	FUME HOOD
GAL	GALLON
GPM	GALLONS PER MINUTE
GALV	GALVANIZED
GA	GAUGE
GCHWS	GLYCOL CHILLED WATER SUPPLY
GCHWR	GLYCOL CHILLED WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
GHWR	GLYCOL HOT WATER RETURN
GC	GENERAL CONTRACTOR
HD	HEAD
HE	HEAT EXCHANGER
HP	HEAT PUMP
HV	HEATING AND VENTILATING
HC	HEATING COIL

ABBREVIATIONS

HT	HEIGHT
HZ	HERTZ
HP	HORSE POWER
HWC	HOT WATER CONVECTOR
HWP	HOT WATER PUMP
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HR	HOUR
H	HUMIDIFIER
IN	INCHES
INCL	INCLUDING
ISP	INTERNAL STATIC PRESSURE
KW	KILOWATT
LVG	LEAVING
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LWT	LEAVING WATER TEMPERATURE
LWB	LEAVING WET BULB
L	LENGTH
LIN	LINEAR
LD	LINEAR DIFFUSER
LRA	LOCKED ROTOR AMPS
LV	LOW VELOCITY
MAV	MAKE UP AIR VALVE
MUF	MAKE-UP FAN
MFR	MANUFACTURER
MAX	MAXIMUM
MC	MECHANICAL CONTRACTOR
MER	MECHANICAL EQUIPMENT ROOM
MED	MEDIUM
MIN	MINIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MOCP	MINIMUM OVER CURRENT PROTECTION
MISC	MISCELLANEOUS
MB	MIXING BOX
MOT	MOTOR
MCC	MOTOR CONTROL CENTER
MHP	MOTOR HORSE POWER
MD	MOTORIZED DAMPER
MTD	MOUNTED
NEG	NEGATIVE
NPSH	NET POSITIVE SUCTION HEAD
NOM	NOMINAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO	NUMBER
OA	OUTDOOR AIR
LBS	POUNDS
LBS/HR	POUNDS PER HOUR
P	PUMP
QTY	QUANTITY
RAD	RADIATION
RLA	RATED LOAD AMPS
RFGR	REFRIGERANT
REG	REGISTER
RHC	REHEAT COIL
RH	RELATIVE HUMIDITY
RV	RELIEF VALVE
RE	RELOCATE
RA	RETURN AIR
RD	RETURN DIFFUSER
RF	RETURN FAN
RG	RETURN GRILLE
RPM	REVOLUTIONS PER MINUTE
R	RISE
RD	ROOF DRAIN
RM	ROOM
ROT	ROTATION
RD	RUPTURE DISC
SCH	SCHEDULE
SH	SENSIBLE HEAT
SAU	SOUND ATTENUATION UNIT
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
SP	STATIC PRESSURE
S-25	STEAM 25 PSIG
SA	SUPPLY AIR
SAV	SUPPLY AIR VALVE
SF	SUPPLY FAN
SR	SUPPLY REGISTER
TEMP	TEMPERATURE
TAU	TERMINAL AIR UNIT
T	THERMOSTAT
MBH	THOUSANDS OF BTU PER HOUR
TS	TIP SPEED
TEF	TOILET EXHAUST FAN
TR	TOP REGISTER
TDH	TOTAL DYNAMIC HEAD
TSP	TOTAL STATIC PRESSURE
TAD	TRANSFER AIR DUCT
TG	TRANSFER GRILLE
TO	TRANSFER OPENING
TV	TURNING VANES
TYP	TYPICAL
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
VB	VACUUM BREAKER
VA	VALVE
VAV	VARIABLE AIR VOLUME
VEL	VELOCITY
VLT	VOLT
VFD	VOLTAGE FREQUENCY DRIVE
V	VOLTS
WC	WATER COLUMN
WG	WATER GUAGE
WPD	WATER PRESSURE DROP
WP	WATER PROOF
WTD	WATER TEMPERATURE DROP
W	WATTS
WB	WET BULB
WMS	WIRE MESH SCREEN

DUCTWORK SYMBOLS

	EXISTING TO REMAIN (WORK SHOWN IN LIGHT)
	EXISTING TO BE DEMOLISHED
	NEW DUCT WORK (WORK SHOWN IN DARK)
	FLEXIBLE CONNECTION
	POINT OF CONNECT
	POINT OF DISCONNECT
	PIPET
(XXX)	INDICATES CFM OF SD
(XXX)	INDICATES CFM OF RD
	INDICATES DIRECTION OF FLOW
	TRANSFER AIR
T	THERMOSTAT
	FAN
M	MOTORIZED DAMPER
	VAV BOX WITH REHEAT COIL
	VAV BOX W/OUT REHEAT COIL
	BRANCH DUCT TAKE-OFF
	VANED ELBOW
	DUCT WITH VOLUME DAMPER
	ACCESS PANEL
	INSULATED DUCTWORK
	ACOUSTICAL DUCTWORK (DUCT SIZE SHOWN INCLUDES ALLOWANCE FOR LINING)
	FLEXIBLE CONNECTION
	DROP OR RISE IN DUCT SIZE
	TRANSITION SQUARE TO ROUND
	DUCT SUPPLY RISER PENETRATION
	SUPPLY DUCT DOWN
	DUCT RETURN RISER PENETRATION
	RETURN DUCT DOWN
	CEILING SUPPLY DIFFUSER
	CEILING RETURN DIFFUSER
	CEILING EXHAUST DIFFUSER
	SUPPLY DIFFUSER WITH HEPA FILTER
	LOW LEVEL RETURN WITH VOLUME DAMPER
	REHEAT COIL
	VAV BOX WITH REHEAT COIL
FD	FIRE DAMPER
SD	SMOKE DAMPER
FSD	FIRE & SMOKE DAMPER
DP	DIFFERENTIAL PRESSURE SENSOR
H	HUMIDIFIER
H	HUMIDISTAT
	DUST COLLECTOR OUTLET
DSD	DUCT SMOKE DETECTOR

NOTE:

ALL ABBREVIATIONS AND SYMBOLS MAY NOT APPEAR ON THE DRAWINGS FOR THIS PROJECT.

MECHANICAL PIPING SYMBOLS

	EXISITING PIPING SUPPLY (WORK SHOWN IN LIGHT)
	NEW PIPING SUPPLY (WORK SHOWN IN DARK)
	NEW PIPING RETURN
	EXISTING PIPING TO BE REMOVED
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
RL	REFRIGERANT LIQUID LINE
RS	REFRIGERANT SUCTION LINE
	PIPE DROPPING DOWN
	PIPE RISING UP
	PIPET
P	PIPE PITCHING DOWNWARD IN DIRECTION OF ARROW
	FLOW IN DIRECTION OF ARROW
	GATE VALVE
	OPEN STEM & YOKE VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
	CHECK VALVE
	BALL VALVE
	AUTOMATIC TWO-WAY VALVE
	AUTOMATIC THREE-WAY VALVE
	TWO WAY POSITION VALVE
	THREE WAY POSITION VALVE
	PLUG VALVE
	FLOW BALANCING VALVE
	SOLENOID VALVE
	RELIEF VALVE
	PRESSURE REDUCING VALVE
	UNION
	FLANGED CONNECTION
	FLEXIBLE CONNECTOR
	ANCHOR
	PIPE CAP
	INLINE PUMP
	FLOAT & THERMOSTATIC TRAP
	BASKET STARINER
	BUCKET TRAP
TT	TEMPERATURE TRANSMITTER
FS	FLOW SWITCH
	ECCENTRIC REDUCER
	VIBRATION ISOLATOR
	THERMOWELL
	CLEAN OUT
	THERMOSTATIC TRAP
	F&T TRAP
	STRAINER W/BLOWDOWN VALVE & HOSE BIBB
	THERMOMETER
	AIR VENT
	FLOW INDICATOR
P/T	PRESSURE/TEMPERATURE TEST WELL
	PRESSURE GAUGE COCK
	STEAM DRIP LEG AND TRAP ASSEMBLY
	PRESSURE GAUGE

DRAWING SYMBOLS

AC / X	EQUIPMENT TAG
X / X	SECTION NUMBER & DRAWING NUMBER
X	DETAIL NUMBER
x	SHEET NOTE NUMBER

REFERENCE CODES:

1. 2020 BUILDING CODE OF NEW YORK STATE
2. 2020 EXISTING BUILDING CODE OF NEW YORK STATE
3. 2020 FIRE CODE OF NEW YORK STATE
4. 2020 MECHANICAL CODE OF NEW YORK STATE
5. 2020 PLUMBING CODE OF NEW YORK STATE
6. 2020 FUEL GAS CODE OF NEW YORK STATE
7. NATIONAL ELECTRICAL CODE 2017 (NFPA 70)
8. 2020 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE

GENERAL NOTES:

1. THE INTENT OF THE CONTRACT DOCUMENTS IS TO ALLOW FOR THE PERFORMANCE OF THE WORK. EVERY ITEM NECESSARILY REQUIRED MAY NOT BE SPECIFICALLY MENTIONED OR SHOWN. UNLESS EXPRESSLY STATED, ALL SYSTEMS AND EQUIPMENT SHALL BE COMPLETED AND APPROPRIATELY OPERABLE. FURNISH AND INSTALL ALL SPECIFIED AND APPROPRIATED ITEMS, AND ALL INCIDENTAL, ACCESSORY, AND OTHER ITEMS NOT SPECIFIED BUT REQUIRED FOR A COMPLETE AND FINISHED ASSEMBLY.
2. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING CONTRACT DOCUMENTS, FIELD CONDITIONS, AND DIMENSIONS FOR ACCURACY AND CONFIRMING THAT WORK IS BUILDABLE AS SHOWN BEFORE PROCEEDING WITH CONSTRUCTION. IF THERE ARE ANY QUESTIONS REGARDING THESE OR OTHER COORDINATION ISSUES, THE CONTRACTOR SHALL SUBMIT THEM, IN WRITING, TO THE ENGINEER AND IS RESPONSIBLE FOR OBTAINING A WRITTEN CLARIFICATION FROM THE ENGINEER BEFORE PROCEEDING WITH WORK IN QUESTION, OR RELATED WORK.
3. EXECUTE WORK IN ACCORDANCE WITH ANY AND ALL APPLICABLE LOCAL, STATE, FEDERAL CODES, MANUFACTURER'S RECOMMENDATIONS, TRADE AND REFERENCE STANDARDS INCLUDING BUT NOT LIMITED TO: IBC, SEISMIC CODES, NEC, NFPA, ASME, IMC, LATEST ENFORCED EDITIONS.
4. THERE SHALL BE NO SUBSTITUTION OF MATERIALS WHERE A MANUFACTURER IS SPECIFIED, WHERE THE TERM "OR EQUAL" IS USED, THE ENGINEER ALONE SHALL DETERMINE EQUALITY BASED UPON INFORMATION SUBMITTED BY THE CONTRACTOR. CONTRACTOR IS RESPOSIBLE FOR ASSOCIATED MECHANICAL, ELECTRICAL AND/OR STRUCTURAL CHANGES, ADDITIONS AND/OR ALTERNATIONS IN DESIGN DUE TO SUBMITTED ALTERNATE MANUFACTURER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISTRIBUTION OF DRAWINGS TO ALL TRADES UNDER HIS JURISDICTION.
6. DO NOT PROCEED WITH ANY WORK REQUIRING ADDITIONAL COMPENSATION BEYOND THE CONTRACT AMOUNT WITHOUT WRITTEN AUTHORIZATION FROM THE OWNER. FAILURE TO OBTAIN AUTHORIZATION SHALL INVALIDATE ANY CLAIM FOR EXTRA COMPENSATION.
7. ALL INSTALLED PLUMBING, MECHANICAL, AND ELECTRICAL EQUIPMENT SHALL OPERATE QUIETLY AND FREE OF VIBRATION.
8. ALL MATERIALS SHALL BE NEW, UNUSED, AND OF THE HIGHEST QUALITY IN EVERY RESPECT UNLESS OTHERWISE NOTED. MANUFACTURED MATERIALS AND EQUIPMENT SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS, U.O.N.
9. THE CONTRACTOR AND SUBCONTRACTORS SHALL PURCHASE AND MAINTAIN CERTIFICATIONS OF INSURANCE WITH RESPECT TO WORKERS COMPENSATION, PUBLIC LIABILITY AND PROPERTY DAMAGE FOR THE LIMITS AS REQUIRED BY LAW. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS IN CONNECTION WITH THE WORK.
10. VERIFY IN THE FIELD, THAT NO CONFLICTS EXIST WHICH WOULD PROHIBIT THE LOCATION OF ANY AND ALL MECHANICAL, TELEPHONE, ELECTRICAL, LIGHTING, PLUMBING, AND SPRINKLER EQUIPMENT (TO INCLUDE ALL REQUIRED PIPING, DUCTWORK, AND CONDUIT) AND THAT ALL REQUIRED CLEARANCES FOR INSTALLATION AND MAINTENANCE OF ABOVE EQUIPMENT ARE PROVIDED.
11. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH ELECTRICAL INSTALLATION TO PREVENT CONFLICT WITH CLEARANCES AND MAINTAIN SPACE REQUIREMENTS OF ELECTRICAL EQUIPMENT. MECHANICAL EQUIPMENT, DUCT WORK, PIPING OR SUPPORTS FOR MECHANICAL EQUIPMENT SHALL NOT BE INSTALLED IN THE DEDICATED ELECTRICAL SPACE ABOVE ELECTRICAL EQUIPMENT, INCLUDING SWITCHBOARDS, PANEL BOARDS, TRANSFORMERS AND CONTROL PANELS. DEDICATED ELECTRICAL SPACE IS THE SPACE DIRECTLY ABOVE THE ELECTRICAL EQUIPMENT EQUAL IN WIDTH AND DEPTH OF THE ELECTRICAL EQUIPMENT AND FROM THE TOP OF THE ELECTRICAL EQUIPMENT TO THE STRUCTURAL DECK OF FLOOR ABOVE. SIMILARLY, MECHANICAL EQUIPMENT, DUCTWORK, PIPING OR SUPPORTS FOR MECHANICAL EQUIPMENT SHALL NOT BE INSTALLED IN THE DEDICATED WORKING SPACE DIRECTLY IN FRONT OF THE ELECTRICAL EQUIPMENT, MINIMUM 30" WIDE OR EQUAL IN WIDTH OF THE ELECTRICAL EQUIPMENT, 3'-0" DEEP AND FROM FLOOR TO THE STRUCTURAL DECK OF FLOOR ABOVE OR THE CEILING.
12. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL ARRANGEMENT OF EQUIPMENT, DUCTS, CONDUITS, PIPING AND FIXTURES. LOCATIONS OF ALL ITEMS SHOWN IN THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. DO NOT SCALE DRAWINGS. CONTRACTOR IS RESPONSIBLE TO SUBMIT HIS/HER SHOP DRAWINGS AFTER COORDINATION WITH OTHER TRADES AND VERIFYING FIELD CONDITIONS. THE CONTRACTOR MAY OBTAIN THE CAD FILES FOR THE FLOOR PLANS AND REFLECTED CEILING PLANS FROM THE ARCHITECT. HE/SHE MUST GENERATE HIS/HER OWN SHOP DRAWINGS ON CAD FOR M-E-P-FP TRADES BASED ON THE FIELD CONDITIONS AND /OR COORDINATION WITH OTHER TRADES. EQUIPMENT LOCATIONS, ROUTING OF DUCTWORK, PIPING AND ELECTRICAL WIRES, CONDUITS AND CABLES, ETC. SHALL SECURE THE BEST CONDITIONS AND RESULTS AND SHALL BE DETERMINED BY THE CONTRACTOR AT THE PROJECT. SHOP DRAWINGS SHALL HAVE THE APPROVAL OF THE ARCHITECT/ENGINEER BEFORE PROCUREMENT AND INSTALLATION OF ANY ITEM.

CONSTRUCTION NOTES:

1. THROUGHOUT THE DURATION OF THE PROJECT REFRAIN FROM ACTIONS THAT COULD LEAD TO THE FILING OF CLAIMS OF LIEN BY SUBCONTRACTORS, SUPPLIERS OF MATERIALS, LABOR, SERVICE, EQUIPMENT, OR ANY OTHER INDIVIDUAL OR COMPANY SO ENTITLED UNDER GOVERNING LAWS AND REGULATIONS UNLESS REASONABLE AND JUSTIFIABLE CAUSE CAN BE SHOWN. APPROVAL FOR PAYMENT SHALL BE CONTINGENT UPON THE CONTRACTOR'S OBTAINING AND FURNISHING TO THE OWNER SIGNED RELEASES FROM SUCH INDIVIDUALS OR COMPANIES.
2. UPON NOTIFICATION OF COMPLETION OF THE WORK AND DELIVERY OF THE CONTRACTOR'S PUNCH-LIST, THE ENGINEER SHALL PREPARE A PUNCH- LIST OF CORRECTIONS, UNSATISFACTORY AND/OR INCOMPLETE WORK, FINAL PAYMENT WILL BE CONTINGENT UPON THE COMPLETION OF THESE ITEMS UNDER THE TERMS OF THE OWNER/CONTRACTOR AGREEMENT.
3. COORDINATE ALL WORK WITH THE BUILDING MANAGER TO AVOID CONFLICT AND INTERFERENCE WITH NORMAL BUILDING OPERATIONS, COMPLYING WITH THE BUILDING'S REGULATIONS REGARDING SCHEDULING AND USE OF ELEVATORS AND LOADING DOCKS FOR DELIVERIES, HANDLING OF MATERIALS, EQUIPMENT, AND DEBRIS.
4. PROVIDE PROTECTION TO ALL EXISTING FINISHES IN ALL SPACES TO BE MAINTAINED WITHIN OR ADJACENT TO THE SCOPE OF WORK AND THE TENANT'S SPACE. THE CONTRACTOR SHALL PATCH AND REPAIR ANY DAMAGE CAUSED BY HIM OR HIS SUBCONTRACTORS. REFINISH TO MATCH EXISTING ADJACENT FINISH, OR AS NOTED HEREIN.
5. PROVIDE STRICT CONTROL OF JOB CLEANING AND PREVENT DUST AND DEBRIS FROM EMANATING FROM CONSTRUCTION AREA.
6. CONTRACTOR SHALL THOROUGHLY EXAMINE THE PREMISES AND SHALL BASE HIS BID ON THE EXISTING CONDITIONS, NOT WITHSTANDING ANY INFORMATION SHOWN OR NOT INDICATED ON THE CONTRACT DOCUMENTS.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR HIS WORK WITH ITS COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF SAME WHICH MAY BE DAMAGED, LOST OR STOLEN, WITHOUT ADDITIONAL COSTS TO THE OWNER.
8. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE BY THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.
9. ALL ELECTRICAL CONTROL WORK (MOUNTING OF DEVICES) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
10. ALL RIGGING OF EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
11. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING ROOF DURING CONSTRUCTION.
12. ANY ROAD BLOCKING REQUIRED SHALL BE COORDINATED BY THE CONTRACTOR. ALL FEES RELATED TO THIS EFFORT SHALL BE THE RESPONSIBILITY OF CONTRACTOR.
13. ALL ROOF PATCHING AND SEALING WALL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
14. UPON COMPLETION OF INSTALLATION, PERFORM TEST OF ALL HVAC EQUIPMENT AND OPERATION IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.
15. THE CONTRACTOR SHALL HAVE A FOREMAN ON SITE DURING ALL ASPECTS OF THE WORK.
16. CONTRACTOR AND SUB-CONTRACTOR SHALL FOLLOW RULES AND REGULATIONS AS LAID DOWN BY THE OWNER.

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SIGNATURE

MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
ABBREVIATIONS, SYMBOLS & NOTES

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-001

KeRi Engineering Project No.: 20181

AIR HANDLING UNIT SCHEDULE

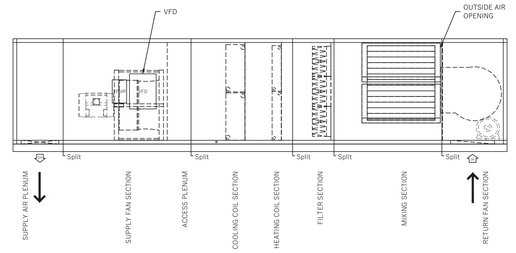
UNIT NO.	LOCATION	AREA SERVING	SUPPLY AIR CFM	OUTDOOR AIR CFM		SUPPLY FAN DATA															RETURN FAN DATA												CHILLED WATER PERFORMANCE													HOT WATER PERFORMANCE											
						SP. (IN W.C.)							MOTOR									SP. (IN W.C.)						MOTOR						AIR DATA					WATER DATA					COIL DATA					AIR DATA				WATER DATA					COIL DATA			
																																EAT		LAT																							
				MAX.	MIN.	TSP	ESP	FAN RPM	TYPE	CLASS	MAX. OUTLET VEL. FPM	SPEED	QTY.	BHP	MHP	RPM	VOLT	PH	HZ	RETURN AIR CFM	TSP	ESP	FAN RPM	TYPE	CLASS	MAX. OUTLET RPM	SPEED	QTY.	BHP	MHP	RPM	VOLT	PH	HZ	FLA	DB (° F)	WB (° F)	DB (° F)	WB (° F)	MAX. P.D. (IN.W.G.)	TOTAL GPM	EWT (° F)	LWT (° F)	MAX. P.D. (FT.)	FLUID TYPE	MAX. FACE VEL. (FPM)	MIN. ROWS DEEP	MAX. FIN PER INCH	TOTAL CAP. (MBH)	SEN. CAP. (MBH)	EAT DB (° F)	LAT DB (° F)	MAX. P.D. (IN.W.G.)	TOTAL GPM	ENT. TEMP. (° F)	LVG. TEMP. (° F)	MAX. P.D. (FT.)	FLUID TYPE	MAX. FACE VEL. (FPM)	MIN. ROWS DEEP	FIN PER INCH	TOTAL CAP. (MBH)
AHU-1	ROOF	OFFICES	21,500	21,500	3,500	4.46	1.50	1178	SWSI	II	-	1176	1	20.31	25	1200	460	3	60	21,500	1.57	1.00	1071	DWDI	S	-	1071	1	11.2	15.0	188	460	3	60	17.7	79.5	63.6	50.0	49.9	0.94	145.2	40.0	52.1	13.1	35% P.G.	500	10	10	820	683	51.8	73.5	0.03	55.2	160.0	140.0	3.2	35% P.G.	500	1	8	521
AHU-2	ROOF	LOCKER ROOM	6,500	6,500	1,900	6.25	1.50	3489	SWSI	III	-	3489	1	10.35	15	3600	460	3	60	4,600	1.44	1.00	1408	DWDI	S	-	1408	1	2.2	3.0	1800	460	3	60	4.3	73.5	61.5	47.1	47.1	0.69	51.8	40.0	50.0	24.0	35% P.G.	500	10	12	238	178	51.0	70.5	0.07	15.0	160.0	140.0	0.8	35% P.G.	500	1	8	142
AHU-3	ROOF	WAREHOUSE FUTURE PROD.	38,500	38,500	3,850	8.05	3.00	2199	SWSI	II	-	2199	4	20.77	25	1800	460	3	60	38,500	1.71	1.50	1065	SWSI	II	-	1065	1	21.2	30.0	1200	460	3	60	35.9	75.2	62.4	51.5	51.2	0.80	214.4	40.0	52.0	13.9	35% P.G.	500	8	9	1203	988	64	85.8	0.04	97.5	160.0	140.0	5.3	35% P.G.	500	1	9	920
AHU-4	ROOF	LAB AREA	18,500	18,500	9,750	6.31	3.50	1152	SWSI	II	-	1152	1	24.07	30	1200	460	3	60	8,750	1.04	0.50	653	SWSI	S	-	653	1	2.0	3.0	1800	460	3	60	4.3	83.4	68.4	49.5	49.4	0.83	182.5	40.0	51.9	33.5	35% P.G.	500	10	8	1019	673	31.0	70.0	0.05	78.1	160.0	140.0	5.9	35% P.G.	500	1	10	738

AIR HANDLING UNIT SCHEDULE (CONT.)

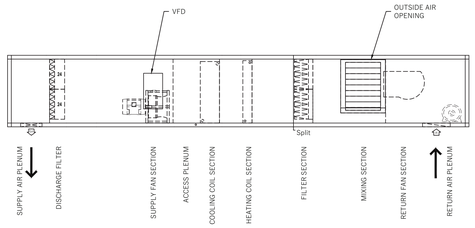
UNIT NO.	FACE AREA S.F.	MAX FACE VELOCITY (FPM)	FILTER DATA									ELECTRICAL PERFORMANCE						BASIS OF DESIGN	MODEL	REMARKS
			PRE-FILTER			FINAL-FILTER			DISCHARGE-FILTER			S.P. LOSS		VOLT	PH	HZ.	FLA	MCA	MOCP			
			TYPE	ASHRAE EFF %	QTY & SIZE	TYPE	ASHRAE EFF %	QTY & SIZE	TYPE	ASHRAE EFF %	QTY & SIZE	INITIAL IN W.C.	FINAL IN W.C.									
AHU-1	4	500	MERV-8	30%	(12) 2" FLAT 24"x24"	MERV-13	89-90%	(12) 12" RIGID 24"x24"	-	-	-	0	2	460	3	60	52.3	65.4	90.0	JOHNSON CONTROLS	XTO-84x108	1,2,3,4,5,6,7,8,9
AHU-2	4/3.3	500	MERV-8	30%	(6) 2" FLAT 12"x24" & (2) 2" FLAT 24"x20"	MERV-14	90-95%	(6) 12" RIGID 12"x24" & (2) 12" RIGID 24"x20"	MERV-18	99.99%	(6) 11.5 HEPA 12"x24" & (2) 11.5 HEPA 24"x20"	0	3	460	3	60	26.4	33.1	45.0	JOHNSON CONTROLS	XTO-57x66	1,2,3,4,5,6,7,8,9
AHU-3	3.3/4	500	MERV-8	30%	(20) 2" FLAT 20"x24 & (5) 2" FLAT 24"x24"	MERV-14	90-95%	(20) 12" RIGID 20"x24" & (5) 12" RIGID 24"x24"	MERV-17	99.97%	(20) 11.5 HEPA 20"x24" & (5) 11.5 HEPA 24"x24"	0	3	460	3	60	164.2	205.3	225.0	JOHNSON CONTROLS	XTO-114x132	1,2,3,4,5,6,7,8,9
AHU-4	4	500	MERV-8	30%	(9) 2" FLAT 24"x24" (93) 2" FLAT 12"X24"	MERV-13	89-90%	(9) 12" RIGID 24"x24" (3) 12" RIGID 12"X24"	-	-	-	0	2	460	3	60	38.9	48.7	70.0	JOHNSON CONTROLS	XTO-84x96	1,2,3,4,5,6,7,8,9

REMARKS:

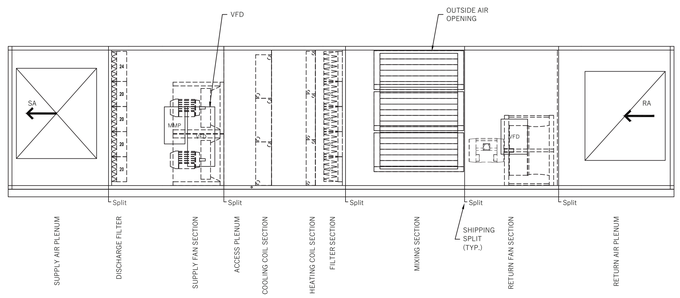
1. PROVIDE FACTORY STARTUP.
2. PROVIDE UNIT MOUNTED DISCONNECT IN NEMA 3R ENCLOSURE.
3. EACH SECTION OF THE UNIT SHALL HAVE A WEATHERPROOF GFIC 120 V CONVENIENCE OUTLET IN WEATHER PROOF ENCLOSURE AND VAPOR PROOF LED LIGHT FIXTURE.
4. ALL FANS SHALL BE INTERNALLY ISOLATED ON SEISMIC SPRING ISOLATORS.
5. COIL TUBE SHEETS AND CASING SHALL BE FORMED FROM STAINLESS STEEL. DRAIN PANS SHALL BE STAINLESS STEEL AND MANUFACTURER SHALL PROVIDE ONE VFD FOR SUPPLY FAN(S) AND ONE VFD FOR RETURN FAN(S).
6. LARGER UNITS WILL BE SHIPPED IN SECTIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR MECHANICAL AND ELECTRICAL ASSEMBLY AND CONNECTION IN THE FIELD. AIR HANDLING UNIT MANUFACTURER IS RESPONSIBLE FOR INSTALLATION SUPERVISION ON ALL UNITS SHIPPED IN SELECTIONS.
7. MANUFACTURER SHALL PROVIDE "DOGHOUSE" WEATHERPROOF COVER FOR CHILLED WATER AND HOT WATER COIL CONNECTIONS. THE "DOGHOUSE" FOR STACKED COILS SHALL BE A MINIMUM OF 30" DEEP.
8. PROVIDE 2 SPARE SETS OF FILTERS.
9. PROVIDE MANUFACTURER PROVIDED EQUIPMENT CURB.



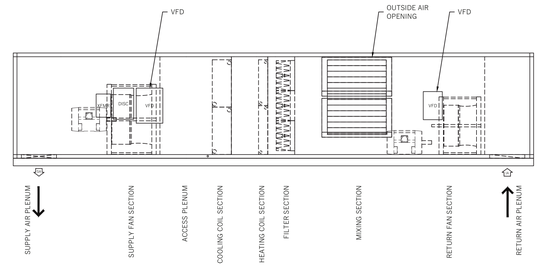
AHU-1 GENERAL ARRANGEMENT DIAGRAM



AHU-2 GENERAL ARRANGEMENT DIAGRAM



AHU-3 GENERAL ARRANGEMENT DIAGRAM



AHU-4 GENERAL ARRANGEMENT DIAGRAM

SPLIT AIR CONDITIONING UNIT SCHEDULE

UNIT TAG	GENERAL							INDOOR UNIT										CONDENSING UNIT													REF. PIPE LENGTH (BETWEEN THE INDOOR AND OUTDOOR UNIT)		MANUFACTURER	REMARKS
	CAPACITY		ENT.AIR		REFRIGERANT	REFRIGERANT POUNDS	TONNAGE	LOCATION	CFM	DRAIN CONNECTION	ELECTRICAL			MCA	WEIGHT (LBS.)	SOUND (DB)	MOUNTING STYLE	MODEL NO.	UNIT TAG.	LOCATION	ENT. AIR	SEER/ EER	COMPRESSOR		REFRIGENERNT LINES (IN)		ELECTRICAL			MCA	WEIGHT (LBS.)	MODEL NO.				
	TOTAL COOLING MBH	SENSIBLE COOLING MBH	DB ° F	WB ° F							VOLT	PH	Hz							DB ° F			RLA	LRA	SUCTION (RS)	LIQUID (RL)	VOLT	PH	Hz				MAX. HEIGHT DIFFERENCE	MAX. PIPE LENGTH		
AC-1	24	18	90	73	R410A	6 LBS, 10 OZ	2.0	UPS ROOM 227	700	5/8	208	1	60	1	46	39-42-45	WALL MOUNTED	PKA-A24KA6	ACCU-1	ROOF	95	17	12	14	5/8	3/8	208	3	60	18	163	PUY-A24NHA6	100	225	MITSUBISHI ELECTRIC	1,2,3,4,5,6,7,8,9
AC-2	24	18	90	73	R410A	6 LBS, 10 OZ	2.0	IT CLOSET 218A	700	5/8	208	1	60	1	46	39-42-45	WALL MOUNTED	PKA-A24KA6	ACCU-2	ROOF	95	17	12	14	5/8	3/8	208	3	60	18	163	PUY-A24NHA6	100	225	MITSUBISHI ELECTRIC	1,2,3,4,5,6,7,8,9
AC-3A	25.2	20.2	90	73	R410A	21 LBS, 9 OZ	2.5	STABILITY ROOM 214	918	5/8	208	1	60	0.63	46	43-49	WALL MOUNTED	PKFY-P30NKMU-E2.TH	ACCU-3	ROOF	95	14	-	-	7/8	3/8	460	3	60	15	605	PUHY-P96YNU-A	541	3280	MITSUBISHI ELECTRIC	1,2,3,4,5,7,8,9
AC-3B	25.2	20.2	90	73	R410A	21 LBS, 9 OZ	2.5	STABILITY ROOM 214	918	5/8	208	1	60	0.63	46	43-49	WALL MOUNTED	PKFY-P30NKMU-E2.TH																	MITSUBISHI ELECTRIC	1,2,3,4,5,7,8,9
AC-3C	25.2	20.2	90	73	R410A	21 LBS, 9 OZ	2.5	STABILITY ROOM 214	918	5/8	208	1	60	0.63	46	43-49	WALL MOUNTED	PKFY-P30NKMU-E2.TH																	MITSUBISHI ELECTRIC	1,2,3,4,5,7,8,9
AC-3D	25.2	20.2	90	73	R410A	21 LBS, 9 OZ	2.5	STABILITY ROOM 214	918	5/8	208	1	60	0.63	46	43-49	WALL MOUNTED	PKFY-P30NKMU-E2.TH																	MITSUBISHI ELECTRIC	1,2,3,4,5,7,8,9
AC-4	24	18	90	73	R410A	6 LBS, 10 OZ	2.0	IT CLOSET 248	700	5/8	208	1	60	1	46	39-42-45	WALL MOUNTED	PKA-A24KA6	ACCU-4	ROOF	95	17	12	14	5/8	3/8	208	3	60	18	163	PUY-A24NHA6	100	225	MITSUBISHI ELECTRIC	1,2,3,4,5,6,7,8,9
AC-5	24	18	90	73	R410A	6 LBS, 10 OZ	2.0	IT CLOSET 1ST FL	700	5/8	208	1	60	1	46	39-42-45	WALL MOUNTED	PKA-A24KA6	ACCU-6	ROOF	95	17	12	14	5/8	3/8	208	3	60	18	163	PUY-A24NHA6	100	225	MITSUBISHI ELECTRIC	1,2,3,4,5,6,7,8,9

REMARKS:

1. INDOOR UNITS SHALL BE MOUNTED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
2. CONDENSATE DRAIN LINE FROM INDOOR UNITS SHALL BE PIPED BY CONTRACTOR AS SHOWN ON PLANS.
3. REFRIGERANT PIPING SHALL RUN FROM INDOOR UNITS TO OUTDOOR UNIT AS PER MANUFACTURER'S INSTRUCTION.
4. UNITS SHALL BE PROVIDED WITH DRAIN PAN SENSORS FOR UNIT SHUTDOWN, TWINNING KIT, WIRED REMOTE CONTROLLERS & WEATHER PROOF DISCONNECT SWITCHES FOR INSTALLATION BY ELECTRICAL CONTRACTOR.
5. PROVIDE CONDENSATE PUMPS FROM UNIT MANUFACTURER.
6. INDOOR UNITS TO BE POWERED FROM THE OUTDOOR UNITS.
7. PROVIDE LOW AMBIENT KIT.
8. PROVIDE MANUFACTURER RECOMMENDED CONDENSING UNIT ROOF SUPPORTS.
9. PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT AND BACNET INTERFACE.

UNIT HEATER SCHEDULE

UNIT NO.	LOC.	HEATING					FAN DATA					BASIS OF DESIGN	MODEL	REMARKS
		MBH	GPM	EWT	LWT	Δ (P)	CFM	HP	VOLTS	PHASE	HZ			
UH-1,2	219 USP WATER ROOM	15	1.92	180	160	-	400	0.04	115	1	60	REZNOR	WS	1,2,3,4,5,6

REMARKS:

1. PROVIDE HEAT EXCHANGER WITH STEEL TUBING WITH ALUMINUM FINS.
2. PROVIDE FAN/MOTOR ASSEMBLY FAN GUARD.
3. PROVIDE HANGING SUPPORT WITH SHAKE-PROOF SCREWS.
4. PROVIDE ADJUSTABLE LOUVER.
5. PROVIDE AIR FLOW INDUCTION OPTIMIZER.
6. PROVIDE THERMOSTAT WITH GUARD COVER.

HEAT PUMP UNIT SCHEDULE

UNIT NO.	GENERAL						INDOOR UNIT											CONDENSING UNIT													REF. PIPE LENGTH (BETWEEN THE INDOOR AND OUTDOOR UNIT)		BASIS OF DESIGN	REMARKS	SOUND (DB)
	CAPACITY			ENT.AIR							ELECTRICAL																									
	TOTAL COOLING MBH	SENSIBLE COOLING MBH	HEATING	DB ° F	WB ° F	REFRIGERANT	TONNAGE	LOCATION	CFM	DRAIN CONNECTION	VOLT	PH	Hz	MCA	WEIGHT (LBS.)	SOUND	MOUNTING STYLE	MODEL NO.	UNIT TAG.	LOCATION	ENT. AIR DB ° F	SEER/ EER	COMPRESSOR RLA	COMPRESSOR LRA	REFRIGERANT LINES (IN) SUCTION (RS)	REFRIGERANT LINES (IN) LIQUID (RL)	ELECTRICAL VOLT	ELECTRICAL PH	ELECTRICAL Hz	MCA	WEIGHT (LBS.)	MODEL NO.	MAX. HEIGHT DIFFERENCE	MAX. PIPE LENGTH			
HP-1	9	-	12	90	73	410A	0.75	GUARDHOUSE	230	1-1/4	208	1	60	0.25	31	31-28-25	CEILING	SLZ-KF09NA	ACCU-5	WALL	95	16/12	-	-	3/8	1/4	208	3	60	29.5	187	MXZ-2C20NAHZ2	82	164	MITSUBISHI	1,2,3,4,5,6,7,8	54
HP-2	12	-	14.5	90	73	410A	1	GUARDHOUSE	230	1-1/4	208	1	60	0.30	31	34-30-25	CEILING	SL-KF-12NA																				

REMARKS:

1. INDOOR UNITS SHALL BE MOUNTED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
2. CONDENSATE DRAIN LINE FROM INDOOR UNITS SHALL BE PIPED BY CONTRACTOR AS SHOWN ON PLANS.
3. REFRIGERANT PIPING SHALL RUN FROM INDOOR UNITS TO OUTDOOR UNIT AS PER MANUFACTURER'S INSTRUCTION.
4. UNITS SHALL BE PROVIDED WITH DRAIN PAN SENSORS FOR UNIT SHUTDOWN, TWINNING KIT, WIRED REMOTE CONTROLLERS & WEATHER PROOF DISCONNECT SWITCHES FOR INSTALLATION BY ELECTRICAL CONTRACTOR.
5. PROVIDE CONDENSATE PUMPS FROM UNIT MANUFACTURER WHERE REQUIRED FOR PROPER CONDENSATE DISPOSAL.
6. PROVIDE LOW AMBIENT KIT.
7. PROVIDE MANUFACTURER RECOMMENDED CONDENSING UNIT WALL SUPPORT BRACKET.
8. PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT AND ASSOCIATED CONTROLS.

HOT WATER CONVECTOR SCHEDULE

UNIT NO.	LOCATION	EWT (° F)	CAPACITY (BTU/LIN. FT.)	SIZE (LxHxW)	BASIS OF DESIGN	MODEL	REMARKS
HWC-1	STAIR #1	180	14,000	24x30x8.25	STERLING	SRG-A-8	1,2,3
HWC-2	STAIR #2	180	14,000	24x30x8.25	STERLING	SRG-A-8	1,2,3
HWC-3	STAIR #3	180	14,000	24x30x8.25	STERLING	SRG-A-8	1,2,3
HWC-4	STAIR #4	180	14,000	24x30x8.25	STERLING	SRG-A-8	1,2,3
HWC-5	102 VESTIBULE	180	5,000	24x30x8.25	STERLING	SRG-A-8	1,2,3
HWC-6	105 VESTIBULE	180	5,000	24x30x8.25	STERLING	SRG-A-8	1,2,3

REMARKS:

1. PROVIDE 16GA CABINET FRONT AND LINER
2. PROVIDE LOUVERED INLET
3. ARCHITECT TO SELECT FINISH COLOR

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Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL SCHEDULES - SHEET 1 OF 2

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-010

KeRi Engineering Project No.: 20181

VAV UNIT WITH HOT WATER REHEAT SCHEDULE

UNIT NO.	SERVING	CFM		INLET DIA. (IN.)	MFR'S MIN. SP REQ. AT DESIGN COOLING FLOW	ESP (IN. W.G.)	HOT WATER REHEAT COIL								SOUND DATA (NC)			ELECTRICAL PERFORMANCE			BASIS OF DESIGN	MODEL	REMARKS
		MAX.	MIN.				EAT (° F)	LAT (° F)	APD (IN. W.C.)	EWT (° F)	LWT (° F)	MAX. WPD (FT. W.C.)	GPM	MBH	MIN. SYSTEM ΔP (IN.)	DISCHARGE	RADIATED	V.	PH.	HZ.			
VAV-1-1	129 CORRIDOR	675	270	8	0.19	0.00	65	85	0.17	180	160	2	1.46	14.58	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-2	123 VESTIBULE, 123A TOILET	150	60	0611E	0.04	0.00	65	85	0.01	180	160	2	0.32	3.24	1	-	-	120	1	60	ENVIRO-TEC	CFR-WC	1,2,3
VAV-1-3	114 CAFETERIA 114A TRAINING ROOM	990	396	10	0.19	0.00	65	85	0.17	180	160	2	2.14	21.38	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-4	133 CONFERENCE ROOM # 1	290	116	6	0.10	0.00	65	85	.06	180	160	2	0.63	6.26	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-5	134 CONFERENCE ROOM # 2	600	240	8	0.15	0.00	65	85	0.14	180	160	2	1.30	12.96	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-6	119 OPEN OFFICE	760	304	10	0.12	0.00	65	85	0.11	180	160	2	1.64	16.42	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-7	116 CORRIDOR 117 & 118 OFFICE	300	120	6	0.10	0.00	65	85	0.06	180	160	2	0.65	6.48	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-8	122 RECEPTION	375	150	0811E	0.03	0.00	65	85	0.03	180	160	2	0.81	8.10	1	-	-	120	1	60	ENVIRO-TEC	CFR-WC	1,2,3
VAV-1-9	121 VESTIBULE	200	80	0611E	0.04	0.00	65	85	0.01	180	160	2	0.43	4.32	1	-	-	120	1	60	ENVIRO-TEC	CFR-WC	1,2,3
VAV-1-10	253 HUDDLE ROOM	500	200	8	0.11	0.00	65	85	0.10	180	160	2	1.08	10.80	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-11A	244 OPEN OFFICE	1200	480	12	0.15	0.00	65	85	0.14	180	160	2	2.59	25.92	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-11B	244 OPEN OFFICE	2400	960	16	0.20	0.00	65	85	0.17	180	160	2	5.18	51.84	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-12	249 OFFICE # 6	510	204	8	0.11	0.00	65	85	0.10	180	160	2	1.10	11.02	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-13	250 OFFICE # 7	550	220	8	0.13	0.00	65	85	0.12	180	160	2	1.19	11.88	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-14	CORRIDOR	225	90	6	0.07	0.00	65	85	0.04	180	160	2	0.49	4.86	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-15	243 EXEC. OFFICE 251 EXEC. TOILET	875	350	10	0.15	0.00	65	85	0.14	180	160	2	1.89	18.90	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-16	242 EXEC. BREAK AREA 252 TOILET	450	180	8	0.09	0.00	65	85	0.08	180	160	2	0.97	9.72	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-17	241 EXEC. CONFERENCE ROOM	960	384	10	0.18	0.00	65	85	0.16	180	160	2	2.07	20.74	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-18	237 CONFERENCE ROOM	420	168	8	0.09	0.00	65	85	0.08	180	160	2	0.91	9.07	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-19	238 BREAK AREA	230	92	6	0.07	0.00	65	85	0.04	180	160	2	0.50	4.97	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-20	234 OFFICE # 3 235 OFFICE # 4 236 OFFICE # 5	390	156	8	0.08	0.00	65	85	0.07	180	160	2	0.84	8.42	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-21	232 OFFICE # 1 233 OFFICE # 2	260	104	6	0.08	0.00	65	85	0.05	180	160	2	0.56	5.62	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
CAV-1-22	246 W. UNISEX TOILET 247 M. UNISEX TOILET	225	225	6	0.07	0.00	65	85	0.02	180	160	2	0.49	4.86	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-23A	230 STORAGE AREA	3930	1572	22	0.46	0.00	65	85	0.40	180	160	2	8.49	84.89	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3
VAV-1-23B	230 STORAGE AREA	3920	1568	22	0.46	0.00	65	85	0.40	180	160	2	8.47	84.67	1	-	-	120	1	60	ENVIRO-TEC	SDR-WC	1,2,3

REMARKS:

1. SEE MECHANICAL NEW WORK DRAWING FOR LOCATION AND AIR QUANTITIES OF EACH AIR DEVICE.
2. PROVIDE CONTROLS TRANSFORMER AS REQUIRED.
3. PROVIDE SUPPORT HANGERS TO SUSPEND THE UNIT FORM THE DECK/STEEL.

REHEAT COIL SCHEDULE

UNIT NO.	SERVING	DESIGN AIRFLOW (CFM)	HOT WATER REHEAT COIL								FACE VELOCITY (FPM)	DUCT SIZE	BASIS OF DESIGN	MODEL	REMARKS
			EAT (° F)	LAT (° F)	APD (IN WC)	EWT (° F)	LWT (° F)	WPD (FT WC)	GPM	MBH					
AHU-2															
RH-2-1	107 AIRLOCK 108 CORRIDOR	1135	65	85	0.26	180	160	1.70	2.46	24.63	851.25	16x12	NATIONWIDE COILS	HWS8S01A09-12X16-RH	1,2,3,4
RH-2-2	110 CORRIDOR	400	65	85	0.08	180	160	0.40	0.87	8.68	411.43	14x10	NATIONWIDE COILS	HWS8S01A07-10.5X14-RH	1,2,3,4
RH-2-3	109 M. LOCKER ROOM	1050	65	85	0.20	180	160	1.50	2.28	22.79	787.50	16x12	NATIONWIDE COILS	HWS8S01A08-12X16-RH	1,2,3,4
RH-2-4	128 M. TOILET	1600	65	85	0.34	180	160	0.80	3.47	34.72	914.29	18x14	NATIONWIDE COILS	HWS8S01B10-13.5X18-RH	1,2,3,4
RH-2-5	113 W. LOCKER 124 AIRLOCK	1125	65	85	0.18	180	160	1.30	2.44	24.41	843.75	16x12	NATIONWIDE COILS	HWS8S01A08-12X16-RH	1,2,3,4
RH-2-6	127 FIRST AID 132 STORAGE SUPP.	525	65	85	0.09	180	160	0.40	1.14	11.39	630.00	12x10	NATIONWIDE COILS	HWS8S01A07-10.5X14-RH	1,2,3,4
AHU-4															
RH-4-1	202 OFFICE 203 OFFICE	200	65	85	0.09	180	160	0	0.43	4.34	450.00	8x8	NATIONWIDE COILS	HWS8S01A08-7.5X8-RH	1,2,3,4
RH-4-2	204 QA SHIFT OFFICE	570	65	85	0.06	180	160	0.60	1.24	12.37	427.50	16x12	NATIONWIDE COILS	HWS8S01A06-12X16-RH	1,2,3,4
RH-4-3A	205 CORRIDOR	1300	65	85	0.27	180	160	0.50	2.82	28.21	866.67	18x12	NATIONWIDE COILS	HWS8S01B09-12X18-RH	1,2,3,4
RH-4-3B	205 CORRIDOR	1500	65	85	0.28	180	160	0.70	3.26	32.55	857.14	18x14	NATIONWIDE COILS	HWS8S01B09-13.5X18-RH	1,2,3,4
RH-4-4	206 R&D LAB	2450	65	85	0.36	180	160	0.90	5.32	53.17	900.00	28x14	NATIONWIDE COILS	HWS8S01S11-13.5X28-RH	1,2,3,4
RH-4-5	GLASS WASH, WEIGH RM, CHEM STOR, CHASE	550	65	85	0.14	180	160	0.50	1.19	11.94	660.00	12x10	NATIONWIDE COILS	HWS8S01A08-10.5X12-RH	1,2,3,4
RH-4-6	208 INSTRUMENT LAB	3400	65	85	0.43	180	160	0.60	7.38	73.78	1046.15	26x18	NATIONWIDE COILS	HWS8S01H11-18X26-RH	1,2,3,4
RH-4-7	211 WET LAB	5900	65	85	0.54	180	160	2.00	12.80	128.03	1180.00	36x20	NATIONWIDE COILS	HWS8S01H10-19.5X36-RH	1,2,3,4
RH-4-8	214 STABILITY ROOM	590	65	85	0.16	180	160	0.50	1.28	12.80	708.00	12x10	NATIONWIDE COILS	HWS8S01A08-10.5X12-RH	1,2,3,4
RH-4-9	216 MEN'S ROOM 217 WOMEN'S ROOM	700	65	85	0.16	180	160	0.80	1.52	15.19	720.00	14x10	NATIONWIDE COILS	HWS8S01A08-10.5X14-RH	1,2,3,4
RH-4-10	223 BREAK ROOM	350	65	85	0.06	180	160	0.20	0.76	7.60	420.00	12x10	NATIONWIDE COILS	HWS8S01A07-10.5X12-RH	1,2,3,4
RH-4-11	224 OFFICE SUPPLIES 225 HUDDLE ROOM	250	65	85	0.17	180	160	0.10	0.54	5.43	562.50	8x8	NATIONWIDE COILS	HWS8S01A10-7.5X8-RH	1,2,3,4
RH-4-12	226 CORRIDOR	410	65	85	0.07	180	160	0.30	0.89	8.90	492.00	12x10	NATIONWIDE COILS	HWS8S01A07-10.5X12-RH	1,2,3,4

REMARKS:

1. COILS TO BE AHRI STANDARD 410 RATED AND CERTIFIED.
2. COILS TO HAVE VENT AND DRAIN FITTINGS
3. PROVIDE BUILT IN AIRFLOW SENSOR
4. PROVIDE TRANSITION BEFORE AND AFTER THE COIL AS NEEDED.

EXHAUST FAN SCHEDULE

UNIT NO.	LOCATION	SERVING	AIRFLOW (CFM)	MIN. EXT. STATIC PRESS. (IN. W.G.)	FAN SPEED (RPM)	FAN TYPE	MOTOR DATA						WEIGHT (LB)	BASIS OF DESIGN	MODEL	REMARKS
							BHP	HP	RPM	VOLT	PH	Hz.				
EF-1	ROOF	M.LOCKER RM.,M. SHOWER, M. TOILET, W. LOCKER RM., W. SHOWER, W. TOILET, JAN. CL.	1,950	0.50	1571	DOWNBLAST	0.44	3/4	1725	277	1	60	58	GREENHECK	G-130-VG	1,11,12,13,18
EF-2	ROOF	114 CAFE., 123A VISIT. TOILET	275	0.50	1436	DOWNBLAST	0.04	1/10	1725	277	1	60	46	GREENHECK	G-080-VG	1,11,12,13,18
EF-3	ROOF	1ST FL OFFICE PRINTER	200	0.50	1618	DOWNBLAST	0.03	1/10	1725	277	1	60	39	GREENHECK	G-070-VG	1,11,12,13,18
EF-4	ROOF	242 EXEC. BREAK AREA, 261 EXEC. TOILET, 252 TOILET	350	0.25	1632	DOWNBLAST	0.06	1/10	1725	277	1	60	46	GREENHECK	G-080-VG	1,11,12,13,18
EF-5	ROOF	238 BREAK AREA	100	0.25	1634	DOWNBLAST	0.02	1/10	1725	277	1	60	39	GREENHECK	G-060-VG	1,11,12,13,18
EF-6	ROOF	246 TOILET, 247 TOILET	225	0.50	1683	DOWNBLAST	0.03	1/10	1725	277	1	60	39	GREENHECK	G-070-VG	1,11,12,13,18
EF-7	ROOF	2ND FL OFFICE PRINTER	200	0.50	1618	DOWNBLAST	0.03	1/10	1725	277	1	60	39	GREENHECK	G-070-VG	1,11,12,13,18
EF-8	ROOF	206 R&D LAB	1,300	1.50	2639	TUBULAR CENTRIFUGAL	1.53	2	1725	460	3	60	393	GREENHECK	VEKTOR-H-12	1,4,5,7,9,10,18,19
EF-9	ROOF	210 GLASS STORAGE	480	0.50	1718	UTILITY	0.02	1/4	1725	277	1	60	217	GREENHECK	USF-07	1,3,4,5,7,9,18
EF-10	ROOF	208 INSTRUMENT LAB	2,600	1.50	1943	TUBULAR CENTRIFUGAL	2.51	3	1725	460	3	60	620	GREENHECK	VEKTOR-H-16	1,4,5,7,9,10,18,19
EF-11	ROOF	209 CHEMICAL STORAGE	320	0.25	1027	UTILITY	0.05	1/4	1725	460	3	60	285	GREENHECK	USF-09	1,2,3,4,5,6,7,8,9,18
EF-12	ROOF	211 WET LABORATORY	2,200	1.50	2657	TUBULAR CENTRIFUGAL	2.58	3	1725	460	3	60	517	GREENHECK	VEKTOR-H-13	1,4,5,7,9,10,18,19
EF-13	ROOF	JAN. CLOS. M. TOILET, W. TOILET, BREAK ROOM	1,050	0.50	1110	DOWNBLAST	0.16	1/4	1150	277	1	60	65	GREENHECK	G-130-VG	1,11,12,13,18
EF-14	ROOF	2ND FL LAB PRINTER	200	0.25	1618	DOWNBLAST	0.03	1/10	1725	277	1	60	65	GREENHECK	G-070-VG	1,11,12,13,18
EF-15	CEILING	114B ELECTRICAL CLOSET	1,600	0.25	1294	INLINE	0.25	1	1725	460	3	60	99	GREENHECK	SQ-130-VG	1,14,15,16,17,18
EF-16	ROOF	227 UPS ROOM	100	0.25	1634	DOWNBLAST	0.02	1/10	1725	277	1	60	39	GREENHECK	G-060-VG	1,11,12,13,18
EF-17	CEILING	222 ELECTRICAL ROOM	2,200	0.25	870	INLINE	0.28	1/3	1725	460	3	60	179	GREENHECK	BSQ-160-3	1,14,15,16,18
EF-18	CEILING	228 ATS ROOM	1,100	0.25	1139	INLINE	0.17	1/4	1725	460	3	60	126	GREENHECK	BSQ-120-4	1,14,15,16,18
EF-19	ROOF	106A CYLINDER STORAGE	100	0.25	1034	UTILITY	0.04	1/4	1725	460	3	60	250	GREENHECK	USF-07	1,3,4,5,7,9,18
EF-20	ROOF	208 INSTRUMENT LAB	800	1.50	3187	TUBULAR CENTRIFUGAL	1.02	1-1/2	3600	460	3	60	388	GREENHECK	VEKTOR-H-9	1,4,5,7,9,10,17,18
EF-21	ROOF	211 WET LABORATORY	800	1.50	3187	TUBULAR CENTRIFUGAL	1.02	1-1/2	3600	460	3	60	388	GREENHECK	VEKTOR-H-9	1,4,5,7,9,10,17,18

REMARKS:

1. PROVIDE UNIT MOUNTED FACTORY DISCONNECT SWITCH.
2. AIRSTREAMS SHALL BE EXPLOSION PROOF. FAN SHALL BE OF AMCA A CONSTRUCTION.
3. PROVIDE HOUSED SPRING ISOLATORS.
4. PROVIDE ALUMINUM BELT GUARD FOR UTILITY SET MOTOR.
5. PROVIDE ALUMINUM DRAIN & PLUG, SHAFT SEAL, ACCESS DOOR, GRAPHITE LINER AND GROUNDING LUG.
6. DUCT UPSTREAM OF FAN SHALL BE WELDED. DUCT CONSTRUCTION SHALL CONFORM TO IBC TABLE 414.5.1.
7. PROVIDE 18" HEAVY LOAD ROOF CURB.
8. PROVIDE MINIMUM OF 10-FT STACK EXTENSION.
9. PROVIDE GRAVITY BACKFDRAFT DAMPER.
10. PROVIDE HIGH PLUME NOZZLE AND SEISMIC SUPPORT
11. PROVIDE ALUMINUM BACKDRAFT DAMPER AND BIRDSCREEN.
12. PROVIDE EC MOTOR AND SPEED CONTROLLER.
13. PROVIDE 18" ROOF CURB.
14. PROVIDE MOUNTING BRACKET AND SPRING HANGING ISOLATOR.
15. PROVIDE THERMOSTAT FOR FAN OPERATION.
16. PROVIDE INLET/OUTLET COMPANION FLANGE.
17. PROVIDE MOTOR STARTER WITH AUXILIARY CONTACTS.
18. PROVIDE BACNET INTERFACE
19. PROVIDE VFD WITH AUXILIARY CONTACTS.

SUPPLY/EXHAUST REGISTER SCHEDULE

CFM	BASIS OF DESIGN	MODEL	FACE TYPE	MOUNTING LOCATION	FACE SIZE (IN)	NOTE
100	CARNES	RTABH	LOUVERED	WALL	10x6	1,2,3
500	CARNES	RNWA	DRUM	DUCT	18x6	1,3,4
1025	CARNES	RNWA	DRUM	DUCT	25x10	1,3,4
1125	CARNES	RNWA	DRUM	DUCT	25x10	1,3,4

REMARKS:

1. NECK SIZE SHOWN ON DRAWING.
2. DOUBLE DEFLECTION, INDIVIDUALLY ADJUSTABLE BLADES. FRONT BLADES PARALLEL TO SHORT DIMENSION.
3. PROVIDE DAMPER.
4. PROVIDE REGISTER WITH HIGH THROW.

LINEAR CEILING DIFFUSER SCHEDULE

CFM	MODEL	NO OF SLOTS	BORDER	SLOT	LENGTH (FT)	BASIS OF DESIGN	REMARKS
100	CHDB	2	1-1/8"	3/4"	2	CARNES	1, 2, 3
200	CHDB	2	1-1/8"	3/4"	4	CARNES	1, 2, 3

REMARKS:

1. PROVIDE FACE OPERATED DAMPER FOR REMOTE DAMPER OPERATION.
2. PROVIDE DUCT CONNECTION PLENUM MODEL "LP" AS REQUIRED.
3. PROVIDE LIGHT SHIELD FOR ALL RETURN DIFFUSERS.

CEILING DIFFUSER SCHEDULE

CFM	MODEL	BASIS OF DESIGN	NECK (NK) SIZE	FACE
0-125	SFPA	CARNES	6"ø	12X12
126-150	SFPA	CARNES	6"ø	24X24
151-225	SFPA	CARNES	8"ø	24X24
226-425	SFPA	CARNES	10"ø	24X24
426-600	SFPA	CARNES	12"ø	24X24
601-725	SFPA	CARNES	14"ø	24X24

REMARKS:

1. 4-WAY THROW PATTERN.
2. WHITE ELECTRO-COATED ACRYLIC ENAMEL.
3. FRAME TYPE TO MATCH CEILING CONSTRUCTION.

CEILING RETURN GRILLE SCHEDULE

CFM	MODEL	BASIS OF DESIGN	NECK (NK) SIZE	PANEL OR FACE SIZE
100-250	SPHB	CARNES	8"ø	24X24
251-450	SPHB	CARNES	10"ø	24X24
451-650	SPHB	CARNES	12"ø	24X24
651-800	SPHB	CARNES	14"ø	24X24
801-1000	SPHB	CARNES	16"ø	24X24

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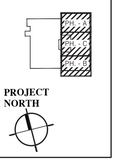
Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

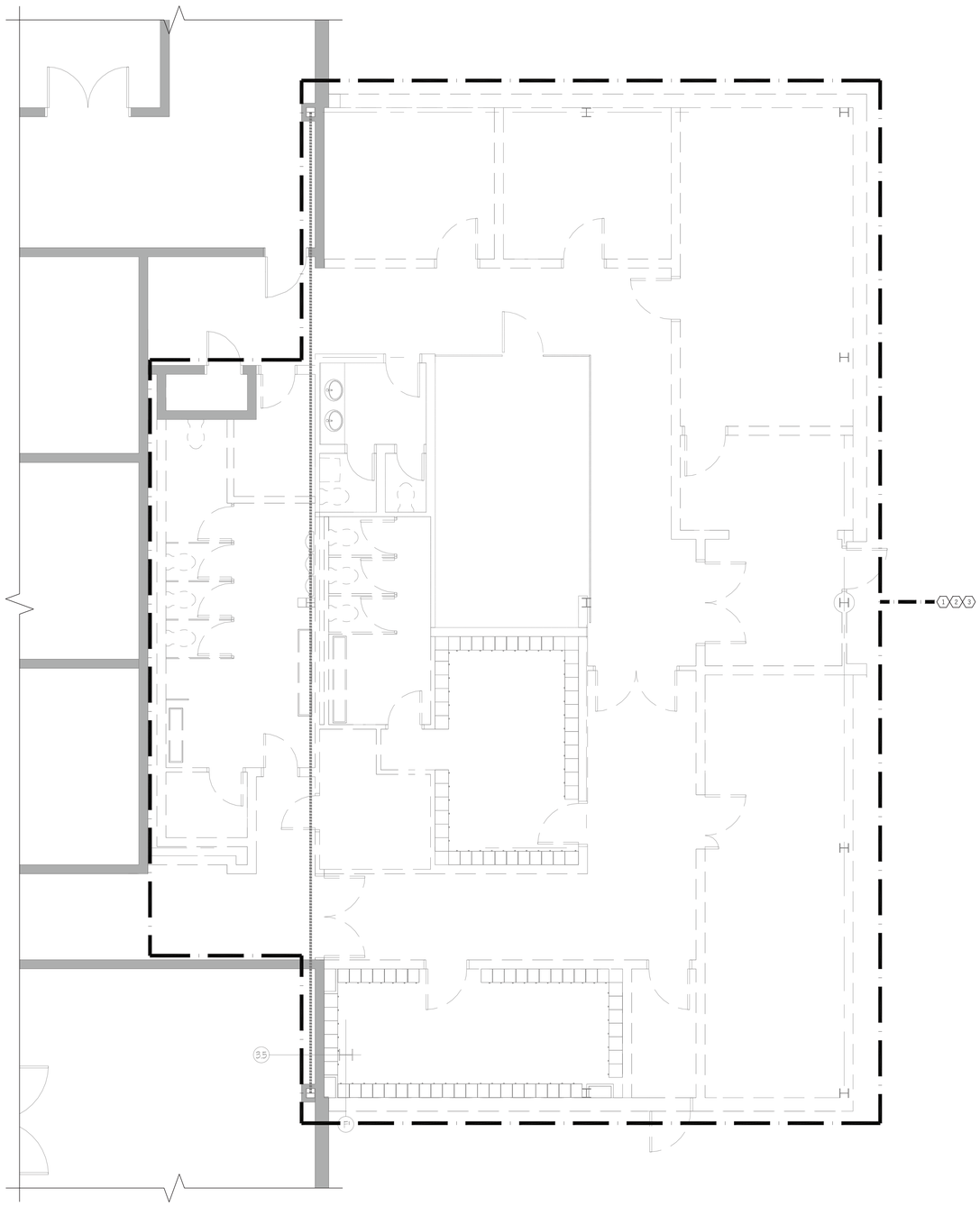
77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL SCHEDULES - SHEET 2 OF 2

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-011

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PART PLAN - DEMOLITION
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL SAFE OFF ALL UNITS AND DEMO EXISTING DUCTWORK SERVING THE OFFICE BUILDING ONLY.
2. CONTRACTOR SHALL DISCONNECT AND CAP ANY DUCTWORK COMING FROM THE PROCESS AREA.
3. CONTRACTOR SHALL DEMO EXISTING CHILLED WATER AND HOT WATER DISTRIBUTION PIPING BACK TO THE MAIN AND CAP IT.

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Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

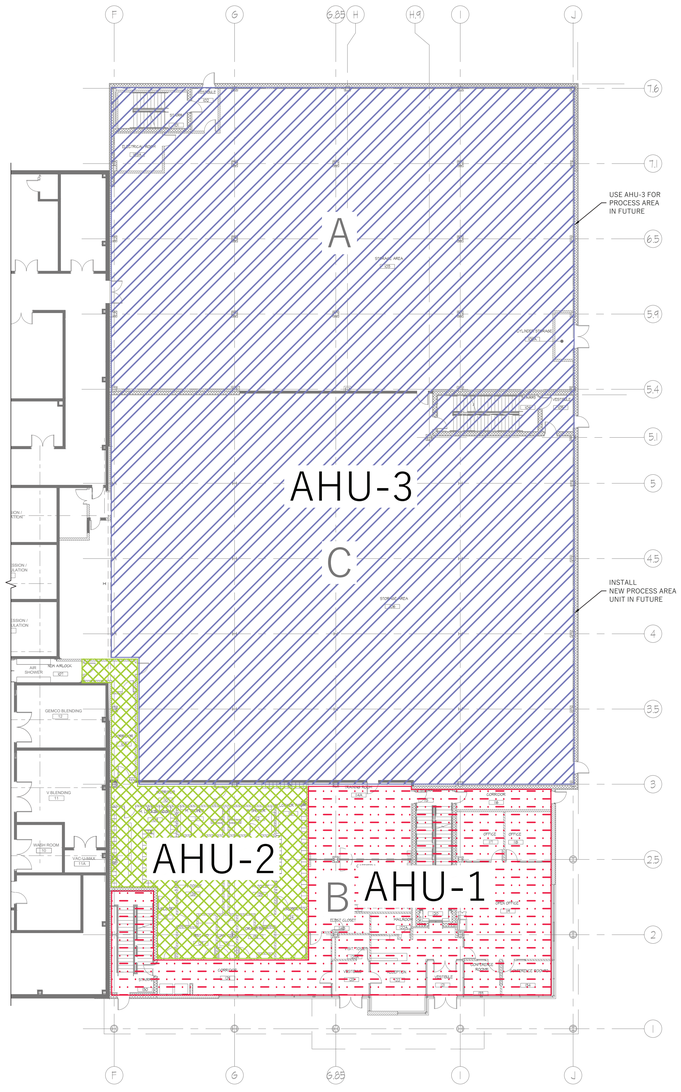
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN - DEMOLITION

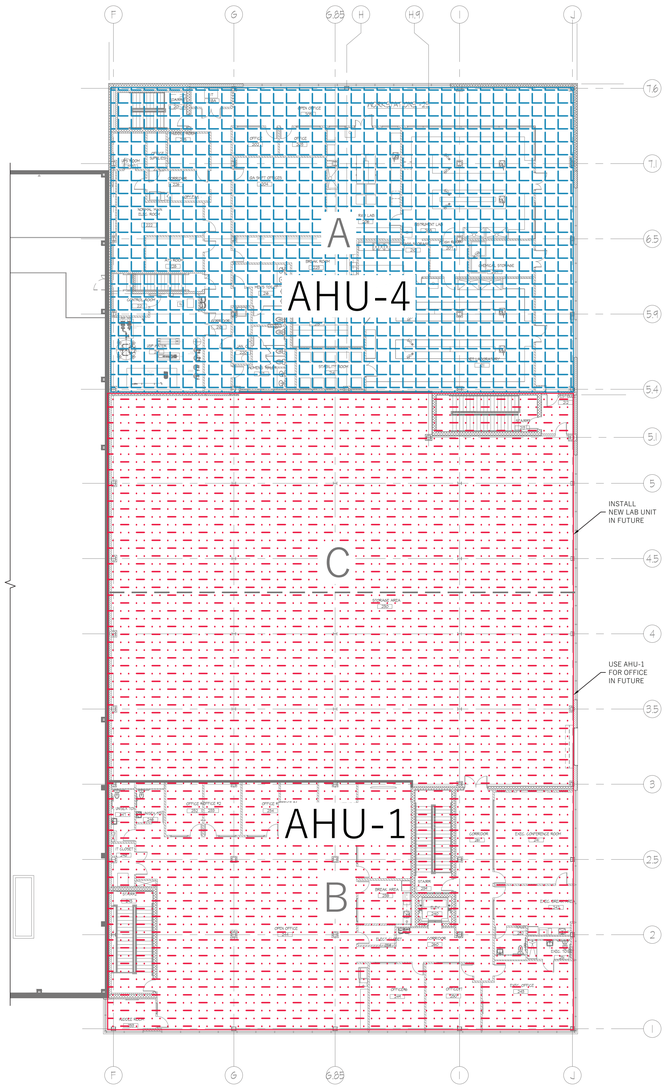
Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-051

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PLAN - ZONING DIAGRAM
SCALE: 1/16" = 1'-0"



2 SECOND FLOOR PLAN - ZONING DIAGRAM
SCALE: 1/16" = 1'-0"

ZONING LEGEND

	AHU-1	OFFICES - NON-CLASSIFIED
	AHU-2	LOCKER ROOMS - CNC
	AHU-3	WAREHOUSE - CNC
	AHU-4	LAB AREA - CNC

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Project:
Chartwell Pharmaceuticals Building Shell

77 Brenner Drive
Congers, New York

Drawing Title:
ZONING DIAGRAMS

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
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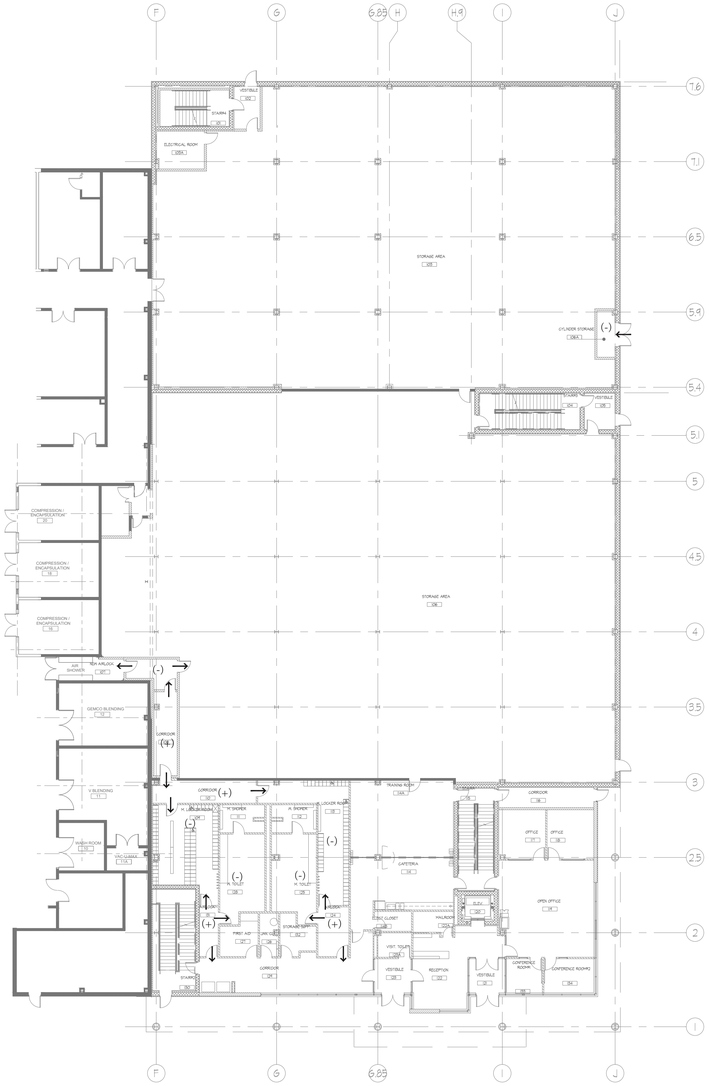
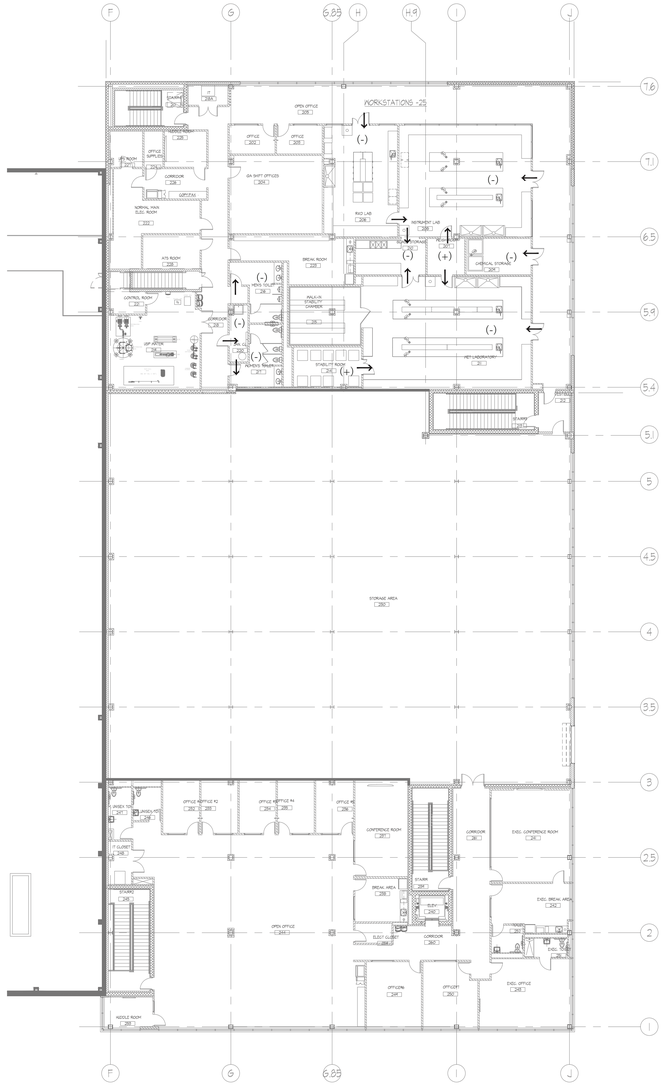
Drawing Number
M-101

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PLAN - PRESSURIZATION DIAGRAM
SCALE: 1/16" = 1'-0"



2 SECOND FLOOR PLAN - PRESSURIZATION DIAGRAM
SCALE: 1/16" = 1'-0"

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PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
PRESSURIZATION DIAGRAMS

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-102

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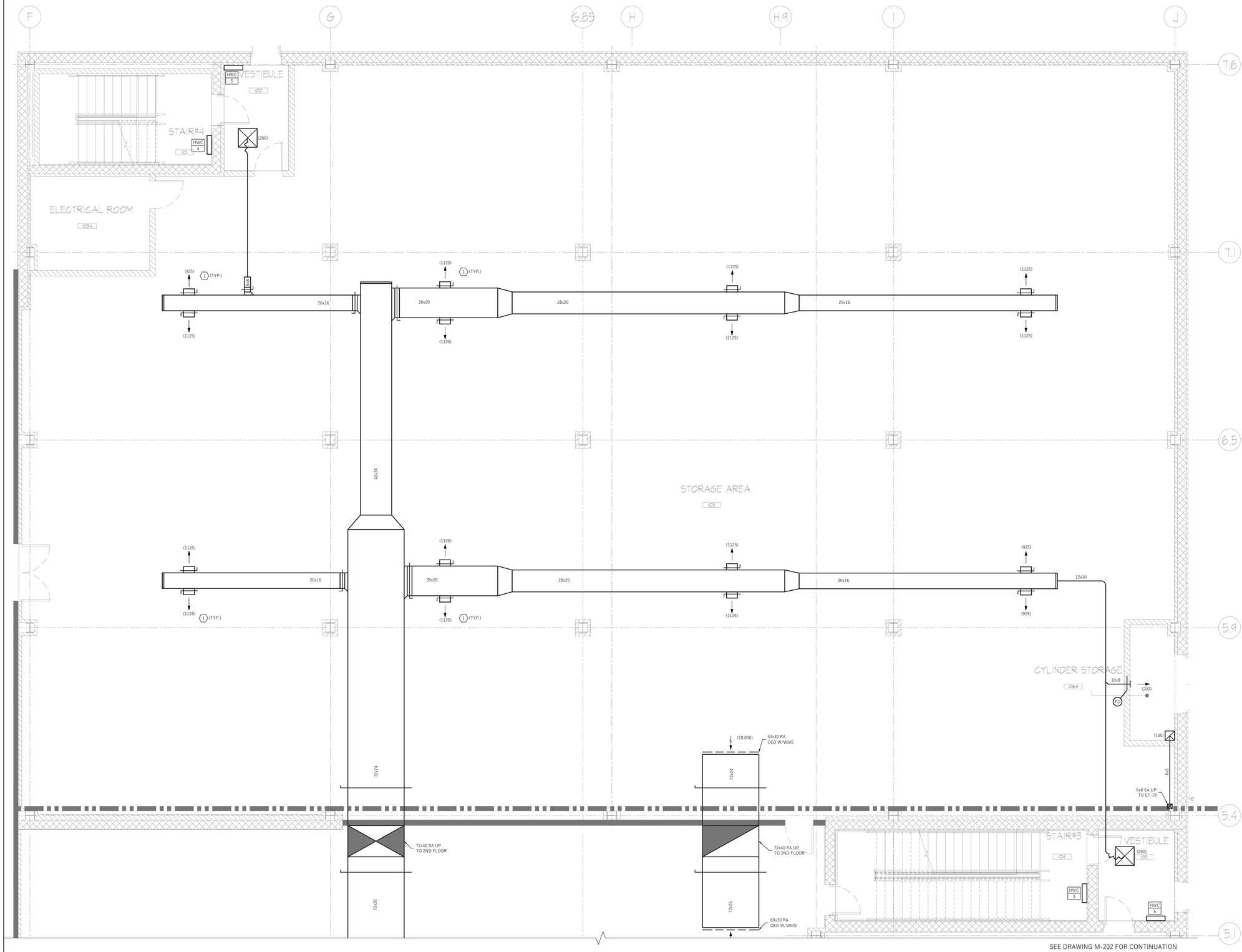

SEE DRAWING M-202 FOR CONTINUATION

1 FIRST FLOOR PART PLAN A - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE HIGH THROW SUPPLY GRILLES.

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Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN A - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-201

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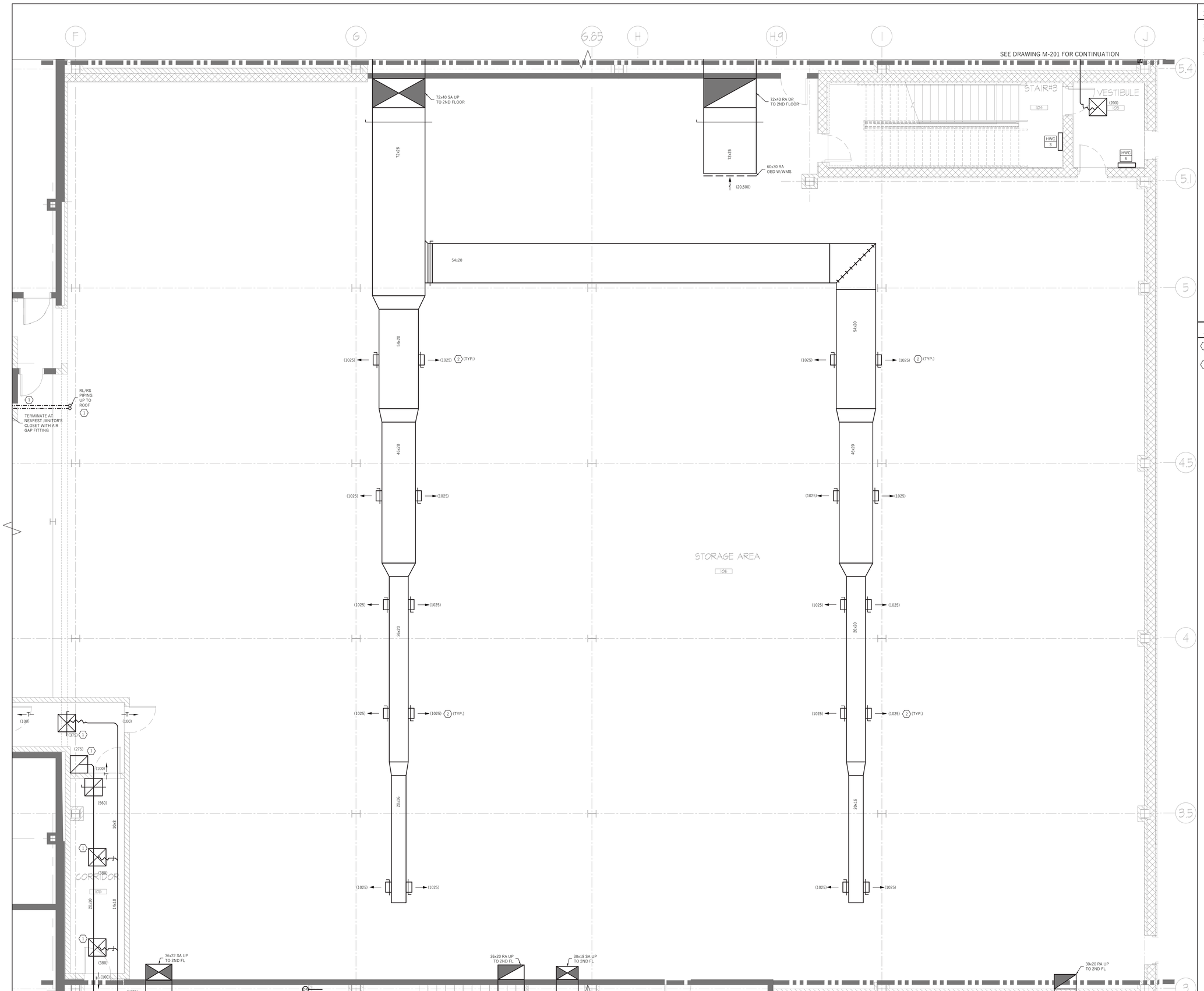

1 FIRST FLOOR PART PLAN C - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE SUPPLY AND RETURN DIFFUSERS WITH DAMPER AT NECK IN ALL AREAS WITH HARD CEILING.
2. CONTRACTOR SHALL PROVIDE HIGH THROW SUPPLY GRILLES.

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Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

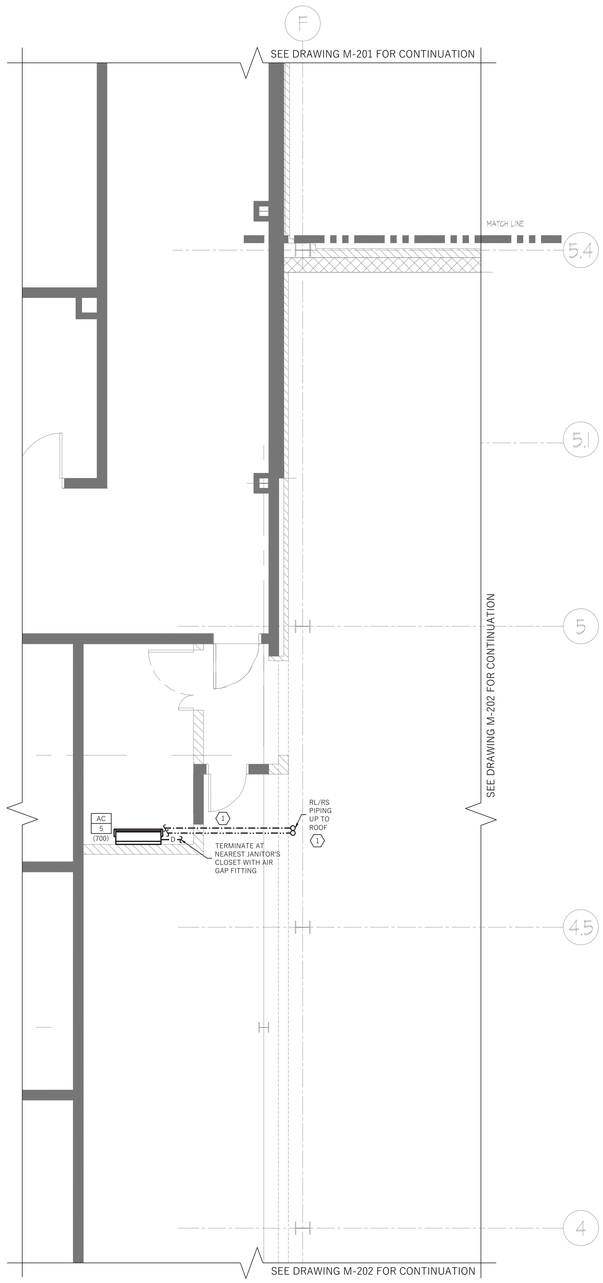
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN C - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-202

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PART PLAN C - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL FIELD VERIFY AND INSTALL REFRIGERANT PIPING UP TO CONDENSING UNIT, ACCU-6, ON THE ROOF DURING PHASE C.

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MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

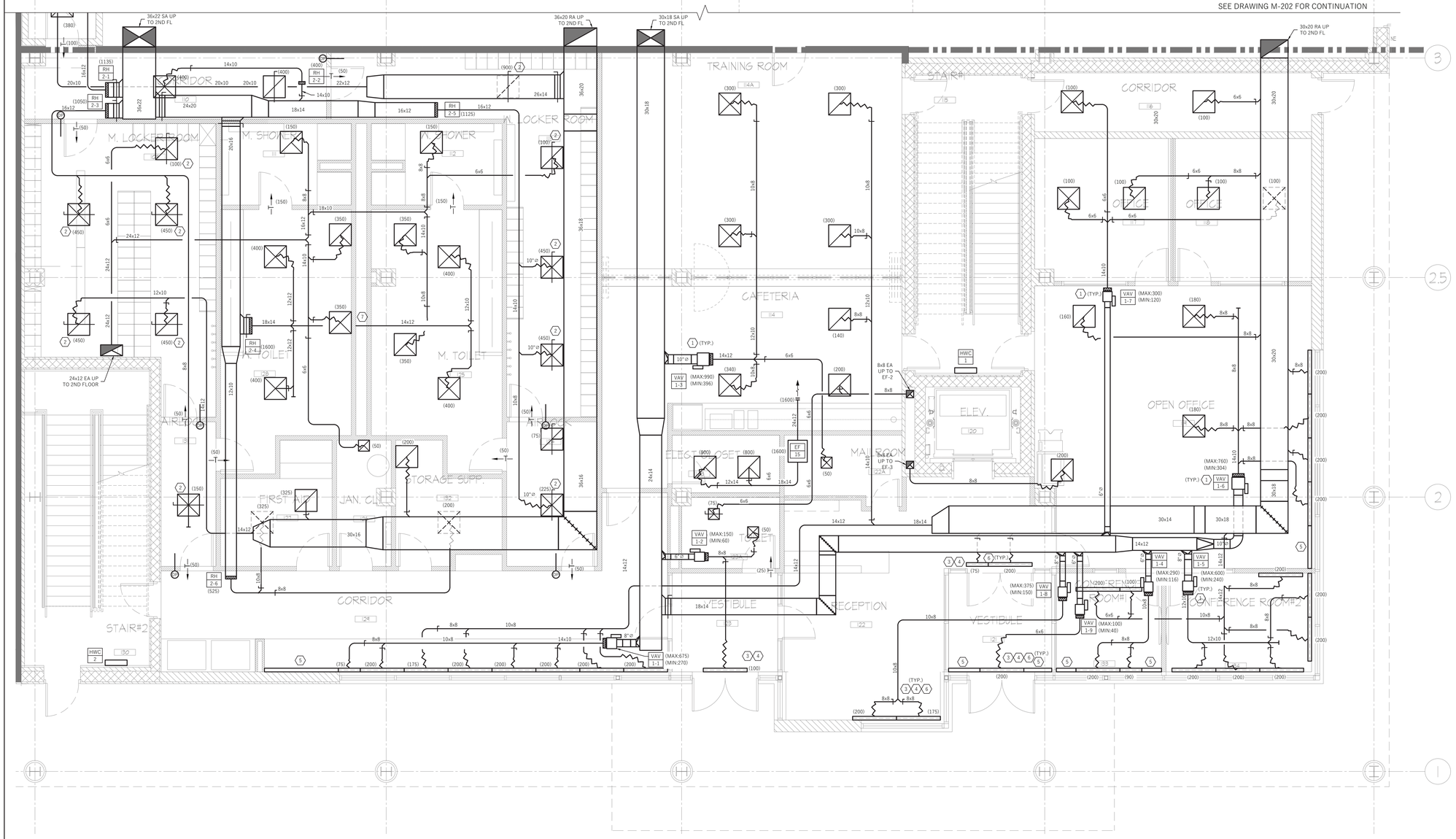
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN C - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-202B

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PART PLAN B - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.
4. CONTRACTOR SHALL REFER TO MECHANICAL SCHEDULES FOR NECK SIZES OF ALL DIFFUSERS. FLEXIBLE DUCT SIZE SHALL MATCH NECK SIZE OF RESPECTIVE DIFFUSER.
5. ALL DUCTWORK ABOVE CEILING SHALL BE INSTALLED AS HIGH AS POSSIBLE. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE 1" INTERNAL LINING. MINIMUM 10 FEET DOWNSTREAM OF VAV.
2. CONTRACTOR SHALL PROVIDE SUPPLY AND RETURN DIFFUSERS WITH DAMPER AT NECK IN ALL AREAS WITH HARD CEILING.
3. CONTRACTOR SHALL PROVIDE SUPPLY AND RETURN LINEAR DIFFUSERS WITH PLENUM BOX AND DAMPER AT NECK IN ALL AREAS WITH HARD CEILING.
4. CONTRACTOR SHALL COORDINATE DUCT ROUTING IN VESTIBULES AND RECEPTION AREAS WITH ARCHITECTURAL PLANS.
5. INACTIVE SECTIONS OF SUPPLY/RETURN LINEAR DIFFUSERS SHALL BE BLANKED OFF.
6. CONTRACTOR SHALL PROVIDE CORD OPERATED BALANCING DAMPERS FOR ALL DIFFUSERS LOCATED IN ACCESSIBLE CEILING.
7. CONTRACTOR SHALL COORDINATE DUCT ROUTING WITH PLUMBING PIPING WITH IN THE CHASE.

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Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
⚠	Addendum #1	04/20/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

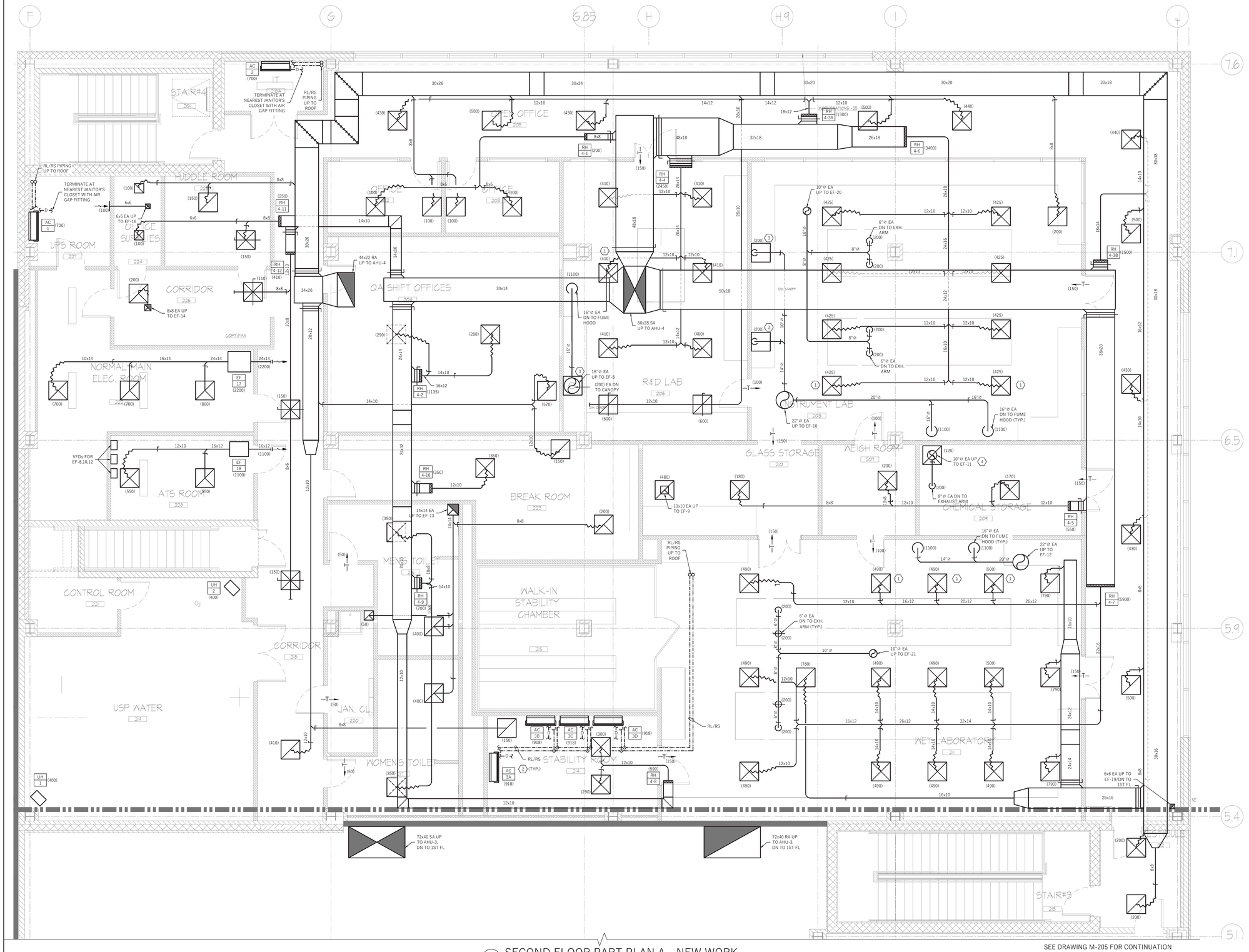
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN B - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-203

KeRi Engineering Project No.: 20181



1 SECOND FLOOR PART PLAN A - NEW WORK

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.
4. CONTRACTOR SHALL REFER TO MECHANICAL SCHEDULES FOR NECK SIZES OF ALL DIFFUSERS. FLEXIBLE DUCT SIZE SHALL MATCH NECK SIZE OF RESPECTIVE DIFFUSER.
5. ALL DUCTWORK ABOVE CEILING SHALL BE INSTALLED AS HIGH AS POSSIBLE. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS.

SHEET NOTES:

1. ALL SUPPLY DIFFUSERS IN LAB AREA SHALL BE LOW VELOCITY PERFORATED CEILING DIFFUSERS.
2. CONTRACTOR SHALL DISCHARGE THE CONDENSATE DRAIN PIPING AT FUNNEL DRAIN PROVIDE WITH IN PIPE CHASE. REFER TO PLUMBING DRAWINGS.
3. CONTRACTOR SHALL PROVIDE 24x24 316 SS CANOPY HOOD.
4. DUCT UPSTREAM OF FAN SHALL BE 316 SS WELDED. DUCT CONSTRUCTION SHALL CONFORM TO IBC TABLE 414.5.1.

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Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

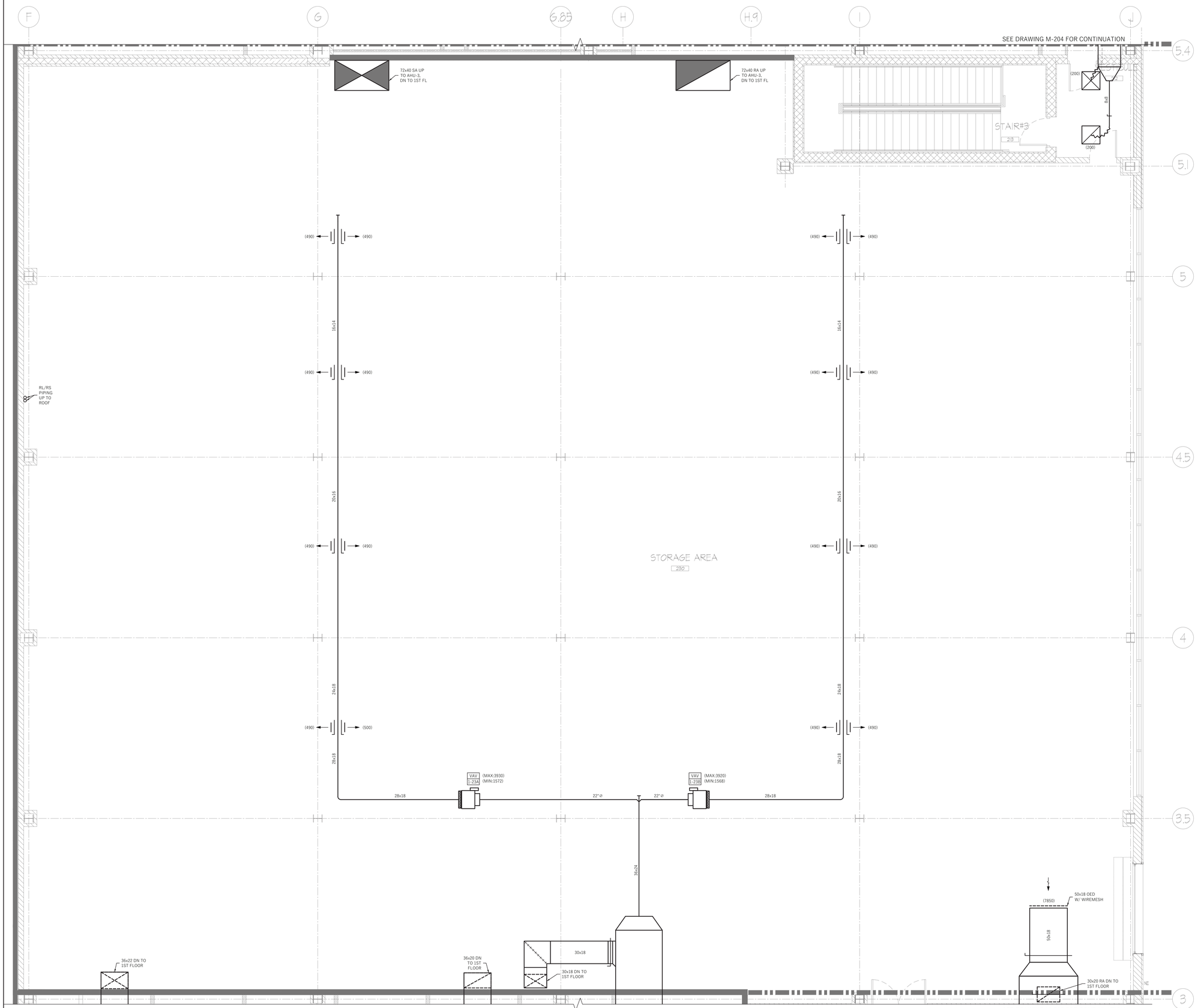
77 Brenner Drive
Congers, New York

Drawing Title:
SECOND FLOOR PART PLAN A - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-204

KeRi Engineering Project No.: 20181



1 SECOND FLOOR PART PLAN C - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.
4. CONTRACTOR SHALL REFER TO MECHANICAL SCHEDULES FOR NECK SIZES OF ALL DIFFUSERS. FLEXIBLE DUCT SIZE SHALL MATCH NECK SIZE OF RESPECTIVE DIFFUSER.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE HIGH THROW SUPPLY GRILLES.

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Revisions:

No.	Revision	Date
1.	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

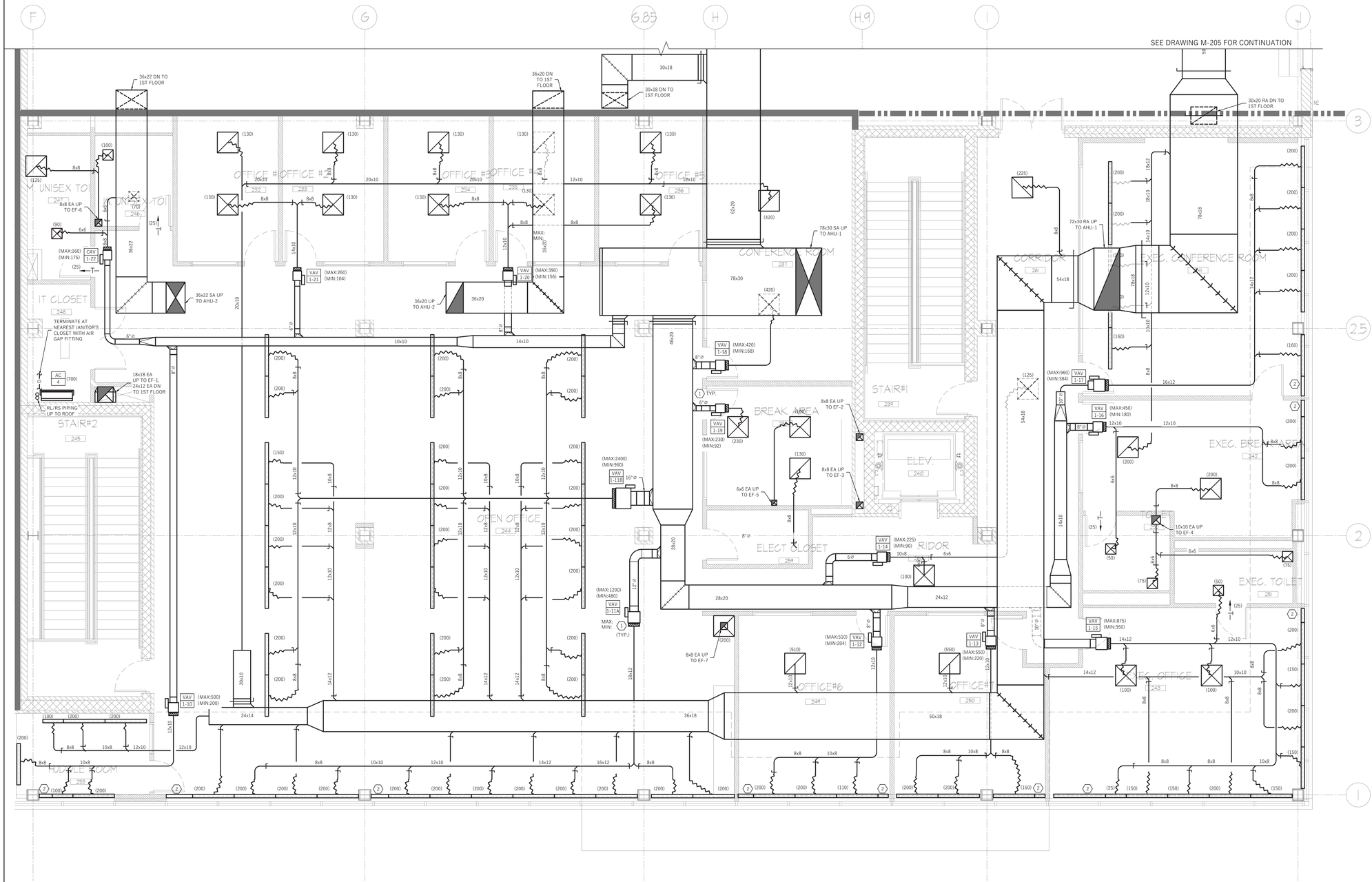
77 Brenner Drive
Congers, New York

Drawing Title:
SECOND FLOOR PART PLAN C - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-205

KeRi Engineering Project No.: 20181



1 SECOND FLOOR PART PLAN B - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
3. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE PROCEEDING WITH ANY WORK.
4. CONTRACTOR SHALL REFER TO MECHANICAL SCHEDULES FOR NECK SIZES OF ALL DIFFUSERS. FLEXIBLE DUCT SIZE SHALL MATCH NECK SIZE OF RESPECTIVE DIFFUSER.
5. ALL DUCTWORK ABOVE CEILING SHALL BE INSTALLED AS HIGH AS POSSIBLE. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE 1" INTERNAL LINING. MINIMUM 10 FEET DOWNSTREAM OF VAV.
2. INACTIVE SECTIONS OF SUPPLY/RETURN LINEAR DIFFUSERS SHALL BE BLANKED OFF.

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Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

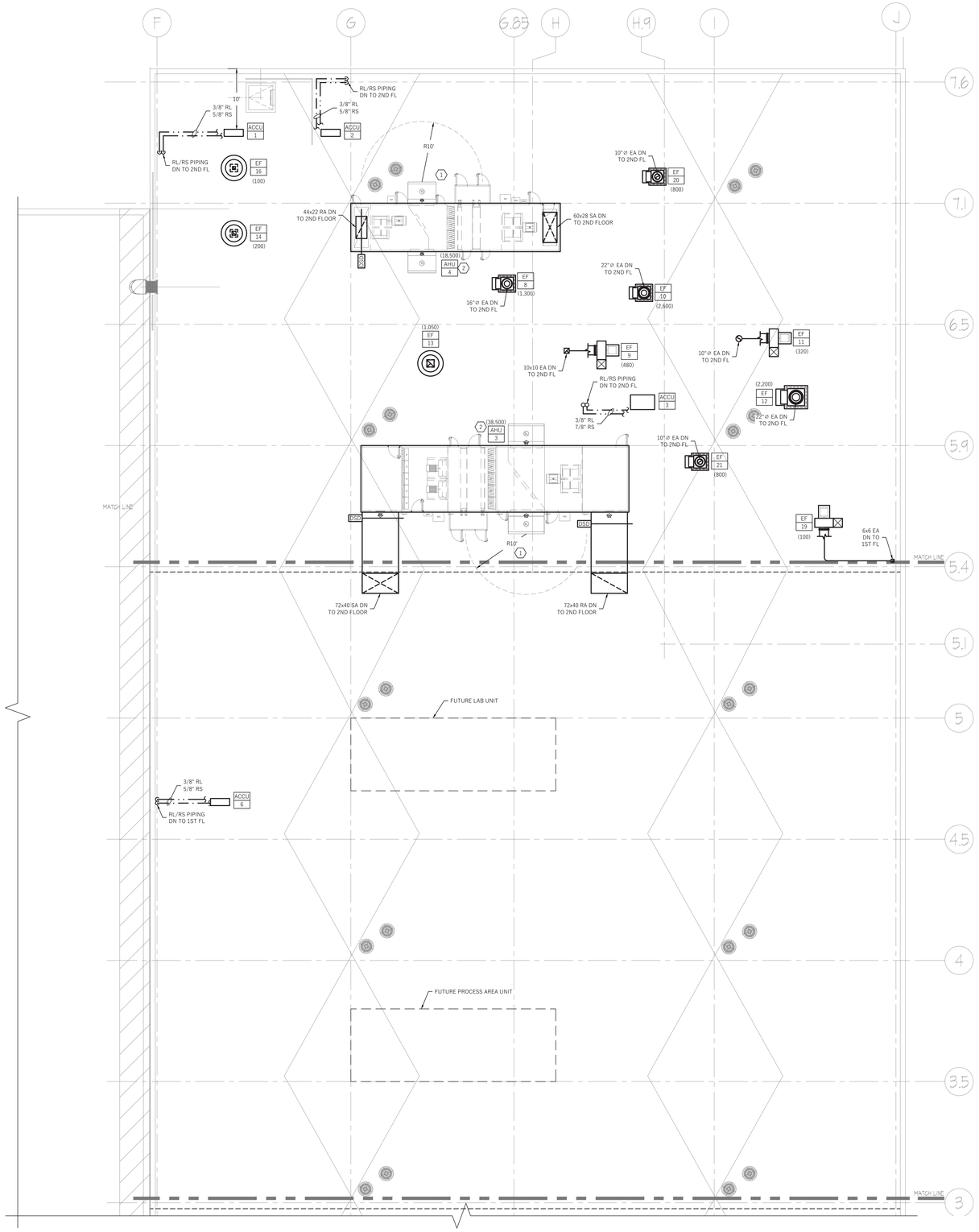
77 Brenner Drive
Congers, New York

Drawing Title:
SECOND FLOOR PART PLAN B - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-206

KeRi Engineering Project No.: 20181



1 ROOF PART PLAN A & C - NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. OA INTAKE SHALL BE 10'-00" AWAY FROM ANY SOURCE OF EXHAUST.
2. CONTRACTOR SHALL COORDINATE UNIT LOCATION AND ORIENTATION WITH STRUCTURAL FRAMING.

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Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

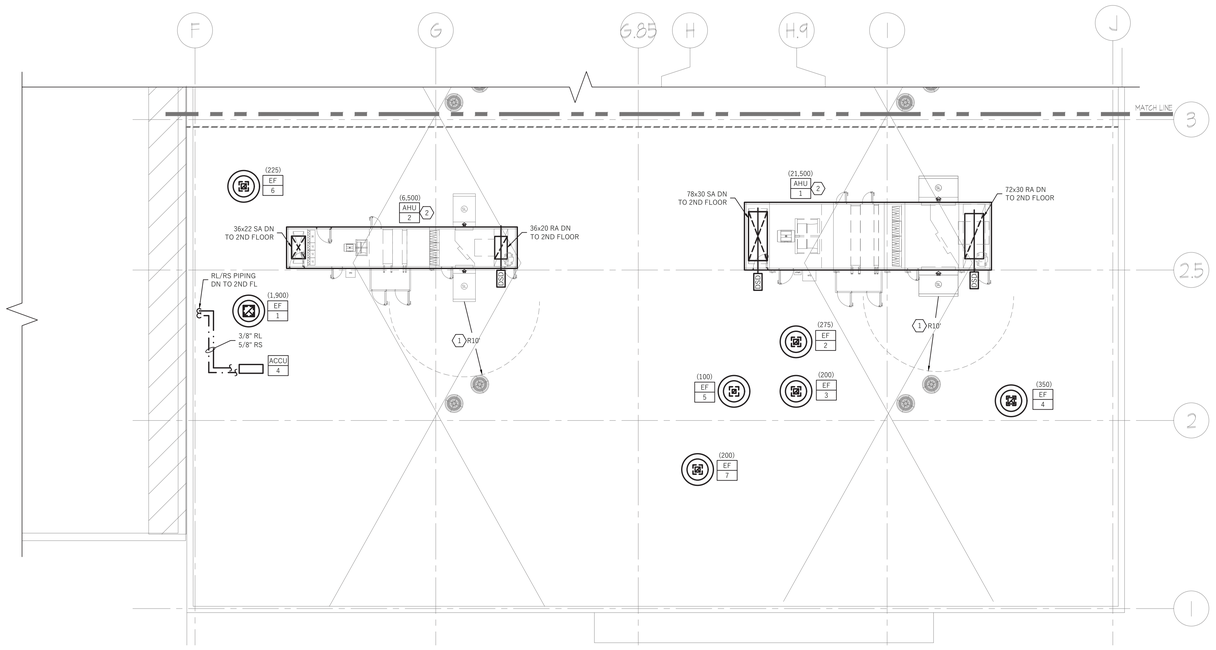
77 Brenner Drive
Congers, New York

Drawing Title:
ROOF PART PLAN A & C - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-207

KeRi Engineering Project No.: 20181



1 ROOF PART PLAN B - NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. OA INTAKE SHALL BE 10'-00" AWAY FROM ANY SOURCE OF EXHAUST.
2. CONTRACTOR SHALL COORDINATE UNIT LOCATION AND ORIENTATION WITH STRUCTURAL FRAMING.

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Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

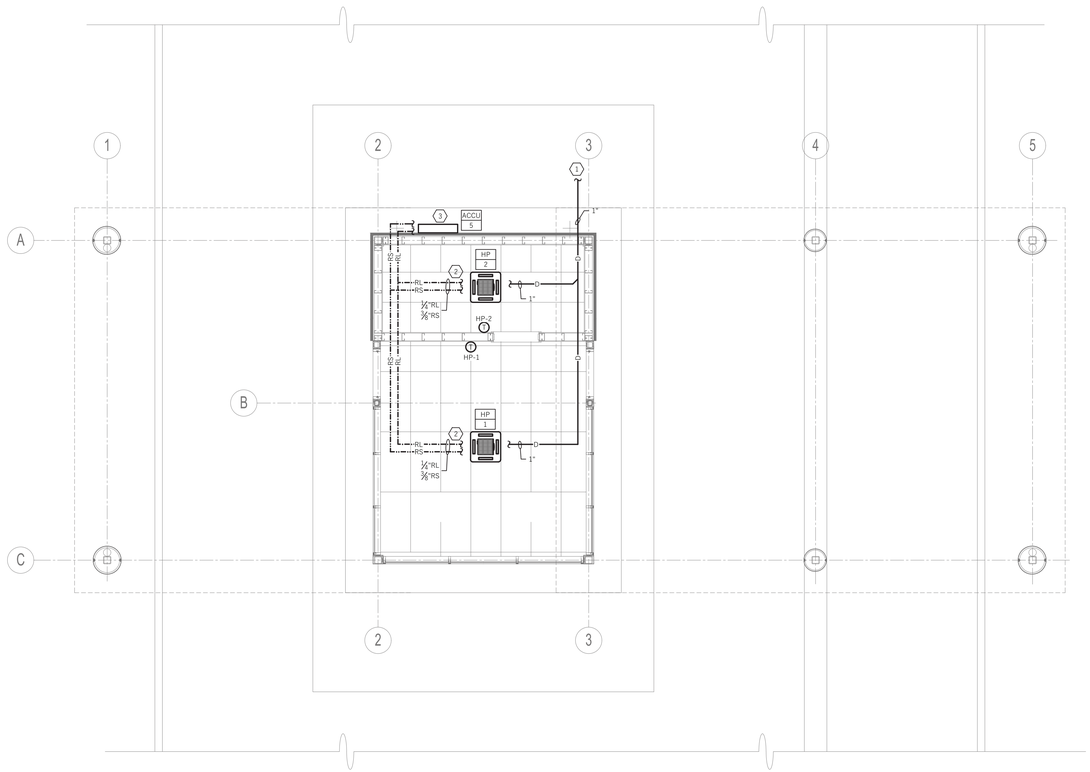
77 Brenner Drive
Congers, New York

Drawing Title:
ROOF PART PLAN B - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-208

KeRi Engineering Project No.: 20181



1 GUARDHOUSE - NEW WORK
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE AND TERMINATE DRAIN PIPE IN SPLASH BLOCK.
2. REFRIGERANT PIPING SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS.
3. CONTRACTOR SHALL INSTALL ACCU-5 ON SIDE WITH MANUFACTURER'S PROVIDED MOUNTING BRACKET. ACCU-5 SHALL BE INSTALLED 7'-0" ABOVE GRADE.

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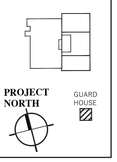
Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

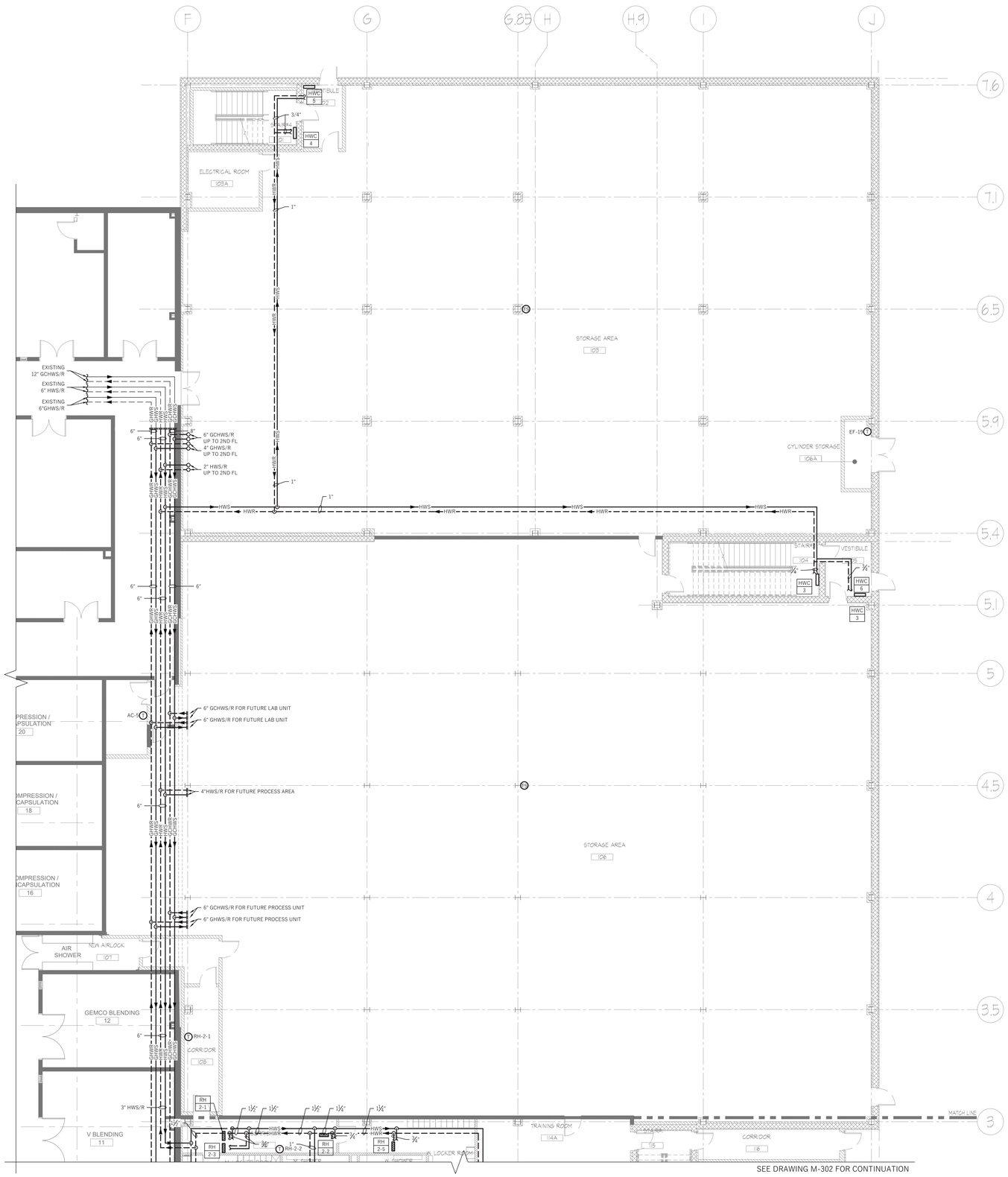
77 Brenner Drive
Congers, New York

Drawing Title:
GUARDHOUSE - NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-209

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PART PLAN A & C - PIPING NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

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Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

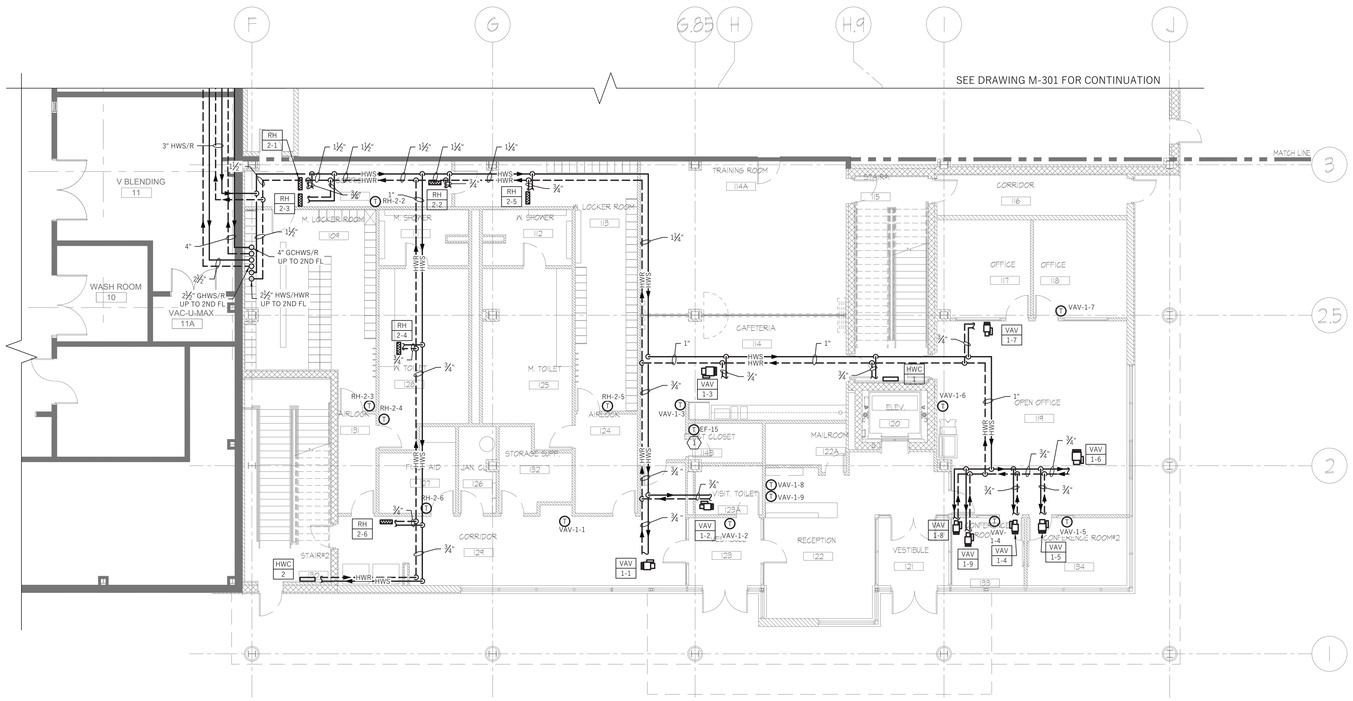
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN A & C - PIPING NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-301

KeRi Engineering Project No.: 20181



1 FIRST FLOOR PART PLAN B - PIPING NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. EXHAUST FAN SHALL BE CONTROLLED FROM THERMOSTAT SET AT 85° F (ADJ.).

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1.	Issued for Permit & Bid	04/02/21
⚠1	Addendum #1	04/20/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

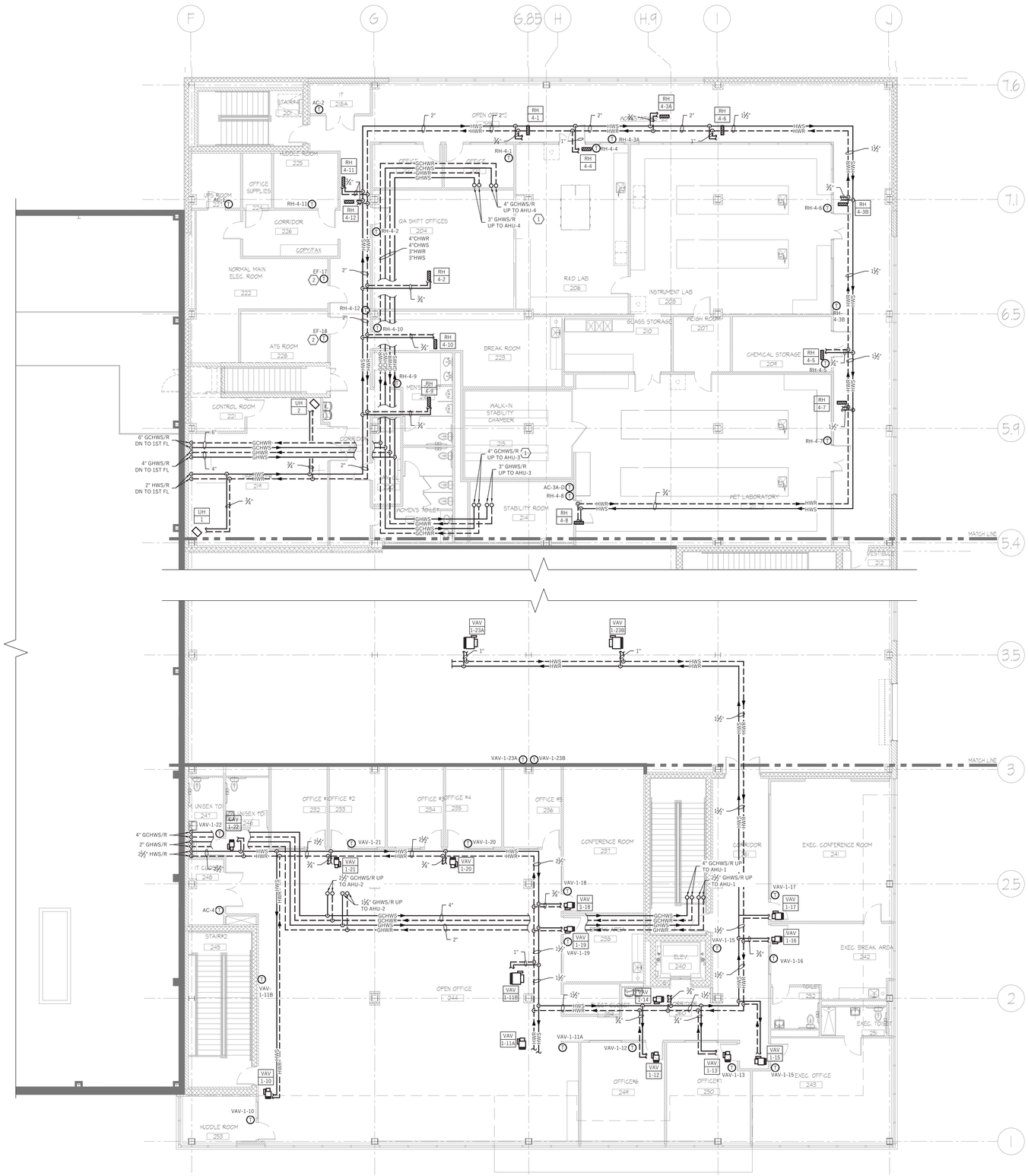
77 Brenner Drive
Congers, New York

Drawing Title:
FIRST FLOOR PART PLAN B - PIPING NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-302

KeRi Engineering Project No.: 20181



1 SECOND FLOOR PART PLAN A & B - PIPING NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL PROVIDE DRAIN PAN IN STABILITY ROOM.
2. EXHAUST FAN SHALL BE CONTROLLED FROM THERMOSTAT SET AT 85° F (ADJ.).

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Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

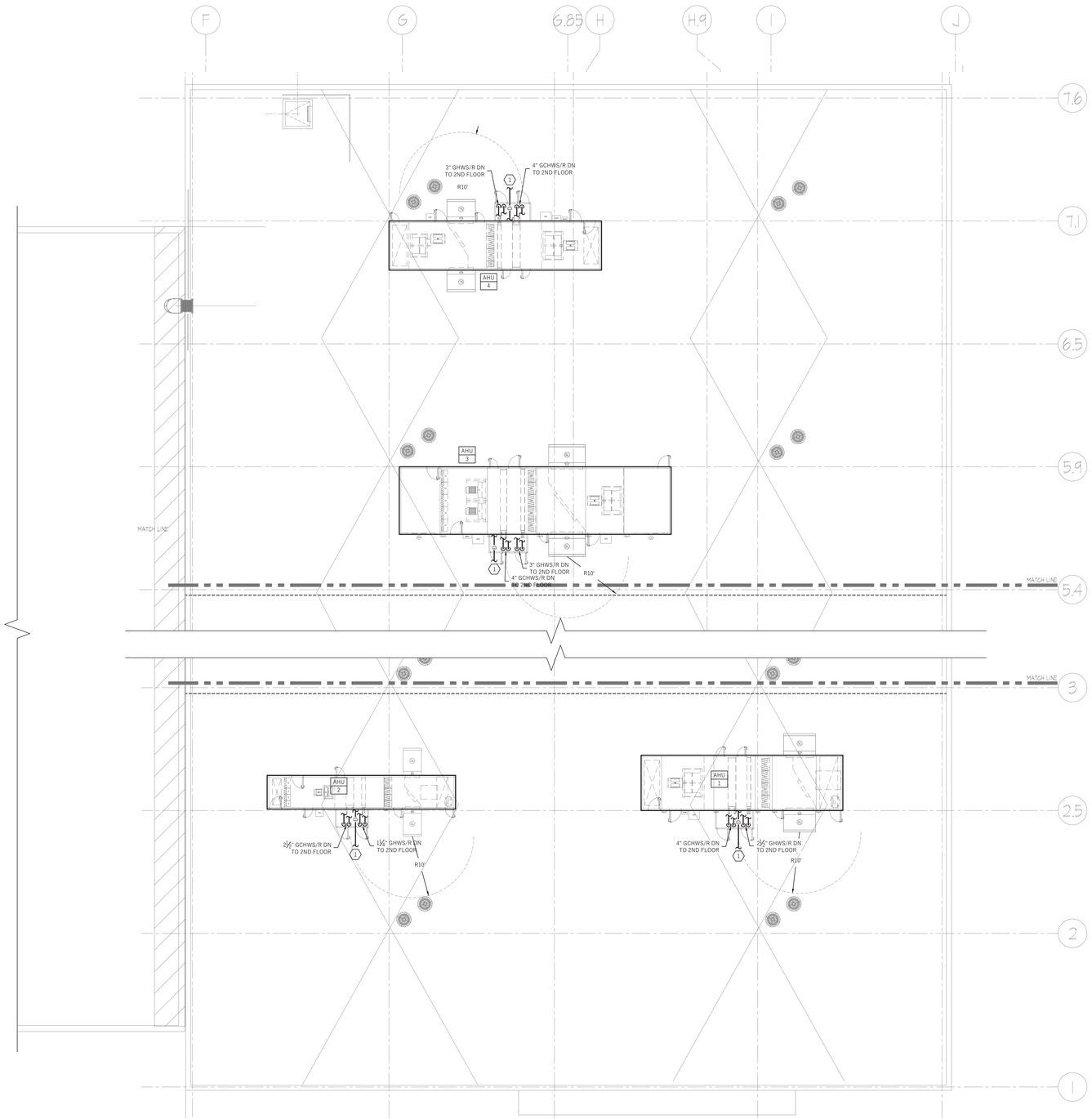
77 Brenner Drive
Congers, New York

Drawing Title:
SECOND FLOOR PART PLAN A & B - PIPING NEW WORK

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-303

KeRi Engineering Project No.: 20181



1 ROOF PART PLAN A & B - PIPING NEW WORK
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT THE AREA OF WORK FROM ANY DAMAGE, DUST AND DEBRIS.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

SHEET NOTES:

1. CONTRACTOR SHALL EXTENT AND TERMINATE DRAIN PIPING TO NEAREST ROOF DRAIN.

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SIGNATURE
MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

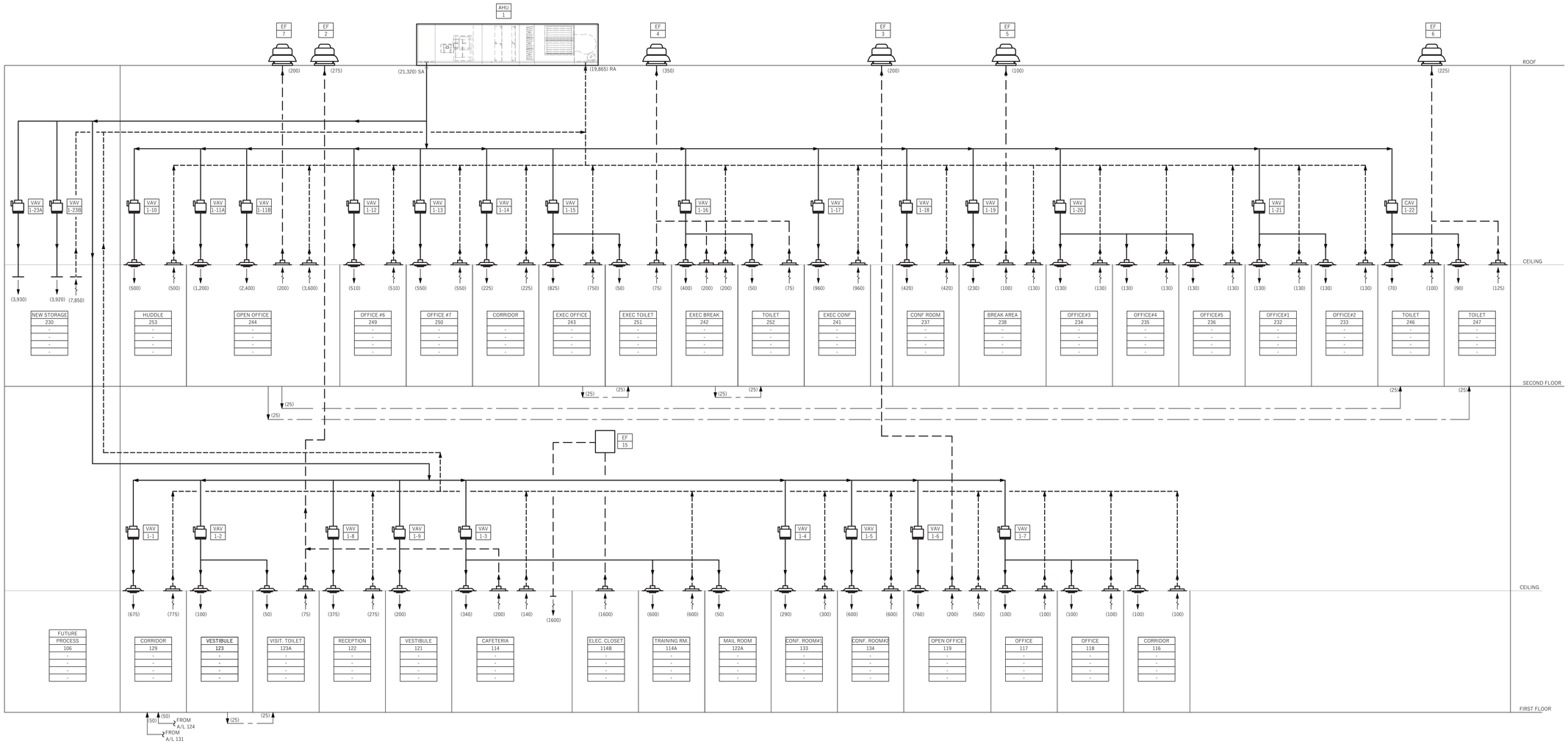
77 Brenner Drive
Congers, New York

Drawing Title:
ROOF PART PLAN A & B - PIPING NEW WORK

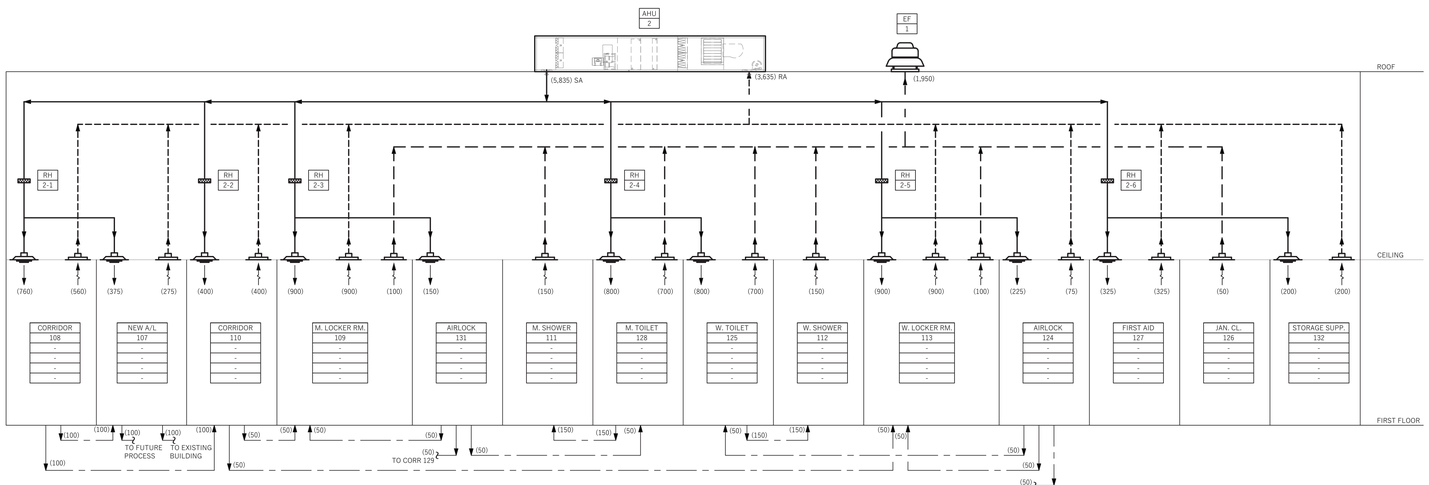
Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-304

KeRi Engineering Project No.: 20181



1 AHU-1 AIRFLOW DIAGRAM
SCALE: N.T.S.



2 AHU-2 AIRFLOW DIAGRAM
SCALE: N.T.S.

AIRFLOW SYMBOLS

- AIRFLOW DIRECTION
- SUPPLY DIFFUSER
- RETURN DIFFUSER
- REHEAT COIL
- VAV BOX
- SUPPLY AIRFLOW
- RETURN AIRFLOW
- EXHAUST AIRFLOW
- TRANSFER AIRFLOW
- AHU-1 / 01 — ROOM TAG
- (XXXX) — AIRFLOW IN CUBIC FEET PER MINUTE
- XX — SHEET NOTE
- ROOM NAME / ZONE # / ROOM # / TEMP / RH / ACH / D.P. — ROOM TAG

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Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
AIRFLOW DIAGRAM - SHEET 1 OF 2

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

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M-401

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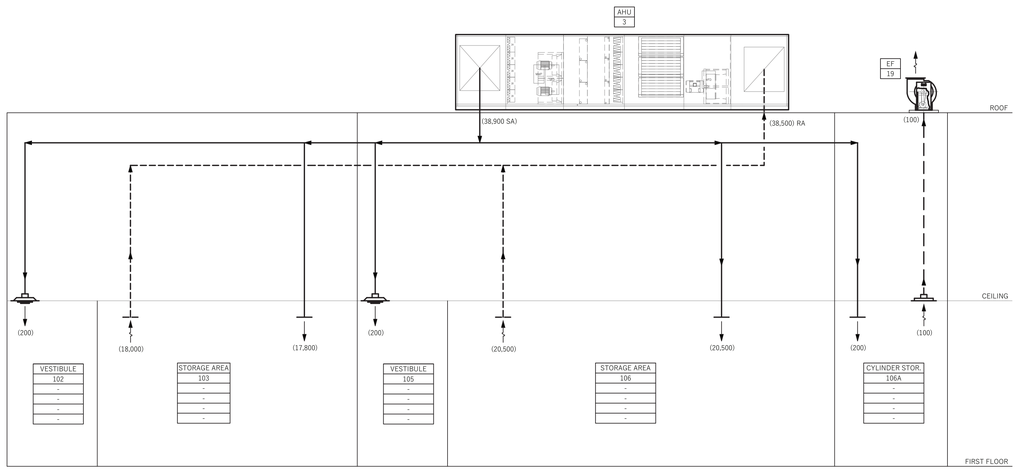
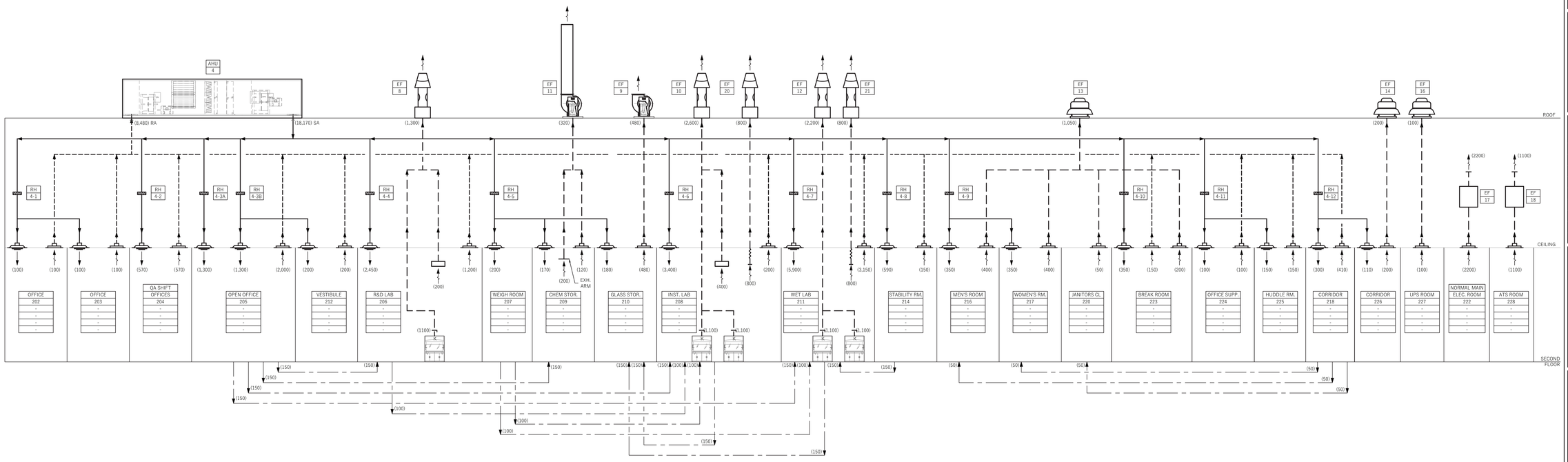


1 AHU-3 AIRFLOW DIAGRAM
SCALE: N.T.S.



2 AHU-4 AIRFLOW DIAGRAM
SCALE: N.T.S.

AIRFLOW SYMBOLS

- AIRFLOW DIRECTION
- SUPPLY DIFFUSER
- RETURN DIFFUSER
- REHEAT COIL
- VAV BOX
- SUPPLY AIRFLOW
- RETURN AIRFLOW
- EXHAUST AIRFLOW
- TRANSFER AIRFLOW
- AHU 01 — ROOM TAG
- (XXXX) — AIRFLOW IN CUBIC FEET PER MINUTE
- XX — SHEET NOTE
- ROOM NAME / ZONE # / ROOM # / TEMP / RH / ACH / D.P. — ROOM TAG

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IT IS A VIOLATION OF LAW FOR ANY PERSON UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ARCHITECT, TO ALTER AN ITEM IN ANY WAY ON THIS DRAWING OR SPECIFICATION (DOCUMENT). IF A DOCUMENT BEARING THE SEAL OF AN ARCHITECT IS ALTERED THE ALTERING ARCHITECT SHALL AFFIX TO THE DOCUMENT THEIR SEAL AND THE NOTIFICATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE AND THE DATE OF SUCH ALTERATION AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

Revisions:

No.	Revision	Date
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1.	Issued for Permit & Bid	04/02/21

Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

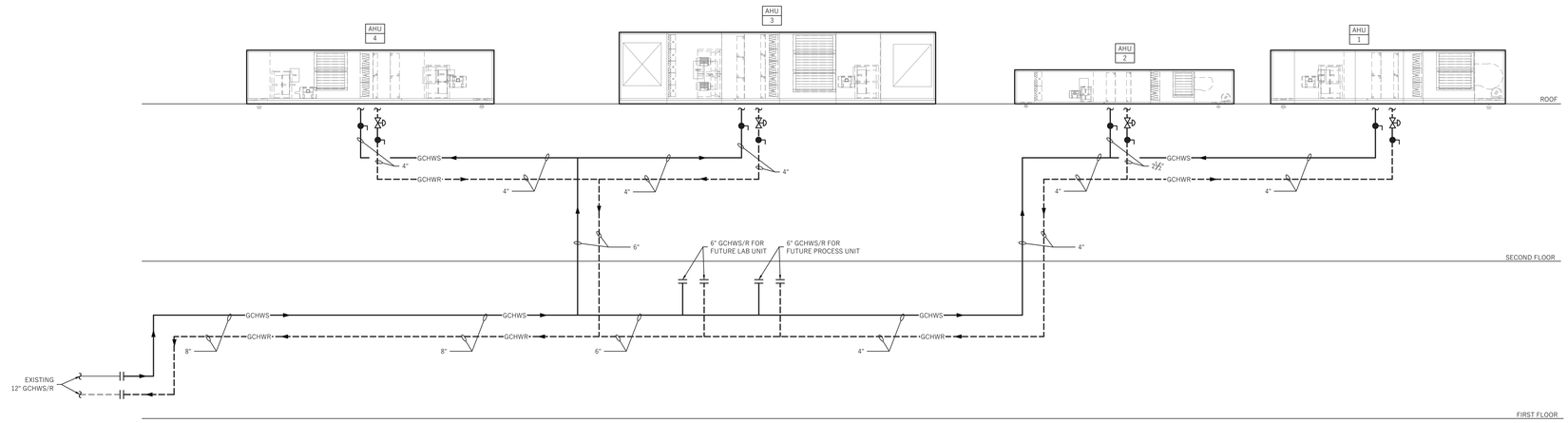
77 Brenner Drive
Congers, New York

Drawing Title:
AIRFLOW DIAGRAM - SHEET 2 OF 2

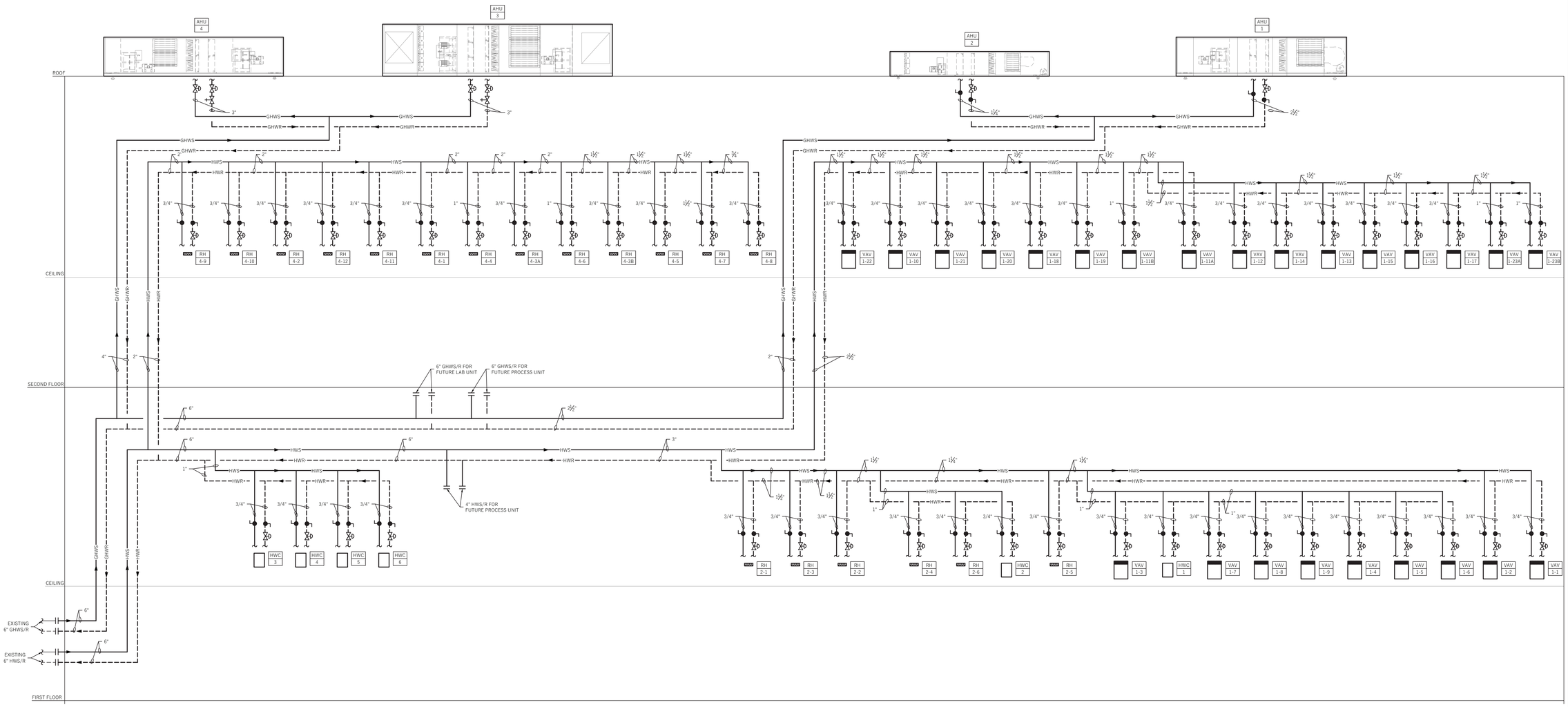
Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-402

KeRi Engineering Project No.: 20181



1 CHILLED WATER RISER DIAGRAM
SCALE: N.T.S.



2 HOT WATER RISER DIAGRAM
SCALE: N.T.S.

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Revisions:

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Key Plan:

PROJECT NORTH

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
CHILLED WATER AND HOT WATER RISER DIAGRAMS

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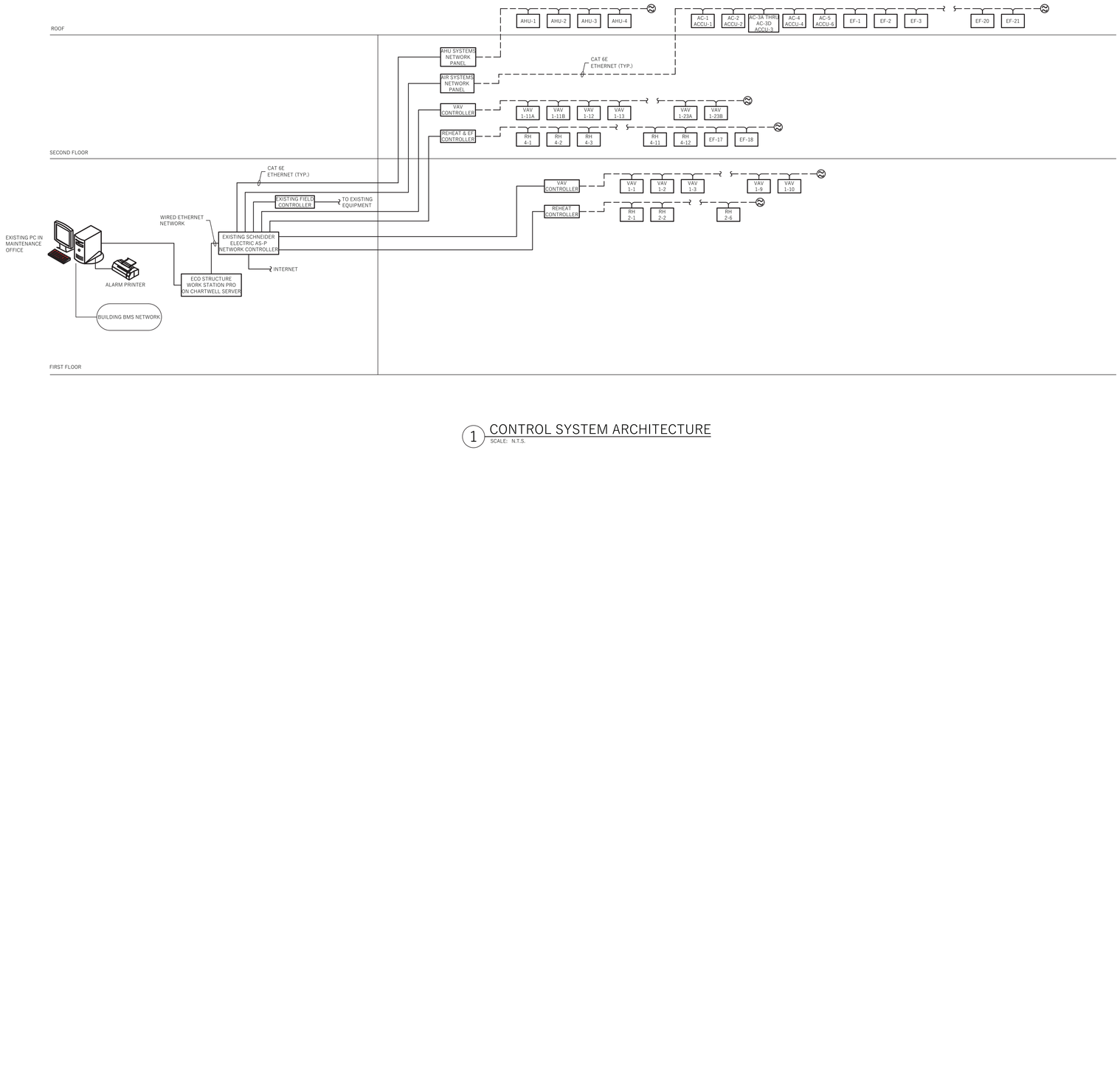
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-403

KeRi Engineering Project No.: 20181



1 CONTROL SYSTEM ARCHITECTURE
SCALE: N.T.S.

GENERAL CONTROLS NOTES:

1. CONTRACTOR SHALL HIRE THE SERVICE OF FOLLOWING CHARTWELL'S CONTROLS CONTRACTOR:
   RICHMAR CONTROLS & SERVICES COMPANY, INC
   851 MCLEAN AVENUE,
   YONKERS, NY 10704
   (914) 776-6060.
2. BMS CONTRACTOR SHALL BE RESPONSIBLE TO INTEGRATE ALL NEW CONTROLS UNDER THIS PROJECT TO EXISTING BMS SYSTEM.
3. ALL CONTROLS WIRING SHALL BE BY CONTRACTOR. COORDINATE WITH CHARTWELL TO PERFORM TERMINATION AND PROGRAMMING.
4. PROVIDE ALL WIRING TO ALL NEW DEVICES AND UP TO EXISTING CONTROL NETWORK FOR CONNECTION TO BMS.
5. ALL WIRING SHALL BE LABELED PROPERLY BASED ON CHARTWELL STANDARDS, COORDINATE WITH CARTWHELL.
6. ALL WIRING SHALL BE PROPERLY SUPPORTED FROM DECK AND SHALL BE PLENUM RATED.
7. ALL CONTROLS WIRING SHALL BE COMPLETED WITH 16 GAUGE, PLENUM RATED WIRE.
8. ALL NEW CONTROLS SHALL BE SCHNEIDER ELECTRIC ECO STRUCTURE AND COMPATIBLE WITH EXISTING BMS.
9. PROVIDE ALL PROGRAMMING AND GRAPHICS AT THE FRONT END.
10. REFER TO MECHANICAL DRAWINGS FOR FINAL QUANTITIES OF ALL EQUIPMENT.

AUTOMATIC TEMPERATURE CONTROLS SPECIFICATIONS

A. THE ATC SYSTEM CONTROLLERS SHALL PROVIDE TIE-INS WITH FIRE ALARM SYSTEM AND SAFETY PANELS. PROVIDE SUBMITTALS, DATA ENTRY, ELECTRICAL INSTALLATION, PROGRAMMING, START-UP, TEST AND VALIDATION ACCEPTANCE DOCUMENTATION, AND SYSTEM WARRANTY. THE COMPLETE INSTALLATION SHALL BE IN STRICT COMPLIANCE TO THE NATIONAL, STATE AND LOCAL MECHANICAL AND ELECTRICAL CODES AND THE ELECTRICAL SECTION OF THESE SPECIFICATION. ALL DEVICES SHALL BE UL OR FM LISTED AND LABELED FOR THE SPECIFIC USE, APPLICATIONS AND ENVIRONMENT TO WHICH THEY ARE APPLIED.

B. WORK SHALL INCLUDE THE FOLLOWING:

1. ALL CONTROL DEVICES, CONTROL SYSTEM WIRING, PROGRAMMING AND SYSTEM COMMISSIONING TO PROVIDE A COMPLETE AND OPERABLE SYSTEM.
2. ALL EQUIPMENT AND MATERIAL SHALL BE IN ACCORDANCE WITH CURRENT SITE STANDARD COMPONENT LIST. INSTALLATION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES.

C. MANUALS

1. AN OPERATOR'S MANUAL SHALL BE PROVIDED FOR ALL OPERATOR FUNCTIONS SPECIFIED UNDER OPERATOR TRAINING.

D. TRAINING

1. ALL TRAINING SHALL BE BY THE CONTROLS CONTRACTOR AND SHALL UTILIZE OPERATOR'S MANUAL AND AS-BUILT DOCUMENTATION.

E. WARRANTY

1. ALL COMPONENTS, SYSTEM SOFTWARE, AND PARTS SUPPLIED BY THE CONTROLS CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE YEAR FROM ACCEPTANCE DATE. LABOR TO REPAIR, REPROGRAM, OR REPLACE COMPONENTS SHALL BE FURNISHED BY THE BMS CONTRACTOR AT NO CHARGE DURING THE WARRANTY PERIOD. ALL CORRECTIVE SOFTWARE MODIFICATIONS MADE DURING WARRANTY PERIOD SHALL BE UPDATED ON ALL USER DOCUMENTATION AND ON USER AND MANUFACTURER ARCHIVED SOFTWARE DISKS.

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1	Addendum #1	04/20/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

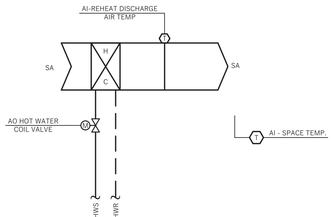
77 Brenner Drive
Congers, New York

Drawing Title:
CONTROL SCHEMATIC - SHEET 1 OF 3

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-501

KeRi Engineering Project No.: 20181

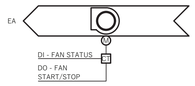


1 HOT WATER REHEAT COIL - CONTROL SCHEMATIC

SCALE: N.T.S.

HOT WATER REHEAT COIL - SEQUENCE OF OPERATION

1. HOT WATER REHEAT COIL SHALL BE CONTROLLED BY LOCAL ROOM CONTROLLER BASED ON SPACE TEMPERATURE SETPOINT OF 68F (ADJ.).
2. WHEN SPACE TEMPERATURE DROPS BELOW SETPOINT, REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN PROPORTIONATELY TO MAINTAIN SPACE TEMPERATURE SETPOINT.
3. WHEN SPACE TEMPERATURE RISES ABOVE SETPOINT, REHEAT COIL CONTROL VALVE SHALL MODULATE TO CLOSED POSITION PROPORTIONATELY TO MAINTAIN SPACE TEMPERATURE SETPOINT.
4. IF FACILITY HAS FULL BMS INTEGRATION, AND IF THE SPACE TEMPERATURE RISES ABOVE SETPOINT AFTER THE REHEAT COIL VALVE IS IN CLOSED POSITION, BMS SYSTEM SHALL SEND A SIGNAL TO RESET CORRESPONDING AHU/AC UNIT DISCHARGE TEMPERATURE BELOW CURRENT SETPOINT IN 5F (ADJ.) INCREMENTS (INTERVALS OF 20MINS) UNTIL SPACE TEMPERATURE IS SATISFIED.
5. BMS SYSTEM SHALL MONITOR REHEAT COIL DISCHARGE AIR TEMPERATURE SENSOR. WHEN THERE IS CALL FOR REHEAT AND IF THE DISCHARGE AIR TEMPERATURE SENSOR DOES NOT SENSE INCREASE IN TEMPERATURE WITHIN 5MINS (ADJ.), REHEAT COIL CONTROLLER SHALL SEND AN ALARM.
6. IF THE DISCHARGE AIR TEMPERATURE SENSOR SENSES TEMPERATURE ABOVE 95F (ADJ.), REHEAT COIL CONTROLLER SHALL SEND AN ALARM TO BMS.



4 GENERAL EXHAUST FANS - CONTROL SCHEMATIC

SCALE: N.T.S.

GENERAL EXHAUST FANS SEQUENCE OF OPERATIONS

GENERAL EXHAUST FANS SHALL BE CONSTANT VOLUME TYPE AND ARE TO BE CONTROLLED AND MONITORED VIA THE BMS SYSTEM. THE BMS CONTRACTOR SHALL PROVIDE, FIELD INSTALL AND WIRE THE NECESSARY DDC CONTROLLERS AND END DEVICES TO ACCOMPLISH THE SEQUENCE AS OUTLINED HEREIN.

RUN CONDITIONS:
THE EXHAUST FANS SHALL OPERATE CONTINUOUSLY BASED ON A MANUAL COMMAND BY AN OPERATOR AT THE WORKSTATION OR ACCORDING TO AN OPERATOR DEFINED SCHEDULE. THE OPERATOR SHALL HAVE THE ABILITY TO OVERRIDE THE STARTING OR STOPPING OF ANY EXHAUST FAN FROM THE OPERATOR WORKSTATION.

FAN:
THE FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

FAN STATUS:
FAN STATUS SHALL BE SENSED BY A CURRENT SENSOR. THE SENSOR SHALL PROVIDE FAN STATUS AND ALARM AT THE BMS

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT SWITCH.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT SWITCH.
- FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

5 ELECTRICAL ROOM / UPS ROOM EXHAUST FAN CONTROL SCHEMATIC

SCALE: N.T.S.

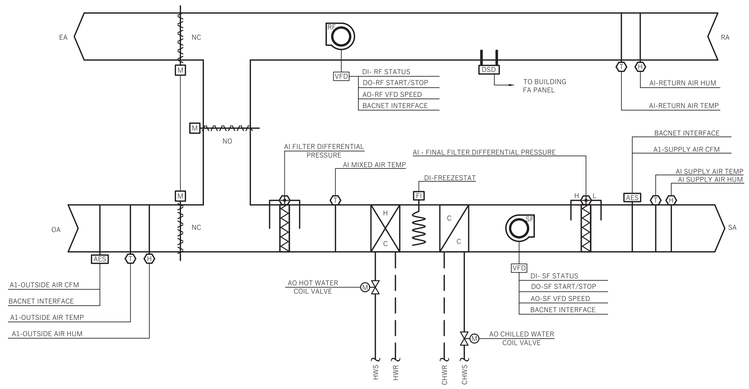
ELECTRICAL ROOM/UPS ROOM EXHAUST FANS SEQUENCE OF OPERATIONS

EXHAUST FANS SHALL BE CONSTANT VOLUME TYPE AND ARE TO BE CONTROLLED AND MONITORED VIA THE BMS SYSTEM. THE BMS CONTRACTOR SHALL PROVIDE, FIELD INSTALL AND WIRE THE NECESSARY DDC CONTROLLERS AND END DEVICES TO ACCOMPLISH THE SEQUENCE AS OUTLINED HEREIN.

RUN CONDITIONS:
THE EXHAUST FANS SHALL OPERATE FROM SPACE TEMPERATURE SENSOR/LOCAL ROOM CONTROLLER.
SET AT 85° F. (ADJ.). THE OPERATOR SHALL HAVE THE ABILITY TO OVERRIDE THE STARTING OR STOPPING OF ANY EXHAUST FAN FROM THE OPERATOR WORKSTATION.

FAN STATUS:
FAN STATUS SHALL BE SENSED BY A CURRENT SENSOR. THE SENSOR SHALL PROVIDE FAN STATUS AND ALARM AT THE BMS

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT SWITCH.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT SWITCH.
- FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).



2 CONSTANT VOLUME AHU CONTROL SCHEMATIC AHU-2, 3 &4

SCALE: N.T.S.

CONSTANT VOLUME AIR HANDLING UNIT SEQUENCE OF OPERATIONS

THE AIR HANDLING UNIT IS A CONSTANT VOLUME SYSTEM. THE BMS CONTRACTOR SHALL PROVIDE A PRIMARY DDC CONTROLLER FOR AIR HANDLING UNIT AND ALL NECESSARY END DEVICES TO ACCOMPLISH THE SEQUENCE OF OPERATIONS AS OUTLINED HEREIN. ALL BMS CONTROLS ARE TO BE FIELD MOUNTED AND WIRED BY THE BMS CONTRACTOR.

RUN CONDITIONS:
THE AIR HANDLING SYSTEM SHALL OPERATE CONTINUOUSLY BASED ON A MANUAL COMMAND BY AN OPERATOR AT THE WORKSTATION. THE OPERATOR SHALL HAVE THE ABILITY TO OVERRIDE THE STARTING OR STOPPING OF AHU FROM THE OPERATOR WORKSTATION OR THE DDC CONTROL UNIT.

EMERGENCY SHUTDOWN:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL TRIGGERED BY DUCT SMOKE DETECTOR OR FIRE ALARM PANEL.

FREEZE PROTECTION:

UPON SENSING A FREEZE CONDITION BELOW 38° F (ADJUSTABLE) AT THE UNIT FREEZESTAT, AN ALARM SHALL BE GENERATED AT THE BMS OPERATOR'S WORKSTATION, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED, THE RETURN AIR DAMPER SHALL FULLY OPEN, AND AIR SHALL BE RE-CIRCULATED AND THE HEATING COIL CONTROL VALVE SHALL BE MODULATED UNTIL COIL ENTERING AIR TEMPERATURE RISE ABOVE 40° F (ADJ.). UPON A RISE IN TEMPERATURE ABOVE 40° F (ADJUSTABLE), THE FREEZESTAT SHALL AUTOMATICALLY RESET, AND THE UNIT SHALL RETURN TO NORMAL OPERATION.

SUPPLY FAN CONTROL:
THE SUPPLY FAN(S) VARIABLE FREQUENCY DRIVES SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.WHEN THE SUPPLY FANS ARE STARTED, THEY SHALL RUN AT THE MINIMUM SPEED REQUIRED TO MAINTAIN ROTATION. MINIMUM SPEED SET POINT SHALL BE COORDINATED WITH THE VARIABLE FREQUENCY DRIVE MANUFACTURER. AFTER SUPPLY FANS ARE RUNNING AND THE DISCHARGE AIR DAMPERS ARE OPEN, THE SOFTWARE CONTROLLER SHALL SLOWLY RAMP UP THE SUPPLY SPEED TO MAINTAIN DISCHARGE AIR FLOW FROM THE UNIT. SUPPLY FAN STATUS SHALL BE MONITORED VIA A CURRENT SENSOR AND FAN DIFFERENTIAL PRESSURE SWITCH.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT/PRESSURE SWITCH.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT/PRESSURE SWITCH.
- SUPPLY FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN FAN CONTROL:
THE RETURN FAN(S) VARIABLE FREQUENCY DRIVES SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. RETURN FAN SHALL TRACK SUPPLY FAN VFD TO MAINTAIN SET DIFFERENTIAL FLOW RATE BETWEEN SUPPLY AND RETURN AIRFLOW. WHEN THE RETURN FANS ARE STARTED, THEY SHALL RUN AT THE MINIMUM SPEED REQUIRED TO MAINTAIN ROTATION. MINIMUM SPEED SET POINT SHALL BE COORDINATED WITH THE VARIABLE FREQUENCY DRIVE MANUFACTURER. RETURN FAN STATUS SHALL BE MONITORED VIA A CURRENT SENSOR AND FAN DIFFERENTIAL PRESSURE SWITCH.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- RETURN FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT/PRESSURE SWITCH.
- RETURN FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT/PRESSURE SWITCH.
- RETURN FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

CONTROLLER SHALL MONITOR AIR FLOW AS FOLLOWS:
1. SUPPLY AIRFLOW MONITORING STATION
2. RETURN AIRFLOW MONITORING STATION
3. OUTSIDE AIRFLOW MONITORING STATION

SUPPLY AIR TEMPERATURE SETPOINT - OUTSIDE AIR RESET:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL RESET FOR COOLING OR HEATING BASED ON OUTSIDE AIR TEMPERATURE AND DEMAND FROM SPACE TEMPERATURE SENSORS

CHILLED WATER COOLING:

THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE CHILLED WATER COOLING COIL VALVE TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT OF 55F(ADJ.).

THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 65° F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.

HOT WATER HEATING :

THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE HOT WATER HEATING TO MAINTAIN SPACE TEMPERATURE SETPOINT OF 65° F (ADJ.).

THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 55° F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

ENTHALPY ECONOMIZER:
THE AHU SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE ECONOMIZER DAMPER IN SEQUENCE TO MAINTAIN A SETPOINT OF 2° F (ADJ.) LESS THAN THE ZONE COOLING SETPOINT. THE OUTSIDE AIR DAMPERS SHALL MAINTAIN A MINIMUM ADJUSTABLE POSITION OF 20% (ADJ.) OPEN WHENEVER OCCUPIED.

ECONOMIZER SHALL BE ENABLED WHENEVER:
OUTSIDE AIR TEMPERATURE IS LESS THAN 65° F (ADJ.)
AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ.)
AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE
AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY
AND THE SUPPLY FAN STATUS IS ON

PRE-FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PRE-FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
PRE-FILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

FINAL FILTER DIFFERENTIAL PRESSURE MONITOR (AHU-3):
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

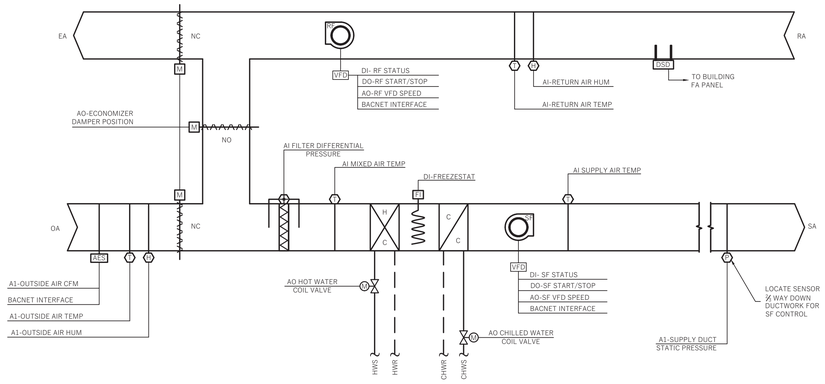
SUPPLY AIR TEMPERATURE:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120° F (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45° F (ADJ.).

UNOCCUPIED CYCLE:

THE SUPPLY AND RETURN FANS AND INTERLOCKED EXHAUST FANS SHALL BE OFF BASED ON A COMMAND FROM THE BMS OPERATOR'S WORKSTATION. THE ECONOMIZER DAMPERS SHALL BE POSITIONED FOR 100% RETURN AIR, THE HEATING COIL CONTROL VALVE SHALL BE FULLY OPEN AND THE COOLING COIL VALVE SHALL BE CLOSED. IF THE SPACE TEMPERATURE DROPS BELOW 60 DEGREES F (ADJUSTABLE), THE SUPPLY AND RETURN FANS SHALL RUN IN THE RECIRCULATION MODE WITH THE HEATING COIL RETURNED TO NORMAL DISCHARGE TEMPERATURE CONTROL, AND THE VAV BOXES PRIMARY AIR DAMPERS OPEN TO THEIR RESPECTIVE MAXIMUM SETTINGS. WHEN THE SPACE TEMPERATURE RISES TO 62 DEGREES F (ADJUSTABLE), THE SUPPLY AND RETURN FANS SHALL SHUT DOWN. COOLING SHALL NOT BE AVAILABLE IN THE UNOCCUPIED CYCLE.



3 VARIABLE AIR VOLUME AHU CONTROL SCHEMATIC - AHU-1

SCALE: N.T.S.

VARIABLE AIR VOLUME AIR HANDLING UNIT SEQUENCE OF OPERATIONS

THE AIR HANDLING UNIT IS A VARIABLE AIR VOLUME SYSTEM. THE BMS CONTRACTOR SHALL PROVIDE A PRIMARY DDC CONTROLLER FOR AIR HANDLING UNIT AND ALL NECESSARY END DEVICES TO ACCOMPLISH THE SEQUENCE OF OPERATIONS AS OUTLINED HEREIN. ALL BMS CONTROLS ARE TO BE FIELD MOUNTED AND WIRED BY THE BMS CONTRACTOR.

RUN CONDITIONS:

THE AIR HANDLING SYSTEM SHALL OPERATE CONTINUOUSLY BASED ON A MANUAL COMMAND BY AN OPERATOR AT THE WORKSTATION. THE OPERATOR SHALL HAVE THE ABILITY TO OVERRIDE THE STARTING OR STOPPING OF AHU FROM THE OPERATOR WORKSTATION OR THE DDC CONTROL UNIT.

STATIC PRESSURE CONTROL:

THE SUPPLY FAN STATIC PRESSURE SHALL BE CONTROLLED BY A STATIC PRESSURE SENSOR LOCATED ⅔ THE WAY DOWN THE SUPPLY DUCTWORK. THE SUPPLY FAN VFD SHALL ADJUST THE FAN SPEED TO MAINTAIN 2.0 INCHES WG (ADJUSTABLE) IN ONE DUCT FOR PROPER OPERATION OF THE VAV BOXES, THE RETURN FAN SHALL TRACK THE SUPPLY FAN.

EMERGENCY SHUTDOWN:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL, CORRESPONDING EXHAUST FAN SHALL ALSO SHUT DOWN.

NIGHT SETBACK
WHEN THE UNIT IS IN THE NIGHT SETBACK, THE UNIT SHALL BE CYCLED TO 50% DESIGN AIR FLOW RATE AND WILL OPERATE CONTINUOUSLY. THE OUTDOOR AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULLY OPEN. IN AND HOT WATER HEATING COIL WILL BE FULL OPEN TO MAINTAIN THE MAXIMUM HEATING DISCHARGE AIR TEMPERATURE SETPOINT.

MORNING WARMUP HEATING MODE:
WHEN THE UNIT IS IN EITHER MORNING WARMUP HEATING, THE SUPPLY FAN WILL OPERATE CONTINUOUSLY. THE OUTDOOR AIR DAMPER AND THE CHILLED WATER COIL SHALL BE CLOSED/OFF. THE RETURN AIR DAMPER SHALL BE FULLY OPEN AND HOT WATER HEATING COIL WILL BE FULL OPEN TO MAINTAIN THE MAXIMUM HEATING DISCHARGE AIR TEMPERATURE SETPOINT AND ALL SPACES MEETING REQUIRED INDOOR TEMPERATURE SETPOINT.

ENTHALPY ECONOMIZER:
THE AHU SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE ECONOMIZER DAMPER IN SEQUENCE TO MAINTAIN A SETPOINT OF 2° F (ADJ.) LESS THAN THE ZONE COOLING SETPOINT. THE OUTSIDE AIR DAMPERS SHALL MAINTAIN A MINIMUM ADJUSTABLE POSITION OF 20% (ADJ.) OPEN WHENEVER OCCUPIED.

ECONOMIZER SHALL BE ENABLED WHENEVER:
OUTSIDE AIR TEMPERATURE IS LESS THAN 65° F (ADJ.)
AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ.)
AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE
AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY
AND THE SUPPLY FAN STATUS IS ON

FREEZE PROTECTION:

THE UNIT COOLING COIL SHALL BE DRAINED DURING WINTER. PROVIDE A TAG AT THE AHU TO INDICATE THAT THAT CHILLED WATER COIL SHALL BE DRAINED EVERY WINTER TO PREVENT FREEZING.

UPON SENSING A FREEZE CONDITION BELOW 38 DEGREES F (ADJUSTABLE) AT THE UNIT FREEZESTAT, THE OUTSIDE AIR DAMPER SHALL COMPLETELY SHUT OFF, THE ECONOMIZER DAMPERS SHALL POSITION FOR 100% RETURN AIR, THE SUPPLY AND RETURN FANS SHALL RUN IN THE RECIRCULATION MODE WITH THE VAV BOXES PRIMARY AIR DAMPERS OPEN TO THEIR RESPECTIVE MAXIMUM SETTINGS. IN ADDITION, THE HEATING COIL CONTROL VALVE SHALL BE POSITIONED FULL OPEN TO FLOW THROUGH THE COIL AND AN ALARM SHALL BE NOTED AT THE BMS OPERATOR'S WORKSTATION. UPON A RISE IN TEMPERATURE ABOVE 40 DEGREES F (ADJUSTABLE), THE FREEZESTAT SHALL AUTOMATICALLY RESET, AND THE UNIT SHALL RETURN TO NORMAL OPERATION.

SUPPLY FAN CONTROL:
THE SUPPLY FAN(S) VARIABLE FREQUENCY DRIVES SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.WHEN THE SUPPLY FANS ARE STARTED, THEY SHALL RUN AT THE MINIMUM SPEED REQUIRED TO MAINTAIN ROTATION. MINIMUM SPEED SET POINT SHALL BE COORDINATED WITH THE VARIABLE FREQUENCY DRIVE MANUFACTURER. AFTER SUPPLY FANS ARE RUNNING AND THE DISCHARGE AIR DAMPERS ARE OPEN, THE SOFTWARE CONTROLLER SHALL SLOWLY RAMP UP THE SUPPLY SPEED TO MAINTAIN STATIC PRESSURE AS SENSED BY A STATIC PRESSURE TRANSMITTER LOCATED 2/3 DUCT DISTANCE AWAY FROM THE UNIT. SUPPLY FAN STATUS SHALL BE MONITORED VIA A CURRENT SENSOR AND FAN DIFFERENTIAL PRESSURE SWITCH.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT/PRESSURE SWITCH.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT/PRESSURE SWITCH.
- SUPPLY FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN FAN CONTROL:
THE RETURN FAN(S) VARIABLE FREQUENCY DRIVES SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. RETURN FAN SHALL TRACK SUPPLY FAN VFD TO MAINTAIN SET DIFFERENTIAL FLOW RATE BETWEEN SUPPLY AND RETURN AIRFLOW. WHEN THE RETURN FANS ARE STARTED, THEY SHALL RUN AT THE MINIMUM SPEED REQUIRED TO MAINTAIN ROTATION. MINIMUM SPEED SET POINT SHALL BE COORDINATED WITH THE VARIABLE FREQUENCY DRIVE MANUFACTURER. RETURN FAN STATUS SHALL BE MONITORED VIA A CURRENT SENSOR AND FAN DIFFERENTIAL PRESSURE SWITCH.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- RETURN FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF AS SENSED BY CURRENT/PRESSURE SWITCH.
- RETURN FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON AS SENSED BY CURRENT/PRESSURE SWITCH.
- RETURN FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

CONTROLLER SHALL MONITOR AIR FLOW AS FOLLOWS:
1. SUPPLY AIRFLOW MONITORING STATION
2. RETURN AIRFLOW MONITORING STATION
3. OUTSIDE AIRFLOW MONITORING STATION

SUPPLY AIR TEMPERATURE SETPOINT - OUTSIDE AIR RESET:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL RESET FOR COOLING OR HEATING BASED ON OUTSIDE AIR TEMPERATURE AND DEMAND FROM SPACE TEMPERATURE SENSORS

CHILLED WATER COOLING:

THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE CHILLED WATER COOLING COIL VALVE TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT OF 55F(ADJ.).

THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 65° F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.

HOT WATER HEATING :

THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE HOT WATER HEATING TO MAINTAIN SPACE TEMPERATURE SETPOINT OF 65° F (ADJ.).

THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 55° F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

FILTER DIFFERENTIAL PRESSURE MONITOR:

THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
FILTER CHANGE REQUIRED: FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

SUPPLY AIR TEMPERATURE:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120° F (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45° F (ADJ.).

UNOCCUPIED CYCLE:

THE SUPPLY AND RETURN FANS AND INTERLOCKED EXHAUST FANS SHALL BE OFF BASED ON A COMMAND FROM THE BMS OPERATOR'S WORKSTATION. THE ECONOMIZER DAMPERS SHALL BE POSITIONED FOR 100% RETURN AIR, THE HEATING COIL CONTROL VALVE SHALL BE FULLY OPEN AND THE COOLING COIL VALVE SHALL BE CLOSED. IF THE SPACE TEMPERATURE DROPS BELOW 60 DEGREES F (ADJUSTABLE), THE SUPPLY AND RETURN FANS SHALL RUN IN THE RECIRCULATION MODE WITH THE HEATING COIL RETURNED TO NORMAL DISCHARGE TEMPERATURE CONTROL, AND THE VAV BOXES PRIMARY AIR DAMPERS OPEN TO THEIR RESPECTIVE MAXIMUM SETTINGS. WHEN THE SPACE TEMPERATURE RISES TO 62 DEGREES F (ADJUSTABLE), THE SUPPLY AND RETURN FANS SHALL SHUT DOWN. COOLING SHALL NOT BE AVAILABLE IN THE UNOCCUPIED CYCLE.

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SIGNATURE

MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

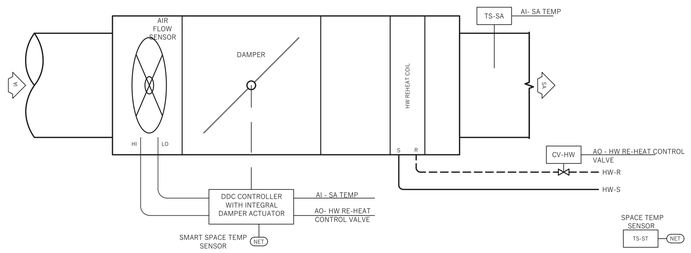
Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:	CONTROL SCHEMATIC - SHEET 2 OF 3
Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-502 1

KeRi Engineering Project No.: 20181

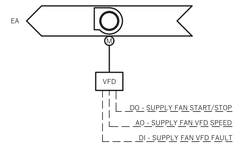


1 TYPICAL VAV BOX(ES) WITH REHEAT CONTROL SCHEMATIC

SCALE: N.T.S.

SEQUENCE OF OPERATION VARIABLE AIR VOLUME BOXES

1. THE SUPPLY AIR DAMPER IS CONTROLLED WITH USER DEFINED SEPARATE HEATING AND COOLING MAXIMUM AND MINIMUM SUPPLY AIR VOLUME SETTINGS (0 TO 100% ADJUSTABLE). AN AIR VELOCITY SENSOR IS USED TO DETERMINE CFM VALUES.
2. THE TERMINAL BOX CONTROLLER MONITORS THE ROOM TEMPERATURE SENSOR AND AIR VELOCITY SENSOR. THE TERMINAL BOX CONTROLLER MODULATES THE SUPPLY AIR DAMPER TO MAINTAIN DESIRED ROOM TEMPERATURE.
3. THE VAV BOX MANUFACTURER SHALL PROVIDE THE BOXES COMPLETE WITH CROSS FLOW SENSORS. THE CONTROL CONTRACTOR SHALL PROVIDE THE DDC CONTROLLER WITH BUILT IN ACTUATOR, SUPPLY AIR SENSOR, TRANSFORMER AND ROOM TEMPERATURE TRANSMITTER.
4. VAV BOXES WILL OPERATE FROM THE CORRESPONDING AHU OCCUPIED/UNOCCUPIED CYCLE.
5. OCCUPIED COOLING MODE:
   a. DURING OCCUPIED COOLING MODE THE BOX WILL MODULATE FROM MINIMUM TO MAXIMUM CFM SETTINGS. THE ROOM TEMPERATURE SENSOR SHALL PROPORTIONATELY POSITION THE AIR DAMPERS TO MAINTAIN DESIRED SPACE TEMPERATURE WITHIN THE CFM RANGE OF THE VAV BOX. ON A CALL FOR COOLING FROM THE ROOM SENSOR THE DDC CONTROLLER SHALL MODULATE THE BOX DAMPER OPEN (TO DELIVER ADDITIONAL SYSTEM AIR) TO MAINTAIN SPACE TEMPERATURE.
   b. AS ROOM TEMPERATURE CONTINUES TO INCREASE THE DDC CONTROLLER SHALL CONTINUE TO MODULATE OPEN UNTIL IT HAS REACHED THE BOX MAXIMUM CFM.
   c. ON A DROP IN SPACE TEMPERATURE, THE DDC CONTROLLER SHALL MODULATE THE BOX DAMPER CLOSED TO DELIVER THE REQUIRED CFM TO MAINTAIN SPACE TEMPERATURE. AS THE ROOM TEMPERATURE CONTINUES TO FALL, THE BOX SHALL CONTINUE TO MODULATE TO THE MINIMUM BOX CFM. ON A CONTINUED DROP IN SPACE TEMPERATURE THE BOX HEATING MINIMUM CFM SET POINT WILL BE ATTAINED AND THE HOT WATER COIL VALVE WILL BE MODULATED OPEN. BOX WILL OPERATE AT MINIMUM CFM AND VALVE WILL MODULATE TO MAINTAIN TEMPERATURE. ADDITIONAL CFM MAY BE INCREASED ONCE VALVE IS FULLY OPEN AND SPACE TEMPERATURE SENSOR CONTINUES TO CALL FOR HEATING.
6. OCCUPIED HEATING MODE:
   a. DURING OCCUPIED HEATING MODE THE BOX WILL MODULATE FROM MINIMUM TO MAXIMUM CFM SETTINGS. THE ROOM TEMPERATURE SENSOR SHALL PROPORTIONATELY POSITION THE AIR DAMPERS TO MAINTAIN DESIRED SPACE TEMPERATURE WITHIN THE CFM RANGE OF THE VAV BOX. ON A CALL FOR HEATING FROM THE ROOM SENSOR THE DDC CONTROLLER SHALL MODULATE THE BOX DAMPER OPEN (TO DELIVER ADDITIONAL SYSTEM AIR) TO MAINTAIN SPACE TEMPERATURE.
   b. AS ROOM TEMPERATURE CONTINUES TO DECREASE THE DDC CONTROLLER SHALL CONTINUE TO MODULATE OPEN UNTIL IT HAS REACHED THE BOX MAXIMUM CFM. IF THE SPACE TEMPERATURE CONTINUES TO DROP THEN THE REHEAT COIL CONTROL VALVE SHALL BE MODULATED OPEN TILL THE SPACE TEMPERATURE IS SATISFIED.
   c. ON AN INCREASE IN SPACE TEMPERATURE, THE DDC CONTROLLER SHALL MODULATE THE BOX DAMPER CLOSE TO DELIVER THE REQUIRED CFM TO MAINTAIN SPACE TEMPERATURE. AS THE ROOM TEMPERATURE CONTINUES TO INCREASE, THE BOX SHALL CONTINUE TO MODULATE TO THE MINIMUM BOX CFM. ON A CONTINUED INCREASE IN SPACE TEMPERATURE THE BOX HEATING MINIMUM CFM SET POINT WILL BE ATTAINED AND THE HOT WATER COIL VALVE WILL BE MODULATED CLOSE.
7. UNOCCUPIED MODE
   a. DURING THE UNOCCUPIED MODE, THE VAV BOX WILL FUNCTION AS FOLLOWS: UPON COMMAND FROM THE CORRESPONDING AIR CONDITIONING UNIT'S CONTROL PANEL TO CHANGEOVER TO UNOCCUPIED MODE, THE TERMINAL BOX CONTROLLER WILL CONTROL USING THE UNOCCUPIED HEATING AND COOLING SET POINTS (55F AND 85F ADJUSTABLE).
8. THE ROOM SENSOR SHALL HAVE LOCAL SET POINT ADJUSTMENT AND OCCUPIED/UNOCCUPIED - HEATING/COOLING SET POINTS SHALL BE ESTABLISHED BY OWNER.



2 EXHAUST FAN WITH VFD CONTROL SCHEMATIC

SCALE: NTS

EF-8, 10, AND 12 EXHAUST FANS SEQUENCE OF OPERATIONS

EXHAUST FANS SHALL BE CONSTANT VOLUME TYPE AND ARE TO BE CONTROLLED AND MONITORED VIA THE BMS SYSTEM. THE BMS CONTRACTOR SHALL PROVIDE, FIELD INSTALL AND WIRE THE NECESSARY DDC CONTROLLERS AND END DEVICES TO ACCOMPLISH THE SEQUENCE AS OUTLINED HEREIN.

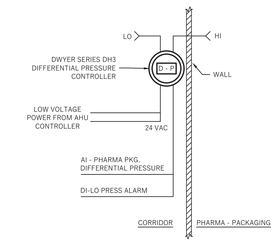
RUN CONDITIONS:

EF-8, 10 AND 12:

EXHAUST FAN SHALL BE PROGRAMMED THROUGH THE EXHAUST FAN VFD TO OPERATE AT TWO FIXED SPEEDS AS INDICATED BELOW, TO MATCH OPERATION OF CORRESPONDING AHU-4.
OCCUPIED MODE - MAXIMUM SPEED AND DESIGN AIR FLOW RATE
UNOCCUPIED MODE - MINIMUM SPEED AND 50% OF DESIGN AIR FLOW RATE.

FAN STATUS:
FAN STATUS SHALL BE SENSED BY VFD AND SHALL PROVIDE FAN STATUS AND ALARM AT THE BMS

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON



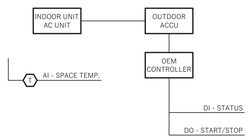
3 ROOM DIFFERENTIAL PRESSURE CONTROL

SCALE: N.T.S.

DIFFERENTIAL PRESSURE CONTROL

THE DIFFERENTIAL PRESSURE BETWEEN THE PHARMACEUTICAL SPACES AND THE CORRIDOR SHALL BE CONTROLLED BY DIGIHELIC DIFFERENTIAL PRESSURE CONTROLLER WHICH SHALL, THROUGH ITS RESPECTIVE AHU PRIMARY DDC CONTROLLER, MODULATE THE AHU OUTSIDE-RETURN AND EXHAUST AIR DAMPERS IN UNISON AS REQUIRED TO MAINTAIN ITS SETPOINT. THE DIFFERENTIAL PRESSURE SHALL BE MONITORED IN A DESIGNATED ROOM FOR EACH AHU.

AN AUDIBLE/ VISUAL ALARM LIGHT SHALL BE LOCATED ON THE LOCAL MOUNTING CABINET FOR EACH RESPECTIVE DIFFERENTIAL PRESSURE CONTROLLER TO INDICATE LOW ROOM PRESSURE IN THE DESIGNATED ROOM SERVED BY THE RESPECTIVE AHU. THE AUDIBLE/VISUAL ALARM SHALL BE INITIATED WHEN THE ROOM PRESSURE OPERATES BELOW THE DESIGN SETPOINT FOR A 60 SECOND PERIOD. THE AUDIBLE ALARM MAY BE SILENCED BY PRESSING A BLUE BUTTON ON THE FACE OF THE CONTROLLER CABINET. WHENEVER THE BUTTON IS IN SILENCE MODE, THE BUTTON WILL ILLUMINATE.



4 SPLIT AIR CONDITIONING UNIT CONTROL SCHEMATIC

SCALE: NTS

SPLIT AIR CONDITIONING UNIT SEQUENCE OF OPERATIONS

UNIT SHALL BE OPERATED FROM MANUFACTURER PROVIDED OEM CONTROL PANEL AND SEQUENCE OF OPERATION.

RUN CONDITIONS:
UNITS SHALL BE OPERATED CONTINUOUSLY TO MAINTAIN SPACE SET POINT CONDITION 72° F. (ADJ.) THE OPERATOR SHALL HAVE THE ABILITY TO OVERRIDE THE START OR STOP OPERATION.

ALARM CONDITION:
WHEN SPACE TEMPERATURE CONDITION IS NOT MAINTAINED FOR MORE THAN 15 MIN (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS.

COOLING MODE:
UNIT SHALL BE OPERATED CONTINUOUSLY TO MAINTAIN SPACE SET POINT TEMPERATURE OF 72° F. (ADJ.).

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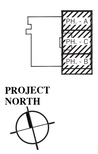
SIGNATURE

MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

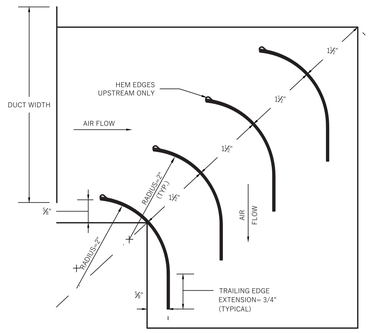
77 Brenner Drive
Congers, New York

Drawing Title:
CONTROL SCHEMATIC - SHEET 3 OF 3

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-503

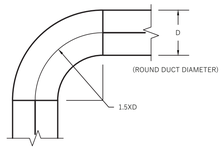
KeRi Engineering Project No.: 20181



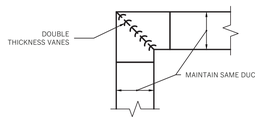
1 SQUARE ELBOW WITH TURNING VANES
SCALE: N.T.S.

NOTES:

1. ALL TURNING VANES TO BE MADE OF 18 GAUGE GALV. SHEET METAL, 2" RADIUS, 1 1/2" SPACING ON DIAGONAL, 3/4" TRAILING EDGE, SINGLE THICKNESS, FOR DUCT VELOCITIES ABOVE 2000 FPM.
2. EDGES OF VANES SHALL BE CLEANLY SHEARED WITH NO BURRS, ETC.
3. VANES SHALL BE SECURELY WELDED TO RUNNERS, AND WELD RUNNERS TO DUCT SIDES, AS SHOWN FOR IN SMACNA MANUAL.

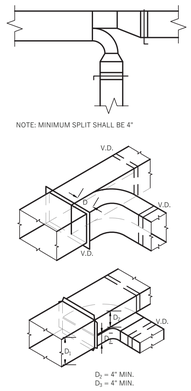


2 ROUND ELBOW
SCALE: N.T.S.



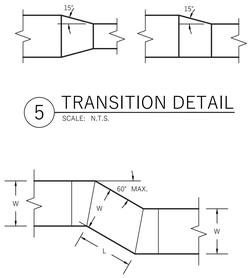
ELBOWS 8" AND SMALLER SHALL BE RADIUS ELBOWS ONLY.

3 SQUARE ELBOW WITH TURNING VANES
SCALE: N.T.S.

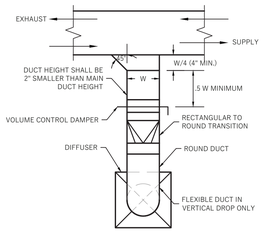


D_1 = 4" MIN.
D_2 = 4" MIN.

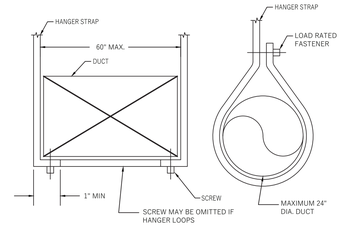
4 DUCT SPLIT FOR BRANCHES
SCALE: N.T.S.



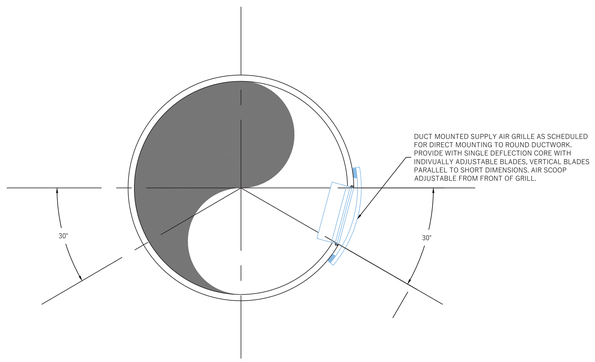
6 OFFSET MITERED
SCALE: N.T.S.



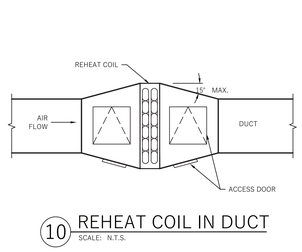
7 CEILING DIFFUSER CONNECTION DETAIL
SCALE: N.T.S.



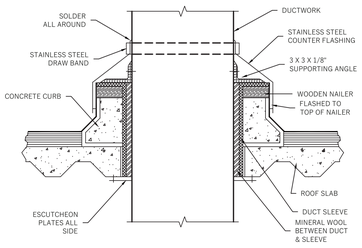
8 DUCT STRAP HANGER DETAIL
SCALE: N.T.S.



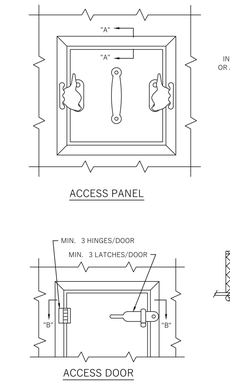
9 TYPICAL SUPPLY AIR GRILLE DETAIL
SCALE: N.T.S.



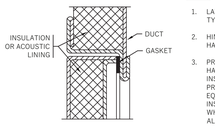
10 REHEAT COIL IN DUCT
SCALE: N.T.S.



11 DUCT PENETRATION DETAIL THROUGH ROOF
SCALE: N.T.S.



ACCESS PANEL

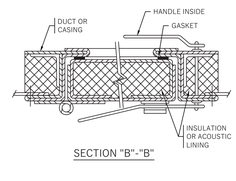


SECTION "A"-"A"

NOTES:

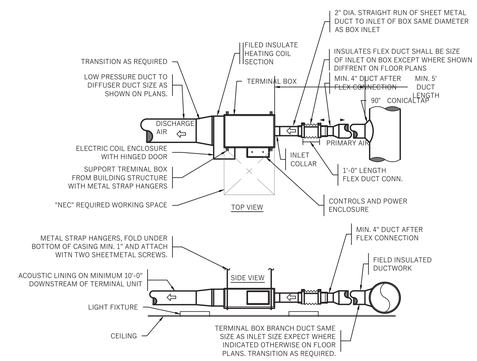
1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS
3. PROVIDE ACCESS DOORS ON AIR HANDLING UNITS AND DUCT WORK INSTALLED IN EQUIPMENT ROOMS. PROVIDE ACCESS PANELS ON ALL EQUIPMENT AND DUCTWORK INSTALLED ABOVE FINISHED CEILINGS WHERE SPACE LIMITATIONS DO NOT ALLOW HINGED DOORS TO OPEN.
4. ACCESS DOOR INSTALLED IN THE DUCT EXPOSED TO WEATHER TO BE WEATHERPROOF. ALL HARDWARE SHALL BE STAINLESS STEEL.

ACCESS DOOR



SECTION "B"-"B"

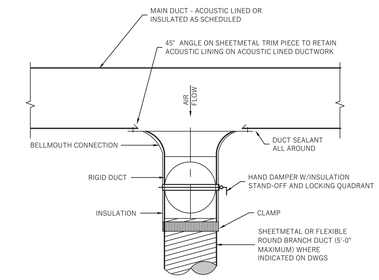
12 ACCESS DOOR & PANEL DETAILS
SCALE: N.T.S.



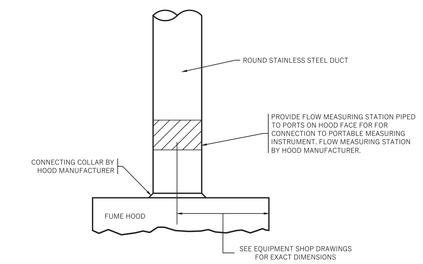
NOTES:

1. DO NOT INSTALL TERMINAL BOX DIRECTLY OVER LIGHT FIXTURES.
2. DO NOT INSTALL TERMINAL BOX OVER CABLE TRAY.
3. REFER TO PLANS FOR DUCT SIZES.

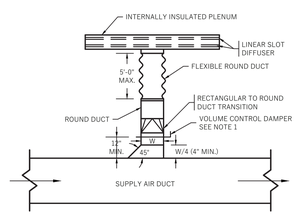
13 TYPICAL CAV/VAV BOX CONNECTION DETAIL
SCALE: N.T.S.



14 BELLMOUTH BRANCH DUCT TAKE - OFF DETAIL
SCALE: N.T.S.

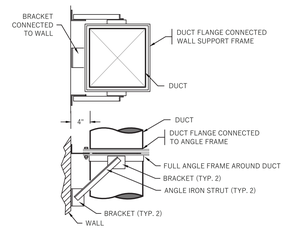


15 TYPICAL FUME HOOD DUCT CONNECTION
SCALE: N.T.S.



16 LINER DIFFUSER CONNECTION DETAIL
SCALE: N.T.S.

NOTES:
1. PROVIDE CORD OPERATED VOLUME DAMPER WHEN INSTALLED IN INACCESSIBLE CEILING.



17 WALL SUPPORT FOR DUCT
SCALE: N.T.S.

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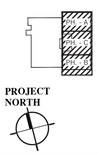
SIGNATURE

MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

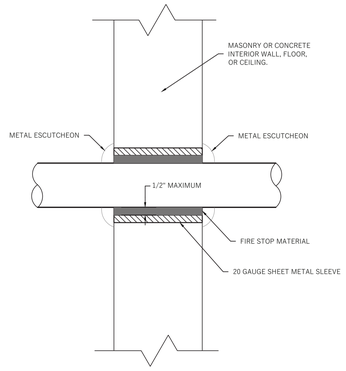
77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL DETAILS - SHEET 1 OF 2

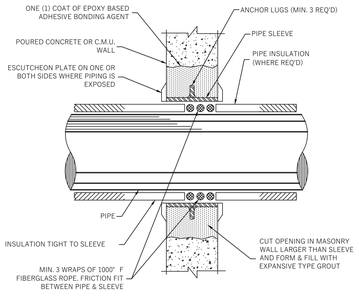
Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-601

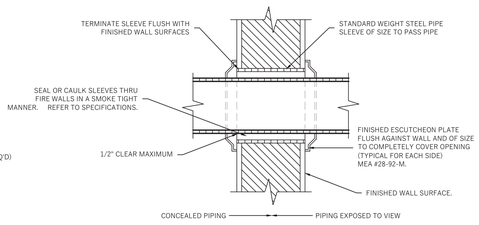
KeRi Engineering Project No.: 20181



1 PIPE PENETRATION IN INTERIOR WALL/FLOOR/CEILING
SCALE: N.T.S.



2 INSULATED PIPE PENETRATION IN CONCRETE / CMU WALL DETAIL
SCALE: N.T.S.



3 PIPE PENETRATION THRU RATED WALL SHOWN (SLAB PENETRATION SIMILAR)
SCALE: N.T.S.

SLEEVE AND ESCUTCHEONS:

A. SLEEVES FOR PIPING THROUGH MASONRY WALL SHALL BE SCHEDULE 40, STANDARD GALVANIZED STEEL PIPE; IN FRAMED PARTITIONS SHALL BE 20 GAUGE SHEET METAL. THE SPACE BETWEEN THE PIPE AND ITS SLEEVE SHALL NOT EXCEED 1/2". THE SLEEVE SHALL HAVE A SUFFICIENT LENGTH TO BE FLUSH WITH THE FINISHED WALL SURFACES.

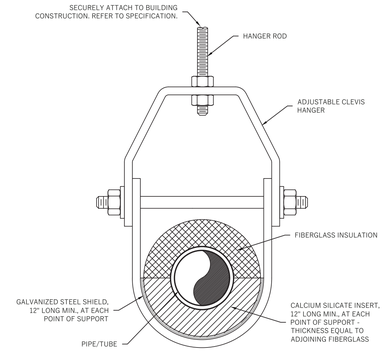
B. EXPOSED PIPING PASSING THROUGH WALLS, FLOORS, OR CEILINGS SHALL BE FITTED WITH CHROMIUM-PLATED CAST BRASS ESCUTCHEONS WITH FASTENING SET SCREWS.

CUTTING AND PATCHING:

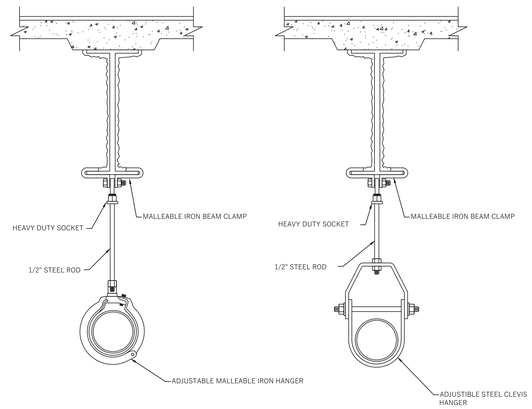
A. PIPING PASSING THROUGH WALLS SHALL HAVE A TRIM OPENING CUT NO GREATER THAN NECESSARY FOR THE INSTALLATION OF A SLEEVE SECURED THEREIN.

B. PIPING PASSING THROUGH CONCRETE FLOORS SHALL HAVE AN OPENING CORE DRILLED SO THAT THE SPACE BETWEEN THE OPENING AND THE PIPE SHALL NOT EXCEED 1/2".

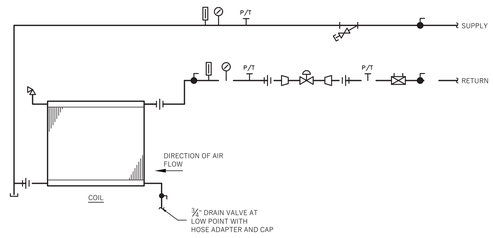
C. ANNULAR SPACES BETWEEN PIPING AND SLEEVES OR CORE DRILLED FLOOR OPENINGS SHALL BE PACKED WITH MINERAL WOOL AND SEALED, TO RETAIN THE FIRE INTEGRITY OF THE WALLS AND FLOORS, WITH NON-HARDENING COMPOUND SIMILAR OR EQUAL TO DUXSEAL AS MANUFACTURED BY THE J.M. CLIPPER CORP.



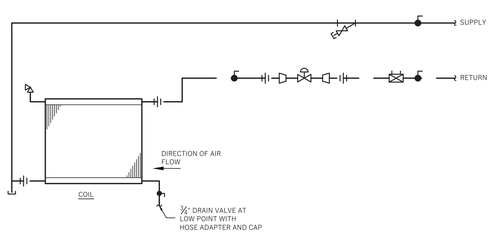
4 ADJUSTABLE CLEVIS HANGER DETAIL
SCALE: N.T.S.



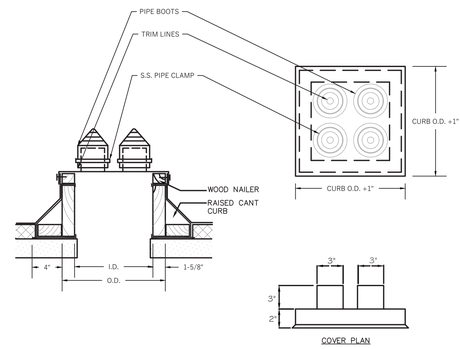
5 PIPE HANGERS FOR PIPE 4" DIAM. AND SMALLER FOR STEEL BEAM CONSTRUCTION
SCALE: N.T.S



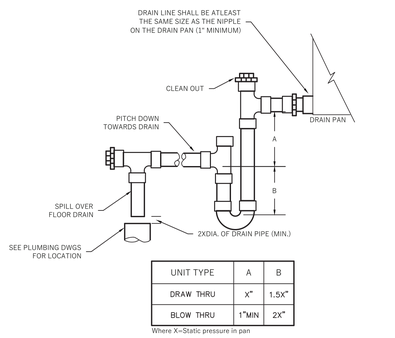
6 TYPICAL AHU COIL CONNECTION DETAIL
SCALE: NTS



7 TYPICAL REHEAT COIL CONNECTION DETAIL
SCALE: NTS



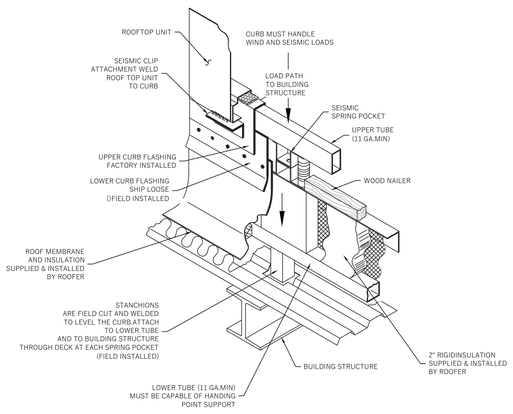
8 PIPE PORTAL FOR ROOF PENETRATION DETAIL
SCALE: N.T.S.



UNIT TYPE	A	B
DRAW THRU	X"	1.5X"
BLOW THRU	1"MIN	2X"

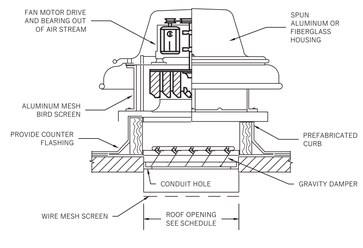
Where X=Static pressure in pan

9 AIR HANDLING UNIT DRAIN TRAP DETAIL
SCALE: N.T.S.

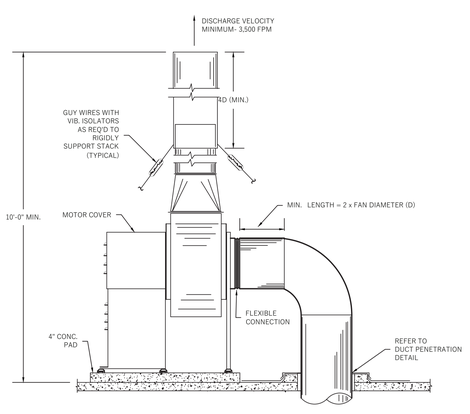


10 INSTALLATION DETAIL OF ROOF CURB OR EQUIPMENT SUPPORTS TO STRUCTURE
SCALE: N.T.S.

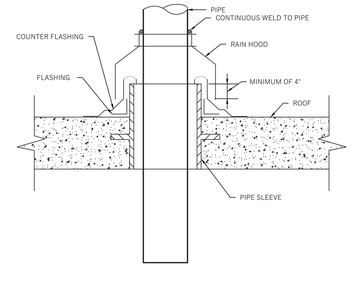
VMC INC.SPEC TYPE-E & F ISOLATOR BASE W/RESTRAINT V



11 ROOF EXHAUST FAN DETAIL
SCALE: N.T.S.



12 EXHAUST STACK DETAIL
SCALE: N.T.S.



13 PIPE PENETRATION THROUGH ROOF
SCALE: N.T.S.

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SIGNATURE

MITUL PATEL, P.E.

Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:

Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL DETAILS - SHEET 2 OF 2

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-602

KeRi Engineering Project No.: 20181

I. GENERAL REQUIREMENTS

A. SCOPE OF WORK

1. PERFORM ALL NECESSARY CUTTING, PATCHING AND PAINTING OF WALLS, FLOORS AND ROOF EXISTING TO MATCH. FILL IN CLEARANCES AROUND PIPE WITH FIRE RETARDANT SEALANT MATERIAL.
2. ALL WORK FLOOR AREA, ROOF AREA SHALL BE PROTECTED FROM DAMAGE, DUST AND DIRT. PROVIDE SUFFICIENT FIREPROOF TARPAULINS AND PLYWOOD IN WORK AREA.
3. PROVIDE DUST PROOF PARTITIONS CLOSING THE WORK AREA FROM THE REMAINDER OF THE OCCUPIED SPACES.
4. EXISTING SURFACES WHICH ARE DAMAGED OR DISTURBED DURING DEMOLITION OR CONSTRUCTION SHALL BE PATCHED AND REPAIRED TO MATCH EXISTING SURFACES TO THE SATISFACTION OF THE ENGINEER AND OWNER.
5. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT SITE AND PERFORM A COMPLETE SURVEY OF ALL EXISTING CONDITIONS AND SHALL MAKE NOTE OF ANY OBSTRUCTIONS AND INTERFERENCE OF NEW WORK WITH EXISTING EQUIPMENT, WORK AND FIELD CONDITIONS. ANY MATERIAL OR WORK NOT SHOWN ON DRAWING BUT NECESSARY TO MAKE THE WORK COMPLETE SHALL BE PROVIDED WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
6. UPON COMPLETION OF INSTALLATION, PERFORM TESTING OF ENTIRE INSTALLATION AND ALL SAFETY FEATURES SHALL BE TESTED IN THE PRESENCE OF THE OWNERS REPRESENTATIVE.
7. ALL WORK SHALL BE DONE IN ACCORDANCE WITH APPLICABLE CODE.
8. PROMPTLY REMOVE ALL DEBRIS FROM SITE AND BROOM CLEAN THE WORK AREA AT THE END OF EACH DAY.

B. SHOP DRAWINGS

1. SUBMIT A MAXIMUM OF SIX (6) COPIES OF ALL EQUIPMENT, MATERIALS, PIPING AND WIRING DIAGRAM FOR ENGINEER'S REVIEW PRIOR TO PURCHASE OR FABRICATION OR INSTALLATION AND FURTHER OBTAIN WRITTEN COMMENTS AND APPROVAL FOR THE SAME.
2. FAILURE TO SUBMIT SHOP DRAWINGS IN AMPLE TIME FOR CHECKING SHALL NOT ENTITLE AN EXTENSION OF CONTRACT TIME, AND NO CLAIM FOR EXTENSION BY REASON OF SUCH DEFAULT WILL BE ALLOWED.

C. OPERATION AND MAINTENANCE MANUALS

1. AFTER INSTALLATION IS COMPLETE, INSTRUCT THE OWNER'S REPRESENTATIVE IN THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND SYSTEMS. SUBMIT THREE (3) COPIES OF ALL OPERATION AND MAINTENANCE MANUALS TO OWNERS REPRESENTATIVES.

D. AS BUILT

1. SUBMIT THREE (3) COPIES OF "AS BUILT" DRAWINGS AFTER INSTALLATION IS TESTED.

E. EXECUTION

1. VERIFY FINAL LOCATIONS FOR ROUGH-INS WITH FIELD MEASUREMENTS AND WITH THE REQUIREMENTS OF THE EQUIPMENT TO BE CONNECTED.
2. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS GIVING RIGHT-OF-WAY PRIORITY TO SYSTEMS REQUIRED TO BE INSTALLED AT A SPECIFIC TIME.
3. PERFORM CUTTING, PATCHING AND PAINTING OF FINISHED SURFACES, SLABS, STRUCTURAL AND BUILDING COMPONENTS TO FACILITATE INSTALLATION AND/OR DEMOLITION OF MECHANICAL EQUIPMENT.

F. WARRANTY

1. ALL EQUIPMENT FURNISHED AND INSTALLED UNDER THIS CONTRACT SHALL BE COVERED BY A FULL, ONE YEAR GUARANTEE. THE WARRANTY SHALL COMMENCE ON THE DATE OF BENEFICIAL OCCUPANCY.

II. PIPING

A. GENERAL

1. PROVIDE NEW PIPING WORK AS NECESSARY FOR NEW EQUIPMENT.
2. ALL EXPOSED PIPING SHALL BE RUN PERPENDICULAR AND/OR PARALLEL TO FLOORS, INTERIOR WALLS, ETC. PIPING AND VALVES SHALL BE GROUPED NEATLY AND SHALL BE RUN SO AS TO AVOID REDUCING HEADROOM OR PASSAGE CLEARANCE.
3. ALL PIPING CONNECTIONS TO COILS AND EQUIPMENT SHALL BE MADE WITH OFFSETS PROVIDED WITH SCREWED OR WELDED BOLTED FLANGES SO ARRANGED THAT THE EQUIPMENT CAN BE SERVICED OR REMOVED WITHOUT DISMANTLING THE PIPING.
4. COPPER TUBING SHALL BE ERECTED NEATLY IN A WORKMANLIKE MANNER. ALL CHANGES IN DIRECTION SHALL BE MADE WITH FITTINGS. APPROVED SEAL-TO-PIPE THREADED ADAPTERS SHALL BE PROVIDED FOR JUNCTIONS WITH EQUIPMENT HAVING THREADED CONNECTIONS.
5. THE ENDS OF ALL PIPE AND NIPPLES SHALL BE THOROUGHLY REAMED TO THE FULL INSIDE DIAMETER OF THE PIPE AND ALL BURRS FORMED IN THE CUTTING OF THE PIPES SHALL BE REMOVED.
6. PIPING AND ALL EQUIPMENT AND VALVE SHALL BE SUPPORTED TO PREVENT STRAINS OR DISTORTIONS IN THE CONNECTED EQUIPMENT AND VALVES. PIPING SHALL BE SUPPORTED TO ALLOW FOR REMOVAL OF EQUIPMENT, VALVES AND ACCESSORIES WITH A MINIMUM OF DISMANTLING AND WITHOUT REQUIRING ADDITIONAL SUPPORTS AFTER THESE ITEMS ARE REMOVED.
7. SCREW THREADS SHALL BE CUT CLEAN AND TRUE; SCREW JOINTS SHALL BE TIGHT WITHOUT CAULKING. NO CAULKING WILL BE PERMITTED. A NON-HARDENING LUBRICANT SHALL BE USED. NO CUSHIONS SHALL BE USED. REDUCTIONS, OTHERWISE CAUSING OBJECTIONABLE WATER OR AIR POCKETS, ARE TO BE MADE WITH ECCENTRIC REDUCERS OR ECCENTRIC FITTINGS.
8. PITCH DRAIN PIPING 1/8 INCH PER FOOT IN THE DIRECTION OF FLOW. AVOID 90 DEGREE LIFT SET-UPS IN LINES BY USING 45 DEGREE ELLS.
9. ALL PIPE SHALL BE NEW, FREE FROM SCALE OR RUST, AND OF THE MATERIAL AND WEIGHT SPECIFIED UNDER THE VARIOUS SERVICES. EACH LENGTH OF PIPE SHALL BE PROPERLY MARKED AT THE MILL FOR PROPER IDENTIFICATION WITH NAME OR SYMBOL OF MANUFACTURER.
10. SOLDER JOINTS SHALL BE MADE WITH 95-5 SOLDER FOR FITTINGS ON WATER PIPING, AND SILVER SOLDER FOR FITTINGS ON REFRIGERANT PIPING.
11. PROVIDE PIPE SLEEVES WHERE PIPING PENETRATES OUTSIDE WALL OR ROOF. ALL SLEEVES SHALL BE PACKED WITH OAKUM BETWEEN PIPE AND SLEEVE. SEAL OPENING WITH UL APPROVED SILICONE SEALANT.
12. USE DI-ELECTRIC UNIONS AT THE JOINTS OF DISSIMILAR MATERIAL PIPING.

B. PIPE SPECIFICATIONS

A. REFRIGERANT PIPING:

1. PIPE: SEAMLESS COPPER TUBING, TYPE ACR, HARD DRAWN; ASTM B280.
2. JOINTS: SOLDERED.
3. FITTINGS: WROUGHT COPPER SOLDER JOINT PRESSURE FITTINGS; ANSI B16.22.
4. JOINT MATERIALS: GRADE 95 TA SOLDER; ASTM B32.
5. SHUT-OFF VALVES: DIAPHRAGM TYPE, FORGED BRASS BODY AND BONNET, POSITIVE BACK SEATING WHEN FULLY OPEN, RAISED SEAT WITH NYLON SEAT DISC, STAINLESS STEEL SPRING, FLARED OR SOLDERED CONNECTIONS, UL LISTED. HENRY VALVE COMPANY GOLDEN BANTAM OR APPROVED EQUAL.
6. CHECK VALVES:FORGED BRASS BODY, TEFLON SEAT, GUIDED PISTON, STAINLESS STEEL SPRING, ACCESSIBLE INTERNAL ARTS, OPERABLE IN ALL POSITIONS. RATED FOR 300F AND 500PSI. HENRY VALVE COMPANY TYPE 1160 OR APPROVED EQUAL.

B. CHILLED WATER, MAKE-UP WATER, HOT WATER AND DUAL TEMPERATURE WATER AND CONDENSER WATER (SEE PARAGRAPH C FOR PIPING EXPOSED IN MECHANICAL ROOMS)

1. PIPE
   a. 2" AND SMALLER: TYPE L HARD DRAWN, SEAMLESS COPPER; ASTM B88.
   b. 2 ½" TO 6": SCHEDULE 40, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   c. 8" TO 12" : SCHEDULE 30, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
2. JOINTS:
   a. 2" AND SMALLER: SOLDERED.
   b. 2 ½" AND LARGER: BUTT-WELDED.
3. JOINT MATERIAL:
   a. 2" AND SMALLER: GRADE 95 TA SOLDER; ASTM B32.
   b. 2 ½" AND LARGER: WELDED; ANSI/AWS D1.1.
4. FITTINGS:
   a. 2" AND SMALLER: WROUGHT COPPER, SOLDERED; ANSI/ASME B16.22.
   b. 2 ½" AND LARGER: WALL THICKNESS AS SPECIFIED FOR PIPE, UTT-WELDED, FLANGED AT VALVE AND EQUIPMENT CONNECTIONS, LONG RADIUS ELBOWS; ASTM A234, ANSI B16.9.
5. UNIONS:
   a. 2" AND SMALLER: BRONZE, SOLDERED JOINT.
   b. 2 ½" AND 3": MALLEABLE-IRON, GROUND JOINT, THREADED.
6. FLANGES:
   a. 2" AND SMALLER: CAST BRONZE, COMPANION TYPE, 150PSI; ANSI B16.24.
   b. 2 ½" AND LARGER: RAISED-FACE, WELDING NECK, FORGED STEEL, 150PSI (FLAT FACED WHEN MATCHED TO 125PSI FLANGES); ASTM A181, ANSI B16.5
7. BOLTS AND NUTS: CARBON STEEL HEX HEAD STUDS WITH HEAVY HEX NUTS; ASTM A307 GRADE B, ASTM A 194 GRADE 2H.
8. GASKETS: MATERIAL, THICKNESS, PRESSURE AND TEMPERATURE TO SUIT SYSTEM (RING TYPE FOR RAISED FACE; FULL FACE FOR FLAT FACED).
9. DIELECTRIC FITTINGS: ISOLATION FLANGES, UNIONS & COUPLINGS, EPCO SALES INC OR APPROVED EQUAL.
10. SHUT-OFF VALVES:
   a. 2 INCH AND SMALLER: 400PSI TWO-PIECE, BRONZE BODY BALL VALVE, SOLDERED JOINT, GRINNELL FIGURE 3500SJ OR APPROVED EQUAL.
   b. 2 1/2 TO 36 INCH: 150/200PSI DUCTILE IRON, LUG TYPE, QUARTER TURN BUTTERFLY VALVE, BRONZE ALUMINUM DISC, EPDM SEAT, MULTI-POSITION LOCKING HANDLE, GEAR OPERATED ABOVE 6 INCH SIZE GEAR OPERATED WITH CHAIN- WHEEL WHERE SPECIFIED, STEM 316 SS WITH TFE BUSHING, GRINNELL LD- 828 OR APPROVED EQUAL.
11. GLOBE VALVES:
   a. 2 INCH AND SMALLER: 200PSI BRONZE, RENEWABLE DISC, RISING STEM, UNION BONNET, SOLDERED JOINT, GRINNELL FIGURE 3240SJ OR APPROVED EQUAL.
   b. 2 1/2 TO 10 INCH: 200PSI FLANGED IRON BODY, BRONZE MOUNTED, YOKE TOP, BOLTED BONNET, NIBCO FIGURE F718B OR APPROVED EQUAL.
12. CHECK VALVES:
   a. 2 INCH AND SMALLER: 300PSI BRONZE, RENEWABLE DISC, THREADED BONNET, SOLDERED JOINTS, SWING TYPE, GRINNELL FIGURE 3300SJ OR APPROVED EQUAL.
   b. 2 1/2 TO 30 INCH: 150PSI FLANGED IRON BODY, BRONZE RENEWABLE SEAT AND DISC, GLOBE STYLE SILENT CHECK, GRINNELL FIGURES 502 1/2 TO 530 OR APPROVED EQUAL.
13. BALANCING VALVES:
   a. SIZE 2" AND SMALLER - BALANCING VALVES 2" AND SMALLER SHALL BE THE BELL AND GOSSETT OR EQUAL CIRCUIT SETTER PLUS, WITH PRESET BALANCE FEATURE, POSITIVE SHUT OFF, MEMORY STOP, DRAWING PLUG, READOUT VALVES, PRE-INSTALLED. BRONZE BODY, BRASS BALL CONSTRUCTION. DESIGN PRESSURE AND TEMPERATURE (MAX.) 300PSI AT 250° F. CALIBRATED NAME PLATE, PROVIDE BALANCE CALCULATOR.
   b. SIZE 2½" AND LARGER - BALANCING VALVES 2½" AND LARGER SHALL BE OF THE LUBRICATED PLUG TYPE, TIGHT SHUT OFF WITH AN ADJUSTABLE STOP AND POSITION INDICATOR. MANUFACTURERS: ROCKWELL NORDSTROM, KEYSTONE OR WALWORTH OR APPROVED EQUAL. (PROVIDE GREASE EXTENTIONS.)

C. CHILLED WATER, MAKE-UP WATER, HOT WATER, DUAL TEMPERATURE WATER AND CONDENSER WATER, EXPOSED IN MECHANICAL ROOMS:

1. PIPE:
   a. 2" AND SMALLER: TYPE L HARD DRAWN, SEAMLESS COPPER; ASTM B88.
   b. 2 1/2 TO 6 INCH: SCHEDULE 40, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   c. 8 TO 12 INCH: SCHEDULE 30, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   d. 14 TO 24-INCH: STANDARD WEIGHT, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   e. 26 TO 60-INCH: 0.500-INCH WALL THICKNESS, WELDED O.D. OR SPIRAL BUTT WELD PIPE; ASTM A139, GRADE B.
2. JOINTS:
   a. 2 INCH AND SMALLER: SOLDERED.
   b. 2 1/2 TO 24 INCH: BUTT-WELDED.
   c. 26 TO 60 INCH: WELDED.
3. JOINT MATERIAL:
   a. 2 INCH AND SMALLER: GRADE 95 TA SOLDERED; ASTM B32.
   b. 2 1/2 INCH AND LARGER: WELDED, ANSI/AWS D1.1.
4. FITTINGS:
   a. 2" AND SMALLER: WROUGHT COPPER, SOLDERED; ANSI/ASME B16.22.
   b. 2 1/2 TO 24 INCH: WALL THICKNESS AS SPECIFIED FOR PIPE, ROLL GROOVED MECHANICAL JOINT, FLANGED AT VALVE AND EQUIPMENT CONNECTIONS, LONG RADIUS ELBOWS; ASTM A234, ANSI B16.9.
   c. 26 TO 60 INCH: WALL THICKNESS AS SPECIFIED FOR PIPE, BUTT-WELDED, FLANGED AT VALVE AND EQUIPMENT CONNECTIONS, LONG RADIUS ELBOWS; ASTM A234, ANSI B16.9.
5. UNIONS
   a. 2 INCH AND SMALLER: SOLDERED JOINT BRONZE.
   b. 2-1/2" TO 3": MALLEABLE-IRON, GROUND JOINT, THREADED.
6. FLANGES:
   a. 2"& SMALLER: CAST BRONZE, COMPANION TYPE, 150PSI; ANSI B.16.24.
   b. 2 1/2 TO 24 INCH: VIC FLANGE, STYLE 741 OR 742, STEEL, 150PSI; 125PSI RATED WHEN MATCHED TO 125PSI FLANGES.
   c. 26 INCH AND LARGER: RAISED-FACE, WELDING NECK, FORGED STEEL, 150PSI; ASTM A181, ANSI B16.5.
7. BOLTS AND NUTS: HEAT TREATED CARBON STEEL HEX HEAD STUDS WITH HEAVY HEX NUTS, MINIMUM TENSILE 110,000PSI; ASTM A183.
8. GASKETS:
   a. 2 INCH AND SMALLER: MATERIAL, THICKNESS, PRESSURE AND TEMPERATURE TO SUIT SYSTEM (RING TYPE FOR RAISED FACE; FULL FACE FOR FLAT FACED).
   b. 2 1/2 INCH AND LARGER: EPDM GRADE E, FOR WATER SERVICE UP TO 230 DEGREES F; ASTM D2000.
9. DIELECTRIC FITTINGS: ISOLATION FLANGES, UNIONS & COUPLINGS, EPCO SALES, INC OR APPROVED EQUAL.
10. JOINT COUPLINGS (2 1/2 INCH TO 24 INCH): ROLL GROOVED, STYLE 07, MALLEABLE IRON, "ZERO FLEX" OR APPROVED EQUAL.
11. SHUT-OFF VALVES:
   a. 2 INCH AND SMALLER: 400 PSI TWO-PIECE, BRONZE BODY BALL VALVE, SOLDERED JOINT, GRINNELL FIGURE 3500SJ OR APPROVED EQUAL.
   b. 2 1/2 TO 36 INCH: 150/200 PSI DUCTILE IRON, LUG TYPE, QUARTER TURN BUTTERFLY VALVE, BRONZE ALUMINUM DISC, EPDM SEAT, MULTI-POSITION LOCKING HANDLE, GEAR OPERATED ABOVE 6 INCH SIZE, GEAR OPERATED WITH CHAIN-WHEEL WHERE SPECIFIED, WITH 316SS WITH TFE BUSHING GRINNELL LD-828 OR APPROVED EQUAL.
12. GLOBE VALVES:
   a. 2 INCH AND SMALLER: 200PSI BRONZE, RENEWABLE DISC, RISING STEM, UNION BONNET SOLDERED JOINT, GRINNELL FIGURE 3240SJ OR APPROVED EQUAL.
   b. 2 1/2 INCH TO 10 INCH: 200PSI FLANGED IRON BODY, BRONZE DISC, BRONZE MOUNTED, YOKE TOP, BOLTED BONNET, NIBCO FIGURE F7188 OR APPROVED EQUAL.
13. CHECK VALVES:
   a. 2 INCH AND SMALLER: 300PSI BRONZE, RENEWABLE DISC, THREADED BONNET, SOLDERED JOINTS, SWING TYPE, GRINNELL FIGURE 3300SJ OR APPROVED EQUAL.
   b. 2 1/2 TO 30 INCH: 150PSI FLANGED IRON BODY, BRONZE RENEWABLE SEAT AND DISC, GLOBE STYLE SILENT CHECK, GRINNELL FIGURES 502½ TO 530 OR APPROVED EQUAL.
14. BALANCING VALVES:
   a. SIZE 2" AND SMALLER - BALANCING VALVES 2" AND SMALLER SHALL BE THE BELL AND GOSSETT OR EQUAL CIRCUIT SETTER PLUS, WITH PRESET BALANCE FEATURE, POSITIVE SHUT OFF, MEMORY STOP, DRAWING PLUG, READOUT VALVES, PRE-INSTALLED. BRONZE BODY, BRASS BALL CONSTRUCTION. DESIGN PRESSURE AND TEMPERATURE (MAX.) 300PSI AT 250° F. CALIBRATED NAME PLATE, PROVIDE BALANCE CALCULATOR.
   b. SIZE 2½" AND LARGER - BALANCING VALVES 2½" AND LARGER SHALL BE OF THE LUBRICATED PLUG TYPE, TIGHT SHUT OFF WITH AN ADJUSTABLE STOP AND POSITION INDICATOR. MANUFACTURERS: ROCKWELL NORDSTROM, KEYSTONE OR WALWORTH OR APPROVED EQUAL. (PROVIDE GREASE EXTENTIONS.)

D. STEAM CONDENSATE RETURN AND PUMPED CONDENSATE:

1. PIPE: SCHEDULE 80, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
2. JOINTS:
   a. 1 1/2 INCH AND SMALLER: THREADED.
   b. 2 INCH AND LARGER: BUTT-WELDED.
3. FITTINGS:
   a. 1 1/2 INCHES AND SMALLER: FORGED STEEL, THREADED, 3000PSI; ASTM A105, ANSI B16.11.
   b. 2 INCH AND LARGER: EXTRA STRONG STEEL, BUTT-WELDED, FLANGED AT VALVE AND EQUIPMENT CONNECTIONS, LONG RADIUS ELBOWS; ASTM A234.
4. UNIONS (1 1/2 INCH AND SMALLER): FORGED STEEL, BRONZE TO IRON GROUND JOINT, HREADED, 3000PSI; ASTM A105.
5. FLANGES: FORGED STEEL, THREADED OR WELD NECK, RAISED FACE 150PSI (FLAT FACED WHEN MATCHED TO 125PSI FLANGES); ASTM A181 OR A105, GRADE 1, ANSI B16.5.
6.
7. BOLTS AND NUTS: CARBON STEEL HEX-HEAD STUDS WITH HEAVY HEX NUTS; ASTM A307 GRADE B, ASTM A194 GRADE 2H.
8.
9. GASKETS: SYNTHETIC FIBERS WITH SBR BINDER, GARLOCK STYLE 3200 (RING TYPE FOR RAISED FACE; FULL FACE FOR FLAT FACED); ASTM F104.
10.
11. SHUT-OFF VALVES:
   a. 1 1/2 INCH AND SMALLER: 150PSI BRONZE GATE, THREADED, SOLID WEDGE, RISING STEM, UNION BONNET, NIBCO FIGURE T134 OR APPROVED EQUAL WITH TFE PACKING.
   b. 2 TO 24-INCH: 125PSI FLANGED IRON BODY GATE, SOLID WEDGE, BRONZE MOUNTED, OS & Y, BOLTED BONNET, RISING STEM, NIBCO FIGURE F6170 OR APPROVED EQUAL.
9. GLOBE VALVES:
   a. 1 1/2 INCH AND SMALLER: 150PSI BRONZE, RENEWABLE DISC, RISING STEM, UNION BONNET, THREADED ENDS, GRINNELL FIGURE 3240 OR APPROVED EQUAL.
   b. 2 TO 10 INCH: 125PSI FLANGED IRON BODY, BRONZE MOUNTED YOKE TOP, BOLTED ONNET, RISING STEM, NIBCO FIGURE F718B OR APPROVED EQUAL.
10. CHECK VALVES:
   a. 1 1/2 INCH AND SMALLER: 125PSI BRONZE RENEWABLE DISC, THREADED BONNET, THREADED ENDS, SWING TYPE, GRINNELL FIGURE 3300 OR APPROVED EQUAL.
   b. 2 TO 12 INCH: 125PSI FLANGED IRON BODY, BRONZE MOUNTED, RENEWABLE SEAT AND DISC, BOLTED BONNET, SWING TYPE, NIBCO FIGURE F918B OR APPROVED EQUAL.

E. CONDENSATE DRAIN, IN SUPPLY OR RETURN AIR PLENUMS:

1. PIPE: HARD DRAWN SEAMLESS COPPER TUBING, TYPE L; ASTM B88.
2. JOINTS: SOLDERED, SOLDER GRADE 95 TA; ASTM B32.
3. FITTINGS: WROUGHT COPPER, SOLDERED ENDS; ANSI B16.29.

F. CONDENSATE DRAIN, OUTSIDE OF AIR PLENUMS:

1. PIPE: PVC, SCHEDULE 40; ASTM D1785 OR ASTM D2241, SDR21 OR 26.
2. JOINTS: SOLVENT WELD; ASTM D2855.
3. FITTINGS: PVC, SCHEDULE 40; ASTM D2467.

G. STEAM: (PRESSURE LIMIT 125PSI)

1. PIPE:
   a. 1 1/2 INCH AND SMALLER: SCHEDULE 80, WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   b. 2 TO 10-INCH: SCHEDULE 40, WELDED OR SEAMLESS STEEL, BLACK; ASTM OR A106, GRADE B.
   c. 12 TO 24-INCH: STANDARD WEIGHT (0.375 INCH THICK WALL), WELDED OR SEAMLESS STEEL, BLACK; ASTM A53 OR A106, GRADE B.
   d. AT PRESSURE REDUCING STATIONS, SUBSTITUTE EXTRA STRONG (XS) WEIGHT CLASS PIPING.
2. JOINTS:
   a. 1 1/2 INCH AND SMALLER: THREADED.
   b. 2 INCH AND LARGER: WELDED.
3. FITTINGS:
   a. 1 1/2 INCH AND SMALLER: FORGED STEEL, THREADED, 3000PSI; ASTM A105, ANSI B16.11 [CAST IRON, THREADED, ASTM A126, ANSI B16.4].
   b. 2 INCH AND LARGER: STANDARD WEIGHT STEEL, BUTT-WELDED, FLANGED AT VALVE AND EQUIPMENT CONNECTIONS, LONG RADIUS ELBOWS; ASTM A234, ANSI B16.9.
4. UNIONS (1 1/2 INCH AND SMALLER): FORGED STEEL, BRONZE TO IRON GROUND JOINT, THREADED, 3000 PSI; ASTM A105 [MALLEABLE IRON, BRASS SEATS, ASTM A197, ANSI B115.1.
5. FLANGES: FORGED STEEL, THREADED OR WELD NECK, RAISED FACE, 150PSI (FLAT FACED WHEN MATCHED TO 125PSI FLANGES); ASTM A181 OR A105, GRADE 1, ANSI B16.5.
6. BOLTS AND NUTS: CARBON STEEL HEX HEAD STUDS WITH HEAVY HEX NUTS; ASTM A307 GRADE B, ASTM A194 GRADE 2H.
7. GASKETS: SYNTHETIC FIBERS WITH SBR BINDER, GARLOCK STYLE 3200 OR 3400 OR APPROVED EQUAL (RING TYPE FOR RAISED FACE; FULL FACE FOR FLAT FACED); ASTM F104.
8. SHUT-OFF VALVES:
   a. 1 1/2 INCH AND SMALLER: 150PSI BRONZE GATE, THREADED ENDS, SOLID WEDGE, RISING STEM, UNION BONNET, NIBCO FIGURE T134 OR APPROVED EQUAL WITH TFE PACKING.
   b. 2 TO 6 INCH: 125PSI FLANGED IRON BODY GATE, SOLID WEDGE, BRONZE MOUNTED, OS&Y, BOLTED BONNET, NIBCO FIGURE F6170 OR APPROVED EQUAL.
   c. 8 AND 10 INCH; OPTION: AS SPECIFIED FOR 2 TO 6 INCH OR 12 INCH AND LARGER.
   d. 12 INCH AND LARGER: 150PSI FLANGE LUGGED BUTTERFLY, CARBON STEEL BODY, 316 STAINLESS STEEL STELLITED DISC, RTFE SEAT, KEYSTONE K-LOCK OR APPROVED EQUAL.
9. GLOBE VALVES:
   a. 1 1/2 INCH AND SMALLER: 150PSI BRONZE, RENEWABLE DISC, BRONZE MOUNTED YOKE TOP, BOLTED BONNET, RISING STEM, GRINNELL FIGURE 3240 OR APPROVED EQUAL.
   b. 2 TO 10 INCH: 125PSI FLANGED IRON BODY, BRONZE MOUNTED DISC, BRONZE MOUNTED YOKE TOP, BOLTED BONNET, RISING STEM, NIBCO FIGURE F718B OR APPROVED EQUAL.
10. CHECK VALVES:
   a. 1 1/2 INCH AND SMALLER: 125PSI BRONZE, RENEWABLE DISC, THREADED BONNET, SCREWED ENDS, SWING TYPE, GRINNELL FIGURE 3300 OR APPROVED EQUAL.
   b. 2 TO 12 INCH: 125PSI FLANGED IRON BODY, BRONZE MOUNTED, RENEWABLE SEAT AND DISC, BOLTED BONNET, SWING TYPE, NIBCO FIGURE F918B OR APPROVED EQUAL.

H. CHEMICAL FEED:

1. PIPE AND FITTINGS: PVC SCHEDULE 80. PVC COMPOUND SHALL BE TYPE 1, GRADE 1, PVC 1120 (CELL CLASS 12454-B) AS IDENTIFIED IN ASTM D 1784.
2. JOINTING: SHALL BE SOLVENT JOINTS. REQUIREMENTS OF SOLVENTS SHALL COMPLY ASTM STANDARDS D-2564 AND F-493, FOR PRIMERS THEY SHALL COMPLY WITH ASTM STANDARD ASTM F-656 AND FOR THE PROCEDURE OF JOINTING ASTM D-2855.
3. SHUT-OFF VALVES (2 INCH AND SMALLER): 150PSI, PVC BALL VALVES, WITH FLOUROELASTOMER O RING SEALS AND SELF LUBRICATING AND SELF ADJUSTING TFE SEATS, CHEMTROL SERIES 45HV-V HORIZON BALL VALVES OR APPROVED EQUAL.
4. CHECK VALVES (2 INCH AND SMALLER): 100PSI, PVC HORIZONTAL SWING CHECK VALVES BY THERMOPLASTIC VALVES INC. OR APPROVED EQUAL.

C. PIPE HANGERS AND SUPPORTS

1. PIPING SHALL BE SUPPORTED ONLY FROM STRUCTURE OF BUILDING.
2. PROVIDE NECESSARY HANGERS AND SUPPORTS OF APPROVED DESIGN TO KEEP PIPING IN PROPER ALIGNMENT AND PREVENT TRANSMISSION OF INJURIOUS THRUSTS AND VIBRATIONS. ALL HANGERS AND SUPPORTS SHALL BE CAPABLE OF SCREW ADJUSTMENT AFTER PIPING IS ERECTED. HANGERS IN CONTACT WITH COPPER PIPE SHALL BE COPPER PLATED STEEL.
3. VERTICAL RUNS OF PIPE SHALL BE SUPPORTED BY HANGERS PLACED NOT OVER ONE FOOT FROM THE ELBOWS ON CONNECTING HORIZONTAL RUNS.
4. PIPING SHALL NOT BE HUNG FROM OTHER PIPING, DUCTS, CONDUITS OR FROM EQUIPMENT OF OTHER TRADES AND NO VERTICAL EXPANSION SHIELDS WILL BE PERMITTED.
5. ALL PIPING RUNNING ALONG WALLS SHALL BE SUPPORTED BY MEANS OF HANGER SUSPENDED FROM HEAVY ANGLE IRON WALL BRACKETS. NO WALL HOOKS WILL BE PERMITTED.
6. PERFORATED STEEL STRAPS OR CHAINS ARE NOT ACCEPTABLE FOR PIPE HANGERS.
7. PLASTIC INSERTS OR WOOD PLUGS ARE NOT ACCEPTABLE FOR FASTENING PIPE HANGERS TO MASONRY.

III. VALVES

A. GENERAL

1. PROVIDE VALVES IN ALL BRANCH MAINS AND RISERS, AT ALL PUMPS, TANKS, REDUCING AND CONTROL VALVES AND AT ALL EQUIPMENT; SO LOCATED AS TO GIVE COMPLETE SHUT-OFF.
2. PROVIDE BLOW-OFF VALVES AT ALL STRAINERS.
3. ALL VALVES UPTO 2" SIZE SHALL HAVE SCREW ENDS AND 2½" AND LARGER SHALL HAVE FLANGED ENDS.

B. SHUT-OFF VALVE

1. 2½" AND SMALLER: 400 PSI, 2-PIECE, BRONZE BODY FULL PORT BALL VALVE, NIBCO.
2. 3" AND LARGER: 200 PSI DUCTILE IRON, LUG TYPE, QUARTER TURN BUTTERFLY VALVES, BRONZE ALUMINUM DISC, EPDM SEAT, GEAR OPERATOR WITH HANDWHEEL AND POSITION INDICATOR IN WEATHERPROOF ENCLOSURE. ALL VALVES INSTALLED AT 7'0" OR HIGHER SHALL BE PROVIDED WITH CHAIN OPERATOR. VALVE SHALL BE NIBCO MAKE.

C. GLOBE VALVE

1. 2" AND SMALLER: 200 PSI BRONZE, RENEWABLE DISC, RISING STEM, UNION BONNET, GRINNELL FIGURE 3240SJ.
2. 2½" AND LARGER: 200 PSI, FLANGED IRON BODY, BRONZE DISC, BRONZE MOUNTED, YOKE TOP, BOLTED BONNET, NIBCO FIGURE F7183B.

D. CHECK VALVE

1. 2" AND SMALLER: 300 PSI BRONZE, RENEWABLE DISC, THREADED BONNET, SWING TYPE, GRINNELL FIGURE 3300SJ.
2. 2½" AND LARGER: 150 PSI FLANGED IRON BODY, BRONZE RENEWABLE SEAT AND DISC, GLOBE STYLE SILENT CHECK, GRINNELL FIGURE 502-1/2 TO 530.

E. BALANCING VALVE

1. SIZE 2" AND SMALLER - BALANCING VALVES 2" AND SMALLER SHALL BE THE BELL AND GOSSETT OR EQUAL CIRCUIT SETTER PLUS, WITH PRESET BALANCE FEATURE, POSITIVE SHUT OFF, MEMORY STOP, DRAWING PLUG, READOUT VALVES, PRE-INSTALLED. BRONZE BODY, BRASS BALL CONSTRUCTION. DESIGN PRESSURE AND TEMPERATURE (MAX.) 300PSI AT 250° F. CALIBRATED NAME PLATE, PROVIDE BALANCE CALCULATOR.
2. SIZE 2½" AND LARGER - BALANCING VALVES 2½" AND LARGER SHALL BE OF THE LUBRICATED PLUG TYPE, TIGHT SHUT OFF WITH AN ADJUSTABLE STOP AND POSITION INDICATOR. MANUFACTURERS: ROCKWELL NORDSTROM, KEYSTONE OR WALWORTH OR APPROVED EQUAL. (PROVIDE GREASE EXTENTIONS.)

IV. PIPING SPECIALTIES:

A. AIR VENTS

1. VENTS: AUTOMATIC TYPES BY BELL & GOSSETT, AMTROL OR TACO; OR APPROVED EQUAL.
2. FLOAT TYPE CAST IRON, BRASS OR SEMI-STEEL BODY, COPPER FLOAT, STAINLESS STEEL VALVE AND VALVE SEAT; SUITABLE FOR SYSTEM OPERATING TEMPERATURE AND PRESSURE INSTALLED WITH AN ISOLATING VALVE AT AIR SEPARATORS, TANKS AND OTHER EQUIPMENT; B&G MODEL 87 OR 107.

B. DRAINS

1. ¾" BALL VALVE WITH HOSE CONNECTION AND CAP FOR USE AT PIPING SYSTEM LOW POINTS.

C. WATER STRAINERS (`Y' TYPE)

1. ACCEPTABLE MANUFACTURERS:
   SPIRAX/ SARCO (MODELS AS SPECIFIED)
   ARMSTRONG
   MUELLER
2. SIZE 2" AND SMALLER: BRONZE BODY, SCREWED, Y PATTERN WITH 1/32" STAINLESS STEEL PERFORATED SCREEN, 250PSI; MODEL BT (ARMSTRONG MODEL F4SC).
3. SIZE 2½" TO 8": CAST IRON BODY, FLANGED Y PATTERN WITH 1/16" STAINLESS STEEL PERFORATED SCREEN, 125PSI, MODEL CI-125, ARMSTRONG MODEL A1FL.

D. FLEXIBLE HOSES

1. ACCEPTABLE MANUFACTURERS:
   MASON INDUSTRIES
   FLEXONICS
2. FLEXIBLE HOSES SHALL BE METALLIC TYPE WITH HOSE AND BRAID MADE OF 321 STAINLESS STEEL. FLANGES SHALL BE OF PLATE STEEL WITH 50LB ASA RILLING; THE WHOLE UNIT SHALL BE SUITABLE FOR WORKING PRESSURE OF 150PSI (MINIMUM).

E. BASKET STRAINER

1. BASKET STRAINERS SHALL BE SIMPLEX WITH FLANGED END CONNECTIONS. STRAINER BODY SHALL BE CAST IRON WITH YOKE TYPE, QUICK OPENING COVERS. STRAINER SHALL BE FITTED WITH THREADED DRAIN PLUG AND SUITABLE FOR 50 PSI OPERATING PRESSURE.
2. BASKETS SHALL BE STAINLESS STEEL WITH MESH LINING AND SHALL HAVE FILTRATION AND MESH SIZE AS SPECIFIED.
3. STRAINERS SHALL HAVE A FREE STRAINING AREA APPROXIMATELY 6 TIMES THE EQUIVALENT CROSS SECTIONAL PIPE AREA. STRAINER SHALL BE HAYWARD OR APPROVED EQUAL.

F. PRESSURE REGULATING VALVE

ASSE 1003, WATER REGULATORS, RATED FOR INITIAL WORKING PRESSURE OF 175PSIG MINIMUM. INCLUDE INTEGRAL FACTORY-INSTALLED OR SEPARATE FIELD-INSTALLED, Y-PATTERN STRAINER.

1. NPS 2 (DN 50) AND SMALLER: BRONZE BODY WITH THREADED ENDS. GENERAL-DUTY SERVICE: SINGLE-SEATED, DIRECT OPERATED, UNLESS OTHERWISE INDICATED. BOOSTER HEATER WATER SUPPLY: SINGLE-SEATED, DIRECT OPERATED WITH INTEGRAL BYPASS.
2. NPS 2-1/2 (DN 65) AND LARGER: BRONZE OR CAST-IRON BODY WITH FLANGED ENDS. INCLUDE AWWA C550 OR FDA-APPROVED, INTERIOR EPOXY COATING FOR REGULATORS WITH CAST-IRON BODY. TYPE: SINGLE-SEATED, DIRECT OPERATED.

G. PRESSURE GAUGES

1. PRESSURE GAUGES SHALL BE CONSTRUCTED OF BLACK ENAMEL WITH AN IRON CAGING, 4 ½" DIAMETER, THREADED CHROMIUM PLATED BRASS RING. 0-150PSIG RATING.

H. THERMOMETERS

1. THERMOMETERS SHALL BE OF THE WELL TYPE, RANGE 0-250° F.

I. PRESSURE/ TEMPERATURE RELIEF VALVES

1. PROVIDE PRESSURE AND TEMPERATURE RELIEF VALVES (WHEN NOT SUPPLIED BY VENDOR) WHERE INDICATED ON DRAWINGS. THEY SHALL BE RATED AS INDICATED ON DRAWINGS. THEY SHALL BE ASME RATED.

J. TAPPING SLEEVE

1. PROVIDE 20"X4" ALL STAINLESS STEEL TAPPING SLEEVE DESIGNED TO MAKE BRANCH CONNECTIONS ON AN EXISTING PIPE.
2. TAPPING SLEEVE SHALL HAVE A FULL CIRCUMFERENTIAL GASKET TO GIVE 360° SUPPORT AND TO SEAL IN CASE OF PIPE BREAKS AT THE POINT OF TAP.
3. TAPPING SLEEVE GASKET SHALL BE RATED FOR TEMPERATURE RANGE UPTO 180° F AND TO RESIST WATER AND CHEMICALS.
4. TAPPING SLEEVE TO BE INSTALLED FROM 24TH FLOOR TO 7TH FLOOR SHALL BE RATED FOR 150 PSI. ALL TAPPING SLEEVES INSTALLED BELOW 7TH FLOOR SHALL BE RATED FOR 200 PSI.
5. TAPPING SLEEVE SHALL BE MANUFACTURED BY SMITH BLAIR MODEL 663..

V. INSULATION

A. INSULATION OMITTED: DO NOT INSULATE THE FOLLOWING:

1. ACCESS DOOR, TEST HOLE FITTINGS, DAMPER QUADRANTS, EXCEPT AS OTHERWISE SPECIFIED. THE ADJOINING INSULATION SHALL BE NEATLY FINISHED AROUND SUCH DEVICES.
2. EXHAUST DUCTWORK NEED NOT BE THERMALLY INSULATED, EXCEPT THE PORTION OF THE DUCT BETWEEN MOTORIZED SPILL DAMPER AND SPILL LOUVER.

B. ALL INSULATION SHALL BE UL LISTED AND HAVE A COMPOSITE RATING NOT TO EXCEED:
1. FLAME SPREAD 25.
2. SMOKE DEVELOPED 50.
3. FUEL CONTRIBUTED 50

C. DUCTWORK INSULATION:

1. APPROVED MANUFACTURERS:
   a. KNAUF INSULATION.
   b. JOHNS MANVILLE
   c. OWENS-CORNING FIBERGLASS COR
   d. 3M VENTURECLAD
   e. POLYGUARD PRODUCTS
2. FIBERGLASS (BLANKET) FLEXIBLE TYPE: 1-LB NOMINAL DENSITY, THERMAL CONDUCTIVITY NOT EXCEEDING 0.27 AT 75°F MEAN TEMPERATURE; FACTORY APPLIED FACING OF ALUMINUM FOIL REINFORCED WITH FIBERGLASS YARN MESH AND LAMINATED TO 40LB KRAFT PAPER CHEMICALLY TREATED TO GIVE THE PERMANENT FLAMESPREAD AND SMOKE_DEVELOPED CHARACTERISTICS REQUIRED.
3. FIBERGLASS BOARD TYPE: 3-LB MINIMUM DENSITY, THERMAL CONDUCTIVITY NOT EXCEEDING 0.23 AT 75°F MEAN TEMPERATURE, FACTORY APPLIED FACING OF ALUMINUM FOIL REINFORCED WITH FIBERGLASS YARN MESH AND LAMINATED TO 40LB KRAFT PAPER CHEMICALLY TREATED TO GIVE THE PERMANENT FLAMESPREAD AND SMOKE_DEVELOPED CHARACTERISTICS REQUIRED. THE USE OF PLAIN (UNFACED) FIBERGLASS BOARD ON DUCTWORK SERVING ONLY AS HEATING SUPPLY DUCTS IS ALSO ACCEPTABLE PROVIDED IT MEETS THE FLAMESPREAD AND SMOKE-DEVELOPED CHARACTERISTICS REQUIRED. ANY DUCTWORK EXPOSED TO VIEW SHALL BE INSULATED WITH FIBERGLASS BOARD TYPE INSULATION.
4. JACKETS FOR DUCTWORK INSULATION: ASTM C921; TYPE I FOR DUCTWORK WITH TEMPERATURES BELOW AMBIENT; TYPE II FOR DUCTWORK WITH TEMPERATURES ABOVE AMBIENT. (TYPE I-VAPOR BARRIER, TYPE II-WATER VAPOR PERMEABLE).
5. OUTDOOR APPLICATIONS: VAPOR BARRIER JACKET SHALL BE A LAMINATED FIVE-PLY SELF-ADHESIVE PERMANENT ACRYLIC SYSTEM; HIGH PUNCTURE, TEAR RESISTANT; ZERO PERMEABILITY; MANUFACTURED WITH MOLD INHIBITORS: VENTURECLAD 1577CW, VENTURECLAD 1577CW-E GRADE OR ALUMAGUARD LITE OR ALUMAGUARD "ALL WEATHER" LT OR EQUAL. OUTDOOR DUCTWORK SHALL BE INSULATED WITH FIBERGLASS BOARD AND SUBSEQUENTLY COVERED WITH LAMINATED SELF-ADHESIVE VAPOR BARRIER AND WEATHERPROOFING JACKETS. SECURE WITH 2" WIDE BUTT STRIPS. ACCESS DOORS AND OTHER ITEMS REQUIRING MAINTENANCE OR ACCESS SHALL BE REMOVABLE AND SEALABLE.
6. ADHESIVES AND SEALANTS FOR INSULATION: ALL ADHESIVES AND SEALANTS USED ON INTERIOR BUILDING INSULATION SHALL COMPLY WITH THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) RULE #1168; VOC LIMITS SHALL COMPLY WITH THE LIMITS INDICATED IN TABLE 1 OF LEED VERSION 3.0, INDOOR ENVIRONMENTAL QUALITY SECTION, CREDIT IEQ 4.1. THOSE LIMITS CORRESPOND TO AN EFFECTIVE DATE OF THE SCAQMD RULE #1168 OF JULY 1, 2005, AND RULE AMENDMENT DATE OF JANUARY 7, 2005.
7. CLEAN AND DRY DUCTWORK PRIOR TO INSULATING. BUTT INSULATION JOINTS FIRMLY TOGETHER TO ENSURE COMPLETE AND TIGHT FIT OVER SURFACES TO BE COVERED.
8. DUCTWORK INSULATION SCHEDULE

MINIMUM DUCT INSULATION THICKNESS COMBINED HEATING AND COOLING SUPPLY DUCTS, RETURN DUCTS AND OUTSIDE AIR INTAKE DUCTS			
EXTERIOR	VENTILATED AIR OR UNVENTED ATTIC WITH ROOF INSLATION	UNVENTED ATTIC WITH ROOF INSULATION OR UNCONDITIONED SPACE (SPACE ABOVE CEILING)	BURIED
SUPPLY DUCTS			
2"	2"	1"	1"
RETURN DUCTS			
1"	1"	NONE	NONE

D. PIPING INSULATION

1. APPROVED MANUFACTURERS:
   a. ARMACELL LLC.
   b. KNAUF INSULATION
   c. JOHNS MANVILLE
   d. THE DOW CHEMICAL COMPANY
   e. OWENS-CORNING FIBERGLAS CORP
   f. 3M VENTURECLAD
   g. ROXUL
2. PRE-FORMED FIBER GLASS PIPE INSULATION, COMPLYING WITH ASTM C547, CLASS 3 (TO 850° F [454° C]), RIGID, MOLDED, NONCOMBUSTIBLE (PLAIN) OR LIMITED COMBUSTIBILITY (JACKETED) PIPE INSULATION. THERMAL CONDUCTIVITY ("K"): 0.23 BTU IN/ (HR FT2 ° F) AT 75° F MEAN TEMPERATURE (0.033 W/M° C AT 24° C) PER ASTM C518. MAXIMUM SERVICE TEMPERATURE: 850° F (454° C). RATED 25/50 PER ASTM E84, CAN ULC S102 OR NFPA 255. WHEN BEING USED OVER AUSTENITIC STAINLESS STEEL, PRODUCT MUST COMPLY WITH THE REQUIREMENTS ASTM C795. ALL-SERVICE VAPOR-RETARDER JACKET (ASJ): A WHITE, KRAFT PAPER OR POLY EXTERIOR, REINFORCED WITH A GLASS FIBER YARN AND BONDED TO AN ALUMINUM FOIL WITH SELF-SEALING LONGITUDINAL CLOSURE LAPS (SSL) AND BUTT STRIPS.
3. PREFORMED POLYISOCYANURATE CLOSED CELL INSULATION WITH A K-FACTOR OF 0.19 AT 75OF MEAN TEMPERATURE AND FACTORY APPLIED POLYVINYLIDENE CHLORIDE (PVDC) VAPOR RETARDER FILM FOR USE IN THE CHILLED WATER SUPPLY AND RETURN LINES AND REFRIGERANT LINES THE EQUAL TO TRYMER 2000 WITH SARAN VAPOR RETARDER BY THE DOW CHEMICAL COMPANY. VAPOR RETARDER, POLYGUARD ZERO-PERM IS ALSO ACCEPTABLE. THE INSULATION THICKNESS SHALL BE AS INDICATED IN PIPE INSULATION THICKNESS TABLE.
4. MINERAL WOOL HIGH TEMPERATURE INSULATION: INORGANIC FIBERS DERIVED FROM BASALT VOLCANIC ROCK WITH A THERMOSETTING RESIN BINDER RATED UP TO 1200°F IN ACCORDANCE WITH ASTM C447. MAXIMUM FLAME SPREAD RATING SHALL BE 5 AND SMOKE DEVELOPED RATING OF 0 WHEN TESTED IN ACCORDANCE WITH ASTM E84, UL723, CAN/ULC-S102-M. MINERAL WOOL SHALL BE RATED AS NON-COMBUSTIBLE IN ACCORDANCE WITH ASTM E136 AND CAN4-S114-M. MINERAL WOOL SHALL BE FUNGI RESISTANT IN ACCORDANCE WITH ASTM C1338. MINERAL WOOL WATER VAPOR SORPTION SHALL BE LESS THAN 1% BY WEIGHT, LESS THAN 0.02% BY VOLUME AT 120 °F AND 95% RH IN ACCORDANCE WITH ASTM C1104. (JOHNS MANVILLE MINWOOL-1200 PIPE, ROXUL PROROX PS960NA (FORMERLY KNOWN AS TECHTON 1200) OR EQUAL).
5. FIELD-APPLIED JACKETS:
   a. PVC PLASTIC: ZESTON 2000 SERIES. ONE PIECE, MOLDED TYPE FITTING COVERS AND JACKETING MATERIAL, GLOSS WHITE. A. CONNECTIONS: TACKS, PRESSURE SENSITIVE, COLOR MATCHING, VINYL TAPE.
   b. ALUMINUM JACKET: 0.016" (0.41 MM) THICK SHEET, (SMOOTH/EMBOSSED) FINISH, WITH LONGITUDINAL SLIP JOINTS AND 2" (51 MM) LAPS, DIE SHAPED FITTING COVERED WITH FACTORY-ATTACHED PROTECTIVE LINER.
   c. STAINLESS STEEL JACKET: TYPE 304 STAINLESS STEEL, 0.10" (2.54 MM), (SMOOTH/CORRUGATED) FINISH.
6. ALL OUTDOOR INSULATED PIPING SHALL BE PROTECTED WITH A CASING OF 0.016" THICK ALUMINUM OR STAINLESS STEEL ALL SERVICE JACKET, APPLIED WITH ALUMINUM OR STAINLESS LOCK-TYPE BANDS, 12" APART.
7. ADHESIVES AND SEALANTS FOR INSULATION: ALL ADHESIVES AND SEALANTS USED ON INTERIOR BUILDING INSULATION SHALL COMPLY WITH THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) RULE #1168; VOC LIMITS SHALL COMPLY WITH THE LIMITS INDICATED IN TABLE 1 OF LEED VERSION 3.0, INDOOR ENVIRONMENTAL QUALITY SECTION, CREDIT IEQ 4.1. THOSE LIMITS CORRESPOND TO AN EFFECTIVE DATE OF THE SCAQMD RULE #1168 OF JULY 1, 2005, AND RULE AMENDMENT DATE OF JANUARY 7, 2005
8. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS. FOAM INSULATION MATERIALS SHALL NOT USE CFC OR HCFC AGENTS IN THE MANUFACTURING PROCESS.
9. GENERAL VALVES, FITTINGS, ETC. SHALL BE INSULATED
10. INSULATION PROTECTION AT HANGERS - PIPE INSULATION SHALL BE PROTECTED AGAINST CRUSHING AT HANGERS WITH THE USE OF PRE-INSULATED PIPE SHIELDS OR PROTECTION SADDLES AND MATCHING HANGER. MINIMUM DIMENSIONS OF SHIELDS SHALL BE 12" IN LENGTH AND 18-GAUGE THICKNESS SHIELDS SHALL BE AS MANUFACTURED BY PIPE SHIELDS, INC. OR APPROVED EQUAL.
11. PAINTING - ALL UNINSULATED PIPES SHALL BE PAINTED WITH ONE COAT OF PRIMER AND ONE COAT OF OWNER APPROVED FINISHED PAINT. ALL OUTDOOR PIPING SHALL BE PAINTED WITH ONE COAT OF PRIMER AND TWO COATS OF WEATHERPROOF FINISH PAINT.
12. CLEAN AND DRY DUCTWORK PRIOR TO INSULATING. BUTT INSULATION JOINTS FIRMLY TOGETHER TO ENSURE COMPLETE AND TIGHT FIT OVER SURFACES TO BE COVERED.
13. PIPING INSULATION SCHEDULE

MINIMUM PIPING INSULATION THICKNESS HEATING AND HOT WATER SYSTEMS (STEAM, STEAM CONDENSATE, HOT WATER HEATING, HIGH TEMPERATURE HOT WATER AND DOMESTIC WATER SYSTEM)							
FLUID OPERATING TEMPERATURE RANGE (° F) AND USAGE	INSULATION CONDUCTIVITY		≥ NOMIANL PIPE OR TUBE SIZE, IN.				
	CONDUCTIVITY, Btu-in./(h-ft2*° F)	MEAN RATING TEMPERATURE, ° F	<1	1 TO <1-1/2	1-1/2 TO <4	4 TO <8	≥ 8
>350° F	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251° F-350° F	0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201° F-250° F	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
140° F-200° F	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105° F-139° F	0.22-0.28	100	1.0	1.0	1.5	1.5	1.5

MINIMUM PIPING INSULATION THICKNESS COOLING SYSTEM (CHILLED WATER, BRINE, AND REFRIGERANT)							
FLUID OPERATING TEMPERATURE RANGE (° F) AND USAGE	INSULATION CONDUCTIVITY		NOMIANL PIPE OR TUBE SIZE, IN.				
	CONDUCTIVITY, Btu-in./(h-ft2*° F)	MEAN RATING TEMPERATURE, ° F	<1	1 TO <1-1/2	1-1/2 TO <4	4 TO <8	≥ 8
40° F-60° F	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
<40° F	0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

VI. BALANCING

A. AIR BALANCE

1. PRIOR TO THE INSTALLATION OF THE MECHANICAL SYSTEMS, ENGAGE THE SERVICES OF OWNER'S APPROVED BALANCING COMPANY. THE BALANCING COMPANY SHALL SUBMIT THE AIRFLOW TEST REPORT TO OWNER/ARCHITECT/ENGINEER AND NOTIFY THE VARIATIONS IN AIRFLOW, IF ANY FROM THAT SHOWN ON THE DESIGN DRAWINGS.
2. THE BALANCING COMPANY SHALL BE A MEMBER OF ASSOCIATED AIR BALANCE COUNCIL, AND SHALL HAVE ITS WORK SUPERVISED BY A MEMBER OF ITS FULL TIME STAFF WHO IS A LICENSED PROFESSIONAL ENGINEER. PRIOR TO BALANCING, A LIST OF INSTRUMENTS TO BE USED SHALL BE SUBMITTED TO THE ENGINEER. THE LIST SHALL INCLUDE SERIAL NUMBERS AND DATES OF CALIBRATION. ALL INSTRUMENTS SHALL BE CALIBRATED WITHIN SIX MONTHS BEFORE TESTS.
3. FINAL BALANCING MUST BE DONE WITH ALL SYSTEMS COMPLETELY INSTALLED AND OPERATING AND AFTER AUTOMATIC TEMPERATURE CONTROLS HAVE BEEN ADJUSTED.
4. BALANCE ALL AIR OUTLETS ON THE SUPPLY AND RETURN DUCTWORK WITHIN 5% OF THE DESIGN REQUIREMENTS.
5. UPON COMPLETION OF ALL AIR BALANCING, ALL DAMPERS SHALL BE MARKED IN THE FINAL ADJUSTED POSITION.
6. SUBMIT SINGLE LINE DIAGRAM OF DUCT SYSTEM.
7. WHERE NECESSARY, THE BALANCING CONTRACTOR SHALL INSTRUCT THE MECHANICAL CONTRACTOR ABOUT CHANGES TO BE MADE IN ORDER TO MEET THE REQUIREMENTS.
9. RECORD OF THE FOLLOWING TEST FOR EACH FAN MOTOR AFTER FINAL BALANCED CONDITIONS.
   a. PUMP SPEED (RPM)
   b. TOTAL STATIC PRESSURE IN W.C.
   c. MOTOR OPERATING AMPS.
   d. ACTUAL VOLTAGE, PHASE AND CYCLES.
   e. FAN AIRFLOW RATE.
   f. CALCULATED BRAKE HORSEPOWER.
   g. FAN SIZE.

B. WATER BALANCE

1. CONDENSER WATER PUMPS AND PIPING FOR CONDENSER WATER SYSTEM SHALL BE COMPLETELY BALANCED BY THE ADJUSTMENT OF PLUG COCKS, VALVES OR OTHER CONTROL DEVICES TO OBTAIN THE FLOW QUANTITIES INDICATED ON THE DESIGN DRAWING. ALL FINAL ADJUSTED FLOW QUANTITIES SHALL BE WITHIN 5% OF THE DESIGN REQUIREMENT.
2. RECORD OF THE FOLLOWING TEST DATA FOR EACH COOLING TOWER CELL AFTER FINAL BALANCED CONDITIONS.
   a. FAN SPEED (RPM)
   b. MOTOR OPERATING AMPS.
   c. ACTUAL VOLTAGE, PHASE AND CYCLES.
   d. FLOW GPM AT EACH FLOW CONTROL VALVE.
   e. CONDENSER WATER SUPPLY TEMPERATURE.
   f. CONDENSER WATER RETURN TEMPERATURE.
   g. AMBIENT DB AND WB TEMPERATURE.
   h. CONDENSER WATER RETURN PRESSURE.
3. RECORD OF THE FOLLOWING TEST FOR EACH PUMP AND MOTOR AFTER FINAL BALANCED CONDITIONS.
   a. PUMP SPEED (RPM)
   b. TOTAL HEAD IN FT.
   c. MOTOR OPERATING AMPS.
   d. ACTUAL VOLTAGE, PHASE AND CYCLES.
   e. PUMP GPM.
   f. CALCULATED BRAKE HORSEPOWER.
   g. PUMP IMPELLER SIZE.
   h. PUMP CURVES.
4. WHERE NECESSARY, THE BALANCING CONTRACTOR SHALL INSTRUCT THE MECHANICAL CONTRACTOR ABOUT PIPING CHANGES TO BE MADE.

VII. TESTING

A. ALL PIPING AND EQUIPMENT INSTALLED AS PART OF THIS WORK SHALL BE TESTED, INCLUDING ALL NECESSARY LABOR, MATERIALS, INSTRUMENTS AND POWER.

B. TEST SHALL BE PERFORMED IN THE PRESENCE AND/OR TO THE SATISFACTION OF THE ENGINEER AND SUCH OTHER PARTIES AS MAY HAVE JURISDICTION.

C. IN NO CASE SHALL PIPING, EQUIPMENT, OR ACCESSORIES BE SUBJECTED TO PRESSURE EXCEEDING THEIR RATINGS AND OTHER DEVICES THAT ARE INCAPABLE OF WITHSTANDING TEST PRESSURE APPLIED TO PIPING, SUCH DEVICES SHALL BE REMOVED, OR OTHERWISE PROTECTED DURING TESTS. AFTER APPROVAL OF SUCH TESTS, DEVICES SHALL BE INSTALLED AND TESTED WITH OPERATING MEDIUM TO OPERATING PRESSURES.

D. TEST SHALL BE MADE AFTER ERECTION AND BEFORE COVERING IS APPLIED OR PIPING IS PAINTED OR CONCEALED.

E. LEAKS APPEARING DURING PRESSURE TEST SHALL BE CORRECTED BY REPLACING ALL DEFECTIVE MATERIALS OR WELDS, AND SUBSEQUENT TESTS SHALL BE MADE UNTIL THE PIPING IS FOUND PERFECT.

VIII. INSTALLATION

A. THE CONTRACTOR SHALL COMPLY WITH OWNER'S SAFETY AND SECURITY POLICIES

1. ROUTE PIPING IN ORDERLY MANNER, PLUMB PARALLEL TO BUILDING STRUCTURE AND MAINTAIN GRADIENT.
2. INSTALL PIPING TO CONSERVE BUILDING SPACE AND NOT INTERFERE WITH USE OF SPACE, OTHER WORK OR EQUIPMENT.
3. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT.
4. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.
5. PROVIDE ACCESS WHERE VALVES AND FITTINGS ARE NOT EXPOSED.

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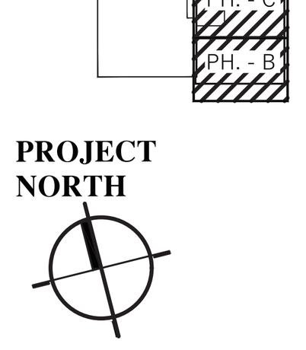
Revisions:

No.	Revision	Date
1 (triangle)	Addendum #1	04/20/21
1.	Issued for Permit & Bid	04/02/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

Chartwell PHARMACEUTICALS

77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL SPECIFICATIONS - SHEET 1 OF 2

Date:	11/02/2020
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Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

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6. WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAP, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICK PRIMER TO WELDING.

7. PREPARE PIPE, FITTINGS, SUPPORTS AND ACCESSORIES FOR FINISH PAINTING.

8. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.

9. INSTALL GATE VALVES FOR THROTTLING, BYPASS, OR MANUAL FLOW CONTROL SERVICES.

10. INSTALL SPECIALTIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

IX. EQUIPMENT CLEARANCES

A. NO EXHAUST EQUIPMENT SHALL BE MOUNTED WITHIN 10 FT. RADIUS FROM THE AC UNIT'S OUTSIDE AIR INTAKE.

X. GENERAL REQUIREMENTS FOR DUCTWORK

A. THE DRAWING(S) INCLUDE THE GENERAL ARRANGEMENT OF THE SHEET METAL WORK. EXAMINE THE DRAWING(S) AND BE RESPONSIBLE FOR PROPER FITTING OF THE WORK WITHOUT SUBSTANTIAL ALTERATION TO THE INDICATED LAYOUT.

B. DUCTWORK, INCLUDING SHEET THICKNESS, MATERIAL GAUGES, CONSTRUCTION OF DUCTS, SUPPORTS AND HANGERS, AND ALL OTHER APPURTENANCES SHALL BE FABRICATED AS SPECIFIED HEREIN. DUCTWORK SHALL BE FABRICATED IN ACCORDANCE WITH "SMACNA HVAC DUCT CONSTRUCTION STANDARDS" AS FOLLOWS:

1. RECTANGULAR DUCTWORK

LARGEST SIDE DIMENSION	GAUGE (ALL FOUR SIDE) LOW PRESSURE (UP TO 2")	MEDIUM PRESSURE (2" UP TO 5")	HIGH PRESSURE (5" & ABOVE)
UP THROUGH 12"	24	24	22
13" THROUGH 18"	24	24	22
19" THROUGH 30"	24	22	22
31" THROUGH 48"	22	22	22
49" THROUGH 54"	20	20	20
55" THROUGH 72"	20	20	20
73" THROUGH 84"	20	18	18
85" AND OVER	18	18	16

2. ROUND DUCTWORK (GALVANIZED) SPIRAL LOCK SEAM CONSTRUCTION

DUCT DIAMAETER	LOW PRESSURE	MEDIUM PRESSURE
UP THROUGH 8"	24	24
9" THROUGH 13"	24	24
14" THROUGH 22"	24	24
23" THROUGH 36"	22	22
37" THROUGH 50"	20	20

ALL RECTANGULAR AND ROUND DUCTWORK SHALL BE CONSTRUCTED TO LOW PRESSURE STANDARD, AS ABOVE.

C. FABRICATION:

1. FABRICATION REQUIREMENTS SPECIFIED UNDER INDIVIDUAL DUCTWORK SYSTEM DESCRIPTION, CONFORM ACCURATELY TO DIMENSIONS SHOWN WITH DUCTS STRAIGHT AND WITH JOINTS NEATLY FINISHED. RIGIDLY BRACE AND REINFORCE DUCTS WITH ANGLES OR OTHER STRUCTURAL MEMBERS. MAKE INTERNAL ENDS OF SLIP JOINTS LAY WITH THE FLOW.

2. ELBOWS IN RECTANGULAR DUCTWORK:

a. SQUARE THROAT ELBOWS LARGER THAN 8"; DOUBLE THICKNESS TURNING VANES.

b. SECURELY FASTEN VANES TO RUNNERS FOR QUIET, VIBRATION FREE OPERATION.

c. SQUARE THROAT ELBOWS 8" AND SMALLER; RADIUS ELBOWS.

d. RADIUS ELBOWS; MINIMUM CENTER LINE RADIUS OF 1½ TIMES DUCT WIDTH.

e. IN PARALLEL FLOW BRANCHES WITH 8" NECK AND SMALLER; MAKE 90° TURNS OUT OF NESTED FITTINGS WITH RADIUS ELBOWS.

3. PROVIDE INSIDE COLLARS WHERE REGISTERS OR GRILLES ARE MOUNTED FLUSH TO THE DUCTWORK. USE MINIMUM SIZE COLLARS REQUIRED TO INSTALL A CONTROLLER WHICH WILL PRODUCE UNIFORM AIR FLOW OVER THE FACE OF THE REGISTER OR GRILLE.

4. HOLES IN DUCTWORK:

a. PLUGS: LOW DENSITY POLYETHYLENE, SNAP-IN TYPE; NIAGARA PLASTICS COMPANY MODEL 659 FOR ⅜" HOLE.

b. TEST HOLES: INSTRUMENT TEST HOLES, SIZED TO SUIT INSULATION THICKNESS WITH FLAT GASKET, SCREW CAP AND CONNECTION HARDWARE IN MATERIAL TO SUIT DUCTWORK; VENTFABRICS VENTLOCK MODEL 699. USE CONCAVE GASKETS FOR ROUND DUCT.

c. WHERE IT IS NECESSARY FOR PIPES, HANGERS, CONDUITS OR OTHER DEVICES TO PENETRATE DUCTWORK, OBTAIN A/E ACCEPTANCE OF THE LOCATIONS. PROVIDE AN AIRFOIL OF THE PROPER DESIGN AND INCREASE DUCT SIZE AS REQUIRED TO SATISFY EACH INDIVIDUAL CONDITION. PROVIDE GASKETS, FLANGERS AND APPLY SEALANT TO MAKE OPENING AIR TIGHT.

5. DISSIMILAR METALS: MAKE CONNECTIONS USING FULLY GASKETED FLANGERS.

6. WHERE DUCTS ARE LOCATED OUTDOORS, LOCATE LONGITUDINAL SEAMS ON THE BOTTOM OF THE DUCT AND CROSSBREAK TOP SURFACES TO SHED WATER.

D. GENERAL CONSTRUCTION SHALL BE AS FOLLOWS:

1. RECTANGULAR; SEALED JOINTS, SEAMS AND CONNECTIONS:

LOW, MEDIUM AND HIGH PRESSURE:

i. SEAMS: PITTSBURGH LOCK.
ii. JOINTS: PROPRIETARY MECHANICAL DUCT CONNECTION SYSTEM FOR DUCTS 8-INCH AND LARGER. POCKET LOCK TYPE FOR DUCTS SMALLER THAN 8-INCH.
iii. SEAL CLASS: A.

2. ROUND; SEALED JOINTS,SEAMS AND CONNECTIONS (ALL PRESSURE CLASSIFICATIONS; 10" POSITIVE TO 2" NEGATIVE.

i. SEAMS: LOCK TYPE, RL-1 (SPIRAL), RL-4 (BUTT WELD OR LAPPED AND SEAM WELDED) OR RL-5 (GROOVED SEAM, PIPE OR FLAT LOCK).
ii. JOINTS: RT-1 (BEADED SLEEVE), RT-6 (SWEDGE), OR RT-5 (BEADED CRIMP) UP TO 2-INCH MAXIMUM.
iii. FITTINGS: SLIP TYPE; PLEATED OR CONTINUOUSLY WELDED STAMPED OR SEGMENTED. CONTINUOUSLY WELDED FITTINGS SUCH AS CONICAL TEES, 45 DEGREE LATERALS OR WYES MAY BE USED.
iv. SEAL CLASS: A.

E. PROPRIETARY MECHANICAL DUCT CONNECTION SYSTEM:

1. ACCEPTABLE MANUFACTURERS:

a. DUCTMATE INDUSTRIES, INC. "DUCTMATE".
b. LOCKFORMER "T.D.C."
c. ENGLE "T.D.F."
d. WARD DUCT CONNECTOR INDUSTRIES.

2. GENERAL: DO NOT USE MECHANICAL CONNECTIONS ON DUCT HEAVIER THAN 16-GAUGE OR LIGHTER THAN 20-GAUGE.

3. PRODUCTS AND MATERIALS:

a. CONSTRUCTION MATERIALS: SAME AS SPECIFIED FOR DUCTWORK.
b. ANGLE: 20-GAUGE WITH OR WITHOUT INTEGRAL POLYMER TYPE SEAL.
c. CORNER PIECE: MINIMUM 16-GAUGE.
d. CLEAT: 20-GAUGE. USE OF PVC AT FIRE DAMPERS AND CONNECTIONS TO DISSIMILAR METALS IN PERMITTED.
e. CORNER CLIPS, BOLTS AND NUTS: 16-GAUGE CLIPS OR ⅜-INCH DIAMETER BOLTS WITH NUTS. USE STAINLESS STEEL NUTS AND BOLTS ON DISSIMILAR METALS.
f. GASKET: TREMCO #440, DUCTMATE #440 OR HARDCAST #1902FR.
g. MASTIC: SERVICE ADHESIVE INC. NO. 5511M.

4. FLEXIBLE DUCTS:

FLEXIBLE DUCTS SHALL BE HIGH QUALITY ALUMINUM FOIL FLEXIBLE AIR DUCT. THE INNER CORE SHALL BE WITH A THICK BLANKET OF FIBERGLASS INSULATION FOR ENERGY EFFICIENCY AND A TOUGH REINFORCED OUTER JACKET FOR RESISTANCE TO TEAR AND PUNCTURE.

INNER CORE CONSTRUCTION SHALL BE 2 PLIES OF TOUGH ALUMINUM FOIL/POLYESTER (TOTAL OF PLIES) LAMINATED WITH A FLAME RETARDANT ENCAPSULATING A SPRING STEEL-WIRE HELIX.

INSULATION SHALL BE FIBERGLASS 0.75LB/FEET DENSITY, 1.25" THICKNESS.

OUTER JACKET SHALL BE ALUMINUM VAPOR BARRIER CONSISTS OF 2 PLIES OF POLYESTER LAMINATED TO A PLY OF ALUMINUM FOIL AND REINFORCED WITH FIBERGLASS STRAND.

XI. DIFFUSERS AND REGISTERS

A. FURNISH AND INSTALL WHERE SHOWN ON THE DRAWINGS ALL METAL DIFFUSERS AND REGISTERS OF THE SIZES AND CAPACITIES INDICATED.

B. EACH AIR SUPPLY OUTLET SHALL HAVE THE REQUIRED CAPACITY AND SHALL BE GUARANTEED TO GIVE THE REQUIRED AIR THROW. WHERE MANUFACTURER'S RECOMMENDATIONS REQUIRE DUCT SIZES DIFFERING FROM THOSE ON THE DRAWINGS, THE SAME SHALL BE PROVIDED AT NO ADDITIONAL COST TO OWNER.

C. LOCATION OF DIFFUSERS AND REGISTERS SHOWN ON THE DRAWINGS ARE APPROXIMATE. COORDINATE WITH OTHER TRADES AND EXISTING FIELD CONDITIONS FOR EXACT LOCATIONS OF DIFFUSERS AND REGISTERS.

D. ALL AIR OUTLETS SHALL HAVE BAKED WHITE ENAMEL FINISH TO MATCH EXISTING, UNLESS OTHERWISE INDICATED.

XII. FIRE DAMPERS

1. ACCETAPLE MANUFACTURERS:

a. RUSKIN

b. AIR BALANCE

2. GALVANIZED STEEL, CURTAIN TYPE WITH BLADES STORED OUT OF AIR STREM, GRAVITY OPERATED FOR VERTICAL USE AND SPRING OPERATED FOR HORIZONTAL USE, 165 DEGREE F FUSIBLE LINK, 2 HOUR RATED, UL LABEL PER UL 555.

3. USE MODEL IBD2, STYLE B FOR LOW PRESSURE RECTANGULAR, STYLE C FOR MEDIUM OR HIGH PRESSURE RECTANGULAR AND STYLE CR FOR ROUND.

XIII. VARIABLE FREQUENCY DRIVES

A. VFD SPECIFICATION
1. VOLTAGE: 460
2. PHASE: 3
3. FREQUENCY: 60Hz
4. POWRE FACTOR: 0.96 OR BETTER
5. EFFICIENCY: 96% OR BATTER
6. ENCLOSURE: NEMA-1
7. INTERRUPT RATING: 65 kAIC
8. HUMIDITY: 95% RH-NON-CONDENSING
9. 3-CONTACTOR SWITCH (HANDLE THRU DOOR) WITH FUSES
10. LINE REACTOR
11. FILTERING TO MINIMIZE MOTOR NOISE
12. VENTILATION FAN WITHIN ENCLOSURE
13. MICROPROCESSOR LOGIC CONTROL WITH PARAMETER SETTINGS
14. 2NO + 2NC AUXILIARY CONTACTS IN BYPASS CONTACTOR
15. DIGITAL KEYPAD
16. (4) PROGRAMMABLE CRITICAL FREQUENCY LOCKOUT RANGES
17. UL LISTED AND IEEE 519 COMPLIANT
18. 24 MONTH WARRANTY
19. PROVIDE A FACTORY REPRESENTATIVE FOR `` ON SITE" START UP SERVICES.

B. PROTECTION FEATURES:
1. UNDER VOLTAGE TRIP@ -35%
2. OVER VOLTAGE TRIP@ +30%
3. MOTOR OVERLOAD IN BOTH DRIVE AND BYPASS MODES.
4. VFD OVERLOAD
5. SHORT CIRCUIT
6. STALL PREVENTION
7. LOCKED ROTOR
8. MOTOR OVER-TEMPERATURE
9. VFD OVER-TEMPERATURE
10. INPUT TRANSIENTS
11. PHASE FAILURE IN BOTH DRIVE AND BYPASS MODES

XIV. SAFETY AND SECURITY REQUIREMENTS

1. THE CONTRACTOR SHALL COMPLY WITH OWNER'S SAFETY AND SECURITY POLICIES.

XV. AUTOMATIC TEMPERATURE CONTROL SYSTEM

A. THE ATC SYSTEM SHALL BE AN EXTENSION TO THE EXISTING SCHNEIDER ELECTRIC BUILDING MANAGEMENT SYSTEM (BMS) WITH ETHERNET NETWORK. CONTRACTOR SHALL HIRE THE SERVICES OF CHARTWELL ATC CONTRACTOR RICHMAR CONTROLS, PHONE - (914) 776-6060.

B. PROVIDE TIE-INS WITH FIRE ALARMS SYSTEM AND SAFETY PANELS. PROVIDE MONITORING AND GRAPHICS FOR THE NEW SYSTEM. PROVIDE SUBMITTALS, DATA ENTRY ELECTRICAL INSTALLATION, PROGRAMMING, START-UP, TEST AND VALIDATION ACCEPTANCE DOCUMENTATION, AND SYSTEM WARRANTY. THE COMPLETE BMS INSTALLATION SHALL BE IN STRICT COMPLIANCE TO THE NATIONAL, STATE AND LOCAL MECHANICAL AND ELECTRICAL CODES AND THE ELECTRICAL SECTION OF THESE SPECIFICATION. ALL DEVICES SHALL BE UL OR FM LISTED AND LABELED FOR THE SPECIFIC USE, APPLICATIONS AND ENVIRONMENT TO WHICH THEY ARE APPLIED.

C. ALL OPEN CLOSE CONTROL VALVES SHALL BE SUPPLIED BY THE ATC CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR. OPEN CLOSE LINE SIZE CONTROL VALVES SHALL BE 150/200 PSI DUCTILE IRON, LUG TYPE, QUARTER TURN BUTTERFLY VALVES, BRONZE ALUMINIUM DISC, EPDM SEAT, ELECTRIC GEAR OPERATOR WITH HANDWHEEL AND POSITION INDICATOR IN WEATHERPROOF ENCLOSURE. HANDWHEEL SHALL FACILITATE MANUAL OPERATION OF VALVE IN THE EVENT OF POWER FAILURE. VALVES INSTALLED @ 7`0" OR HIGHER SHALL BE PROVIDED WITH CHAIN OPERATOR. VALVES SHALL BE NIBCO MAKE.

D. WORK SHALL INCLUDE THE FOLLOWING:

1. INTEGRATE NEW CONTROLS WITH EXISTING BMS.

2. ALL CONTROL DEVICES, CONTROL SYSTEM WIRING, PROGRAMMING AND SYSTEM COMMISSIONING TO PROVIDE A COMPLETE AND OPERABLE SYSTEM.

3. ALL EQUIPMENT AND MATERIAL SHALL BE IN ACCORDANCE WITH CURRENT ISSUE OF PRUDENTIAL SITE STANDARD COMPONENT LIST. INSTALLATION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES.

E. MANUALS

1. AN OPERATOR'S MANUAL SHALL BE PROVIDED WITH GRAPHIC EXPLANATIONS OF KEYBOARD USE FOR ALL OPERATOR FUNCTIONS SPECIFIED UNDER OPERATOR TRAINING.

E. TRAINING

1. ALL TRAINING SHALL BE BY THE CONTROLS CONTRACTOR AND SHALL UTILIZE OPERATOR'S MANUAL AND AS-BUILT DOCUMENTATION.

F. WARRANTY

1. ALL COMPONENTS, SYSTEM SOFTWARE, AND PARTS SUPPLIED BY THE CONTROLS CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE YEAR FROM ACCEPTANCE DATE. LABOR TO REPAIR, REPROGRAM, OR REPLACE COMPONENTS SHALL BE FURNISHED BY THE BMS CONTRACTOR AT NO CHARGE DURING THE WARRANTY PERIOD. ALL CORRECTIVE SOFTWARE MODIFICATIONS MADE DURING WARRANTY PERIOD SHALL BE UPDATED ON ALL USER DOCUMENTATION AND ON USER AND MANUFACTURER ARCHIVED SOFTWARE DISKS.

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SIGNATURE

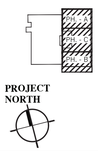
MITUL PATEL, P.E.

IT IS A VIOLATION OF LAW FOR ANY PERSON UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ARCHITECT, TO ALTER AN ITEM IN ANY WAY ON THIS DRAWING OR SPECIFICATION (DOCUMENT). IF A DOCUMENT BEARING THE SEAL OF AN ARCHITECT IS ALTERED THE ALTERING ARCHITECT SHALL AFFIX TO THE DOCUMENT THEIR SEAL AND THE NOTIFICATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE AND THE DATE OF SUCH ALTERATION AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

Revisions:

No.	Revision	Date
1.	Issued for Permit & Bid	04/02/21
1	Addendum #1	04/20/21

Key Plan:



Project:
Chartwell Pharmaceuticals Building Shell

77 Brenner Drive
Congers, New York

Drawing Title:
MECHANICAL SPECIFICATIONS - SHEET 2 OF 2

Date:	11/02/2020
Scale:	AS NOTED
Drawn By:	MB
Reviewed By:	SR
KSD Project No.:	20060

Drawing Number
M-702

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