Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

DURHAM HALL
ROOMS 171 & 181 RENOVATIONS
PHASE 2

PROJECT CODE: 25-698021

VICINITY MAP

BLACKSBURG VA.

INDEX OF DRAWINGS

REFERENCE CODES AND INFORMATION

CODE GOVERNING NEW WORK: 2021 VIRGINIA EXISTING BUILDING CODE (VEBC)

2023 VIRGINIA TECH DESIGN AND CONSTRUCTION MANUAL

CONTRACTOR SHALL COMPLY WITH: Virginia Tech's Safety Requirement for Contractors and Subcontractors Program, WHICH IS INCORPORATED BY REFERENCE. COPIES OF THIS PROGRAM ARE AVAILABLE FROM THE OWNER OR MAY BE DOWNLOADED FROM WWW.EHSS.VT.EDU.

BUILDING NUMBER	126
CONSTRUCTION TYPE:	IIB
OCCUPANT USE GROUP:	B
BUILDING AREA GROSS	107,929 SF
RENOVATION AREA GROSS:	5,626 SF
FIRE SUPPRESSION:	EXISTING
FIRE ALARM:	EXISTING

ASBESTOS/LEAD DISCLOSURE

AN ASBESTOS INSPECTION WAS PERFORMED AND NO ACM WAS FOUND. THE ASBESTOS INSPECTION REPORT IS INCLUDED AND WILL BE PROVIDED WITH THE DRAWING/BID PACKAGE.

AN INSPECTION TO IDENTIFY LEAD CONTAINING OR COATED COMPONENTS HAS BEEN CONDUCTED AND AND WILL BE PROVIDED WITH THE DRAWING/BID PACKAGE. THIS REPORT IS PROVIDED FOR THE CONTRACTOR'S USE AND MAY NOT BE ALL INCLUSIVE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COMPLY WITH ALL VIRGINIA OCCUPATIONAL SAFETY AND HEALTH (VOSH) REGULATIONS AS THEY PERTAIN TO EMPLOYEE EXPOSURES TO LEAD. ALL LEAD AND LEAD-COATED BUILDING COMPONENTS SHALL BE RECYCLED TO THE EXTENT POSSIBLE.

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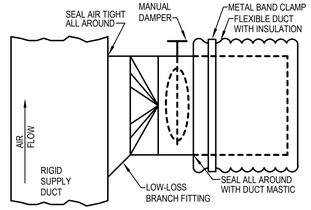
REVISION	DATE

VT DURHAM HALL
ROOMS 171 & 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

TITLE SHEET

DESIGNED MEH/MAR/MGW	DRAWN MEH/MAR/MGW
CHECKED RDF/WAM	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

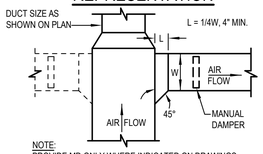
SHEET
T-1



FLEX BRANCH FITTING DETAIL

NO SCALE

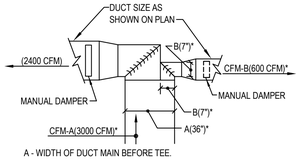
SINGLE LINE REPRESENTATION



NOTE:
PROVIDE MD ONLY WHERE INDICATED ON DRAWINGS.

LATERAL BRANCH DUCT DETAIL

SCHEMATIC



A - WIDTH OF DUCT MAIN BEFORE TEE.
B - WIDTH OF GIVEN BRANCH.
CFM-A - TOTAL AIR QUANTITY PASSING THRU DUCT AT A.
CFM-B - AIR QUANTITY REMOVED AT TAKEOFF B.

$B = \frac{CFM\text{-}B}{CFM\text{-}A} \times A$

* EXAMPLE; CFM-A = 3000 CFM, CFM-B = 600 CFM, A = 36"

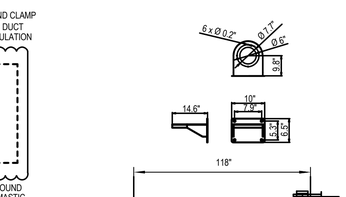
$B = \frac{600\ CFM}{3000\ CFM} \times 36" = 7.2"$

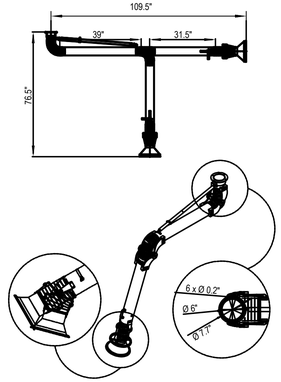
SAY B = 7"(7.2" ROUNDED OFF TO THE NEAREST 1/2)

NOTE:
PROVIDE MD ONLY WHERE INDICATED ON DRAWINGS.

TEE-BRANCH DUCT DETAIL

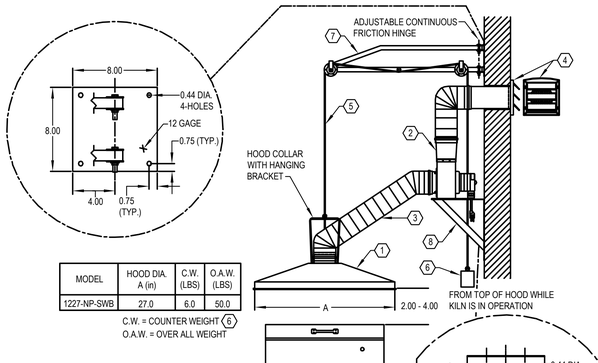
SCHEMATIC





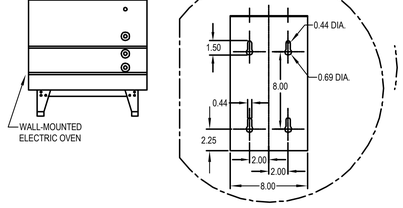
FUME EXTRACTOR ARM DETAIL

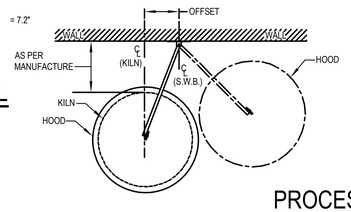
SCHEMATIC



MODEL	HOOD DIA. A (in)	C.W. (LBS)	O.A.W. (LBS)
1227-NP-SWB	27.0	6.0	50.0

C.W. = COUNTER WEIGHT (6)
O.A.W. = OVER ALL WEIGHT





PROCESS OVEN CAPTURE HOOD

SCHEMATIC
REFER TO OPERATION AND MAINTENANCE MANUAL FOR INSTALLATION

DETAIL NOTES: ⬡

1. CONICAL CONNECTION HOOD.
2. NON-EXPLOSION PROOF BLOWER, 1/20 HP 1/60/115, 250 CFM, 1.7 AMPS, 1550 RPM. MAX. 62 dB @ 5 FT.
3. TRIPLE PLY LAMINATE ALUMINIZED POLYESTER FACE WITH FOIL BACKING FLEXIBLE EXHAUST HOSE.
4. EXTERIOR SURFACE MOUNTED LOUVER - NOT APPLICABLE FOR THIS INSTALLATION - REFER TO PLANS FOR CONNECTION TO EXISTING RELIEF LOUVER.
5. 3/16" DIAMTERE PLASTIC COATED STEEL CABLE, 10' LENGTH WITH CABLE CLAMPS FOR CONNECTION TO COUNTER-WEIGHT AND BLOWER.
6. 3" DIAMETER COLD ROLLED STEEL COUNTER-WEIGHT.
7. OVER-HEAD PULLEY SYSTEM: 1"X1"X24" STRUCTURAL TUBING, BALL BEARING PULLEYS, RESISTANCE PULLEY, SLIDE BRACKETS, AND PULLEY SAFETY STRAPS.
8. PAINTED 12 GA. STEEL BLOWER WALL SUPPORT BRACKET.

GENERAL NOTES:

1. ALL DUCTWORK AND PIPES SHALL BE COORDINATED WITH OTHER NEW AND EXISTING DUCTS, PIPES, LIGHTS, STRUCTURAL SYSTEM, CEILING SUPPORTS AND FRAMING BEFORE INSTALLATION. MINOR DUCT AND PIPE OFFSETS AND MINOR DUCT TRANSITIONS SHALL BE PROVIDED AS REQUIRED. WHERE TRANSITIONS ARE REQUIRED, CROSS SECTIONAL AREA OF DUCT SHALL NOT BE REDUCED. MEASUREMENTS FOR VERTICAL CLEARANCES OF DUCTWORK SHALL BE TAKEN AT THE JOB SITE BEFORE FABRICATION OF ANY DUCTWORK.
2. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTRUCTIONS.
3. MATERIALS AND INSTALLATION SHALL COMPLY WITH LOCAL CODES, APPLICABLE PROVISIONS OF LATEST EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION, LOCAL UTILITY REGULATIONS AND GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION.
4. CONTRACTOR SHALL SEAL PENETRATIONS IN EXISTING WALLS AS REQUIRED TO COMPLY WITH EXISTING WALL RATINGS.
5. VERIFY WALL OPENINGS WITH STRUCTURE.
6. VERIFY THE FINAL LOCATION OF ALL THERMOSTATS, TEMPERATURE SENSORS, PANELS AND CONTROL INSTRUMENTS WITH THE ARCHITECT AND OWNER PRIOR TO ROUGH-IN.
7. VERIFY LOCATIONS OF NEW AND EXISTING EQUIPMENT AND ROUTE OF DUCTWORK WITH EXISTING CONDITIONS.
8. ALL CUTTING AND PATCHING FOR THE INSTALLATION OF NEW WORK IN EXISTING BUILDING SHALL BE DONE BY THE GENERAL CONTRACTOR.
9. REFER TO ARCHITECTURAL, STRUCTURAL AND ELECTRICAL DRAWINGS TO COORDINATE THE EXACT LOCATIONS OF DIFFUSERS, REGISTERS, GRILLES, PIPING AND OTHER MECHANICAL EQUIPMENT WITH CEILING GRID, LIGHTS, BEAMS AND OTHER BUILDING COMPONENTS.
10. CONTRACTOR SHALL PROVIDE AND INSTALL ALL SUPPORTS REQUIRED TO MOUNT MECHANICAL EQUIPMENT, PIPING AND DUCTWORK.
11. WHERE PIPE AND DUCT CONNECTIONS ARE SHOWN CONNECTING TO EXISTING, CONTRACTOR SHALL DETERMINE EXACT LOCATIONS AND CONNECTION SIZES PRIOR TO INSTALLATION.
12. DUCTWORK SHALL BE G-90 ZINC-COATED SHEET STEEL OR ALUMINUM, CONSTRUCTED AND INSTALLED AS RECOMMENDED BY THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARDS". COAT ALL INTERIOR SURFACES OF RIGID FABRICATED AND PRE-MANUFACTURED DUCT AND ACCESSORIES WITH ONE COAT OF FOSTER 40-20 FUNGICIDAL PROTECTIVE FINISH AS MANUFACTURED BY FOSTER PRODUCTS CORPORATION OR PROVIDE DUCTWORK WITH AGION ANTI-MICROBIAL COATED STEEL/ALUMINUM.
13. FLEXIBLE DUCTS SHALL BE FLEXIBLE METAL OR METAL AND NEOPRENE-COATED CANVAS HOSE INSULATED WITH 1" THICK FIBERGLASS WITH VINYL VAPOR BARRIER. ALL ROUND DUCT TAKE-OFFS SHALL BE MADE WITH SPIN-IN FITTINGS WITH 45 DEG. EXTRACTOR AND BALANCING DAMPER. THE DUCT DIAMETER SHALL MATCH THE AIR DIFFUSER SIZE UNLESS OTHERWISE INDICATED.
14. PROVIDE FLEXIBLE DUCT CONNECTIONS BETWEEN THE SUPPLY AND RETURN DUCTS FROM THE AIR UNITS. FLEXIBLE CONNECTIONS SHALL BE WEATHERTIGHT WHEN EXPOSED.
15. PROVIDE AIR TIGHT SEAL BETWEEN DUCTWORK AND FIRE PARTITIONS/WALLS WITH FIRE RESISTANT MATERIAL.
16. SUPPLY AIR DUCTWORK SHALL BE INSULATED WITH 1 LB. DENSITY, FLEXIBLE TYPE, 1-1/2" THICK WITH FACTORY APPLIED FACING OF 0.7 MIL FOIL-SCRIM-WHITE KRAFT PAPER JACKET EFFECTIVELY VAPOR SEALED.
17. NEW DUCT AND PIPE INSULATION SHALL BE AS SPECIFIED AND SHALL BE SEALED TO EXISTING. INSULATION THAT IS DAMAGED OR REMOVED FOR NEW WORK SHALL BE REPLACED, REPAIRED AND SEALED AS REQUIRED.
18. ALL CEILING DIFFUSERS SHALL BE 4-WAY THROW TYPE UNLESS NOTED OTHERWISE.
19. CEILING DIFFUSERS SHALL BE PRICE SQUARE LOUVER FACE, LAY-IN, ADJUSTABLE TYPE COMPLETE WITH EQUALIZING DEFLECTORS AND VOLUME CONTROL UNITS (RADIAL BLADE TYPE ARE NOT ACCEPTABLE. FINISH SHALL BE WHITE.
20. RETURN GRILLES AND REGISTERS SHALL BE PRICE SERIES 635, 45 DEGREE DEFLECTION. DAMPERS FOR REGISTERS SHALL BE FACE OPERATED AND OPPOSED BLADE TYPE.
21. AIR DEFLECTORS SHALL BE INSTALLED IN ALL SQUARE ELBOWS.
22. CEILING GRID AND OTHER ITEMS SHALL NOT BE SUPPORTED FROM OR IN CONTACT WITH MECHANICAL EQUIPMENT. CONDUIT, WIRING, PIPING AND SUPPORTS SHALL NOT BE LOCATED IN FRONT OF FAN COIL ACCESS PANELS.
23. DUCTWORK AND PIPING SHALL NOT BE INSTALLED ABOVE ELECTRICAL PANELS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING WITH ELECTRICAL PANELS WHEN SHOWN NEAR PANELS OR OVER ELECTRICAL ROOMS.
24. INSTRUCT THE OWNER IN THE PROPER OPERATION AND MAINTENANCE OF THE MECHANICAL SYSTEMS UNTIL THE OWNER IS FULLY PREPARED TO OPERATE AND MAINTAIN THE MECHANICAL SYSTEM. HOWEVER, LENGTH OF INSTRUCTION TIME SHALL BE LIMITED TO ONE DAY.
25. EQUIPMENT, MATERIALS AND LABOR REQUIRED BY THESE CONTRACT DRAWINGS SHALL BE GUARANTEED TO BE FREE FROM DEFECTIVE MATERIALS OR WORKMANSHIP FOR ONE YEAR AFTER FINAL ACCEPTANCE OF THE PROJECT UNLESS SPECIFIED OTHERWISE. DEFECTIVE MATERIALS OR WORKMANSHIP OCCURRING DURING THIS PERIOD SHALL BE CORRECTED AT NO ADDITIONAL COST.
26. PROVIDE 12" LONG STEEL SLEEVE, STEEL RETAINING ANGLES, AND ACCESSORIES REQUIRED BY IMC 607.5.3, EXCEPTION 3 FOR DUCTS THAT PENETRATE FIRE PARTITIONS. ANNULAR SPACE BETWEEN THE SLEEV AND WALL OPENING SHALL BE FILLED WITH ROCK WOOL BATTING ON ALL SIDES.

DEMOLITION NOTES:

1. THE CONTRACTOR SHALL REMOVE OR ALTER AS NECESSARY ALL EXISTING PIPING, EQUIPMENT, EQUIPMENT FOUNDATIONS, AND APPURTENANCES THAT ARE NOT REQUIRED FOR THE EXISTING SYSTEMS TO REMAIN. CONTRACTOR SHALL VISIT THE SITE TO DETERMINE THE SCOPE OF THIS WORK AND VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BIDS.
2. EXISTING EQUIPMENT SHALL BE TURNED OVER TO THE OWNER, UNLESS DIRECTED OTHERWISE AND LOCATED AS DIRECTED BY THE OWNER. ALL OTHER ITEMS TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE PREMISES.
3. INSULATION ON EXISTING PIPING THAT IS DAMAGED OR REMOVED DUE TO THE DEMOLITION WORK SHALL BE REPLACED AND SEALED AS REQUIRED TO PROVIDE CONTINUOUS COVERAGE.

PRE-CONSTRUCTION BALANCING:

1. THE CONTRACTOR SHALL PROVIDE A PRE-CONSTRUCTION TESTING AND BALANCING REPORT FOR THE SPACES AND EXISTING EQUIPMENT INDICATED ON THE PLANS. REPORT SHALL INCLUDE MEASURED FLOWS FOR ALL AIR DEVICES AND DUCT BRANCHES SHOWN AND FOR THE EXISTING CHILLED AND HEATING WATER PIPING RISERS AND BRANCHES SHOWN ON THE PLANS. WATER BALANCING SHALL INCLUDE CONFIRMATION OF DIRECTION OF FLOW FOR ALL LINES IN THE EXISTING RISER. REPORT SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER AND TO VT OPERATIONS PRIOR TO DEMOLITION.

HVAC LEGEND

ABOVE	ABV		FROM	FRM	
ABOVE FINISHED FLOOR	AFF		GALLONS	GAL	
AIR CONDITIONING UNIT	AC		GALLONS PER MINUTE	GPM	
AIR HANDLING UNIT	AHU		GLOBE VALVE	GBV	
ANCHOR			HEATING WATER RETURN PIPE	HWR	HWR
BELOW	BEL		HEATING WATER SUPPLY PIPE	HWS	HWS
BETWEEN	BET		HORIZONTAL UNIT HEATER	HUH	
CAPACITY	CAP		HORSEPOWER	HP	
CEILING	CLG		HOUR	HR	
			HUMIDISTAT		H
CEILING GRILLE	CG		INCH	IN	
			INLINE EXHAUST FAN	IEF	
CEILING REGISTER	CR		KILOWATT	KW	
CHECK VALVE			LEAVING AIR TEMPERATURE	LAT	
CHILLED WATER RETURN PIPE	CWR	CWR	LEAVING WATER TEMPERATURE	LWT	
CHILLED WATER SUPPLY PIPE	CWS	CWS			
CIRCUIT SETTER		CS(GPM)	MANUAL AIR VENT		MAV
			MANUAL DAMPER	MD	
CLEANOUT	CO	CO			
COMMON	C		MOTOR OPERATED DAMPER	MOD	
CONTROL SWITCH	S				
COOLING COIL CONDENSATE DRAIN PIPE	CCCD	D	NEW CONNECTED TO EXISTING		
CUBIC FEET PER MINUTE	CFM		NORMALLY CLOSED	NC	
DEGREES FAHRENHEIT	°F		NORMALLY OPEN	NO	
DIAMETER	DIA		OUTDOOR AIR	OA	
DIRECTION OF FLOW			PIPING INDICATION WITH RESPECT TO FLOW		
DIRECTION OF SLOPE DOWN					
DOWN	DN		SHEET METAL DUCTWORK		
DRY BULB	DB		TOP TAKEOFF		
DUCT SLOPE DOWN		DN	TURN DOWN OR FROM BELOW		
DUCT SLOPE UP		UP	TURN UP OR DOWN		
DUCT TRANSITION			TURN UP OR FROM ABOVE		
DUCTWORK (NEW)			POUNDS	LBS	
ACOUSTIC LINED			POUNDS PER SQUARE INCH GAGE	PSIG	
RETURN & EXHAUST			PRESSURE DROP	PD	
SUPPLY					
WATERTIGHT			PRESSURE GAUGE		
DUCTWORK (EXISTING TO REMAIN)		EX			
RETURN		EX R	PRESSURE REDUCING VALVE (FILL VALVE)	PRV	
EXHAUST		EX E			
SUPPLY		EX S	PRESSURE RELIEF VALVE		
DUCTWORK (EXISTING TO BE REMOVED)			RETURN AIR	RA	
EACH	EA		REVOLUTIONS PER MINUTE	RPM	
ENTERING AIR TEMPERATURE	EAT		SERVICE VALVE		
ENTERING WATER TEMPERATURE	EWT				
			STATIC PRESSURE	SP	
EXISTING, REMOVE FROM THIS POINT			STRAINER		
FAN COIL UNIT	FC		SUPPLY AIR	SA	
FEET	FT				
FEET PER MINUTE	FPM				
FIRE DAMPER	FD		THERMOMETER		
FIRE/SMOKE DAMPER	FSD		THERMOSTAT OR TEMPERATURE SENSOR	T'STAT	T
FIRESTAT	FS		THOUSAND BTU PER HOUR	MBH	
			THREE-SPEED FAN SWITCH		S
FLEXIBLE DUCT CONNECTION					
FLEXIBLE DUCT RUNOUT			THREE-WAY CONTROL VALVE		
FLEXIBLE PIPE CONNECTION					
FLOOR	FL		TWO-WAY CONTROL VALVE		
FLOW SWITCH	FSW	FSW	UNION		
FREEZE PROTECTION	FP		WALL HEATER	WH	
			WET BULB	WB	

FANS:

MARK	AREA SERVED	CFM	ESP	MCA	MOTOR HP	VOLTS/PH	MANUFACTURER	MODEL	NOTES
IEF-FE1 & 2	FUME EXTRACTOR	350	1.0	13.0	1.0	115/1	GREENHECK	SQ-98-VG	1, 2, 3, 5
IEF-PS	POWERSHOT	350	1.0	13.0	1.0	115/1	GREENHECK	SQ-98-VG	1, 2, 3, 5
OEF-1 THRU 4	PROCESS OVENS	250	0.5	1.7	1/20	115/1	VENT-A-FUME	1227-NP-SWB	1, 4, 5

NOTES:
1. PROVIDE MOTOR OPERATED DAMPERS (MOD) UNLESS OTHERWISE NOTED.
2. FAN MOTOR SHALL BE SUITABLE FOR OPERATION WITH VARIABLE SPEED DRIVE.
3. FAN SHALL BE SPARK-B RESISTANCE RATED CONSTRUCTION.
4. PROVIDE INTAKE CONNECTION, FLANGED OUTLET CONNECTION, AND SUPPORT BRACKET SYSTEM FOR WALL MOUNTING.
5. PROVIDE ALL WIRING, INTERLOCKS, AND CONTROLS FOR OPERATION WHEN ASSOCIATED EQUIPMENT IS ENERGIZED.

EXISTING VARIABLE VOLUME HEATING BOXES: TRANE VCWF & VFPE — SYSTEM: AHU-4

MARK	SIZE	AIR P.D., IN H20	CFM			HEATING CAPACITY, (MBH)	FLOWRATE (GPM)	ROOM SERVED
			MAX	LO MIN	HI MIN			
VAV-B	12	.12	410	160	205	13.0	0.8	171
VAV-B	14	.08	410	160	205	13.0	0.8	171
VAV-C	5	.11	1050	420	525	23.9	1.2	171A
FPB-F	14	.39	2550	1020	1275	105.7	6.0	171
FPB-F	14	.39	2550	1020	1275	105.7	6.0	171
FPB-E	12	.44	1780	710	890	81.0	7.2	171

* BASED ON EXISTING PLANS DATED 10 MARCH 1995

EXISTING AIR HANDLING UNIT: TRANE CLCH — SYSTEM: AHU-4

MARK	SIZE	CONFIG.	CFM		SUPPLY FAN EXTERNAL STATIC PRESSURE (IN. W.C.)	SUPPLY FAN BRAKE H.P.	SUPPLY FAN MOTOR H.P.	RETURN FAN EXTERNAL STATIC PRESSURE (IN. W.C.)	RETURN FAN BRAKE H.P.	RETURN FAN MOTOR H.P.
			TOTAL	MIN O/A						
AHU-4	14	A	7930	1590	2.5	8.8	10.0	1.0	2.0	3.0

* BASED ON EXISTING PLANS DATED 10 MARCH 1995

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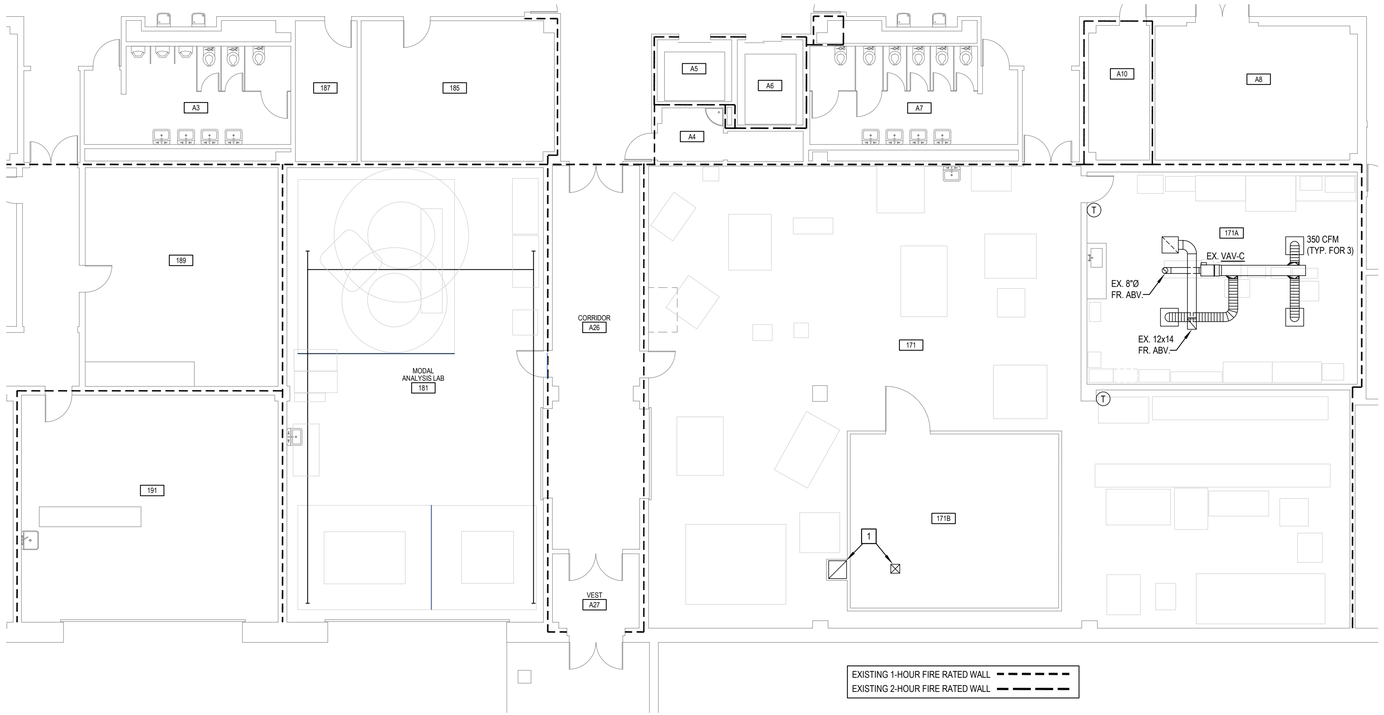
REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

LEGENDS, NOTES, & EQUIPMENT SCHEDULES FOR HVAC

DESIGNED MEH	DRAWN MEH
CHECKED RDF	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET
M-200

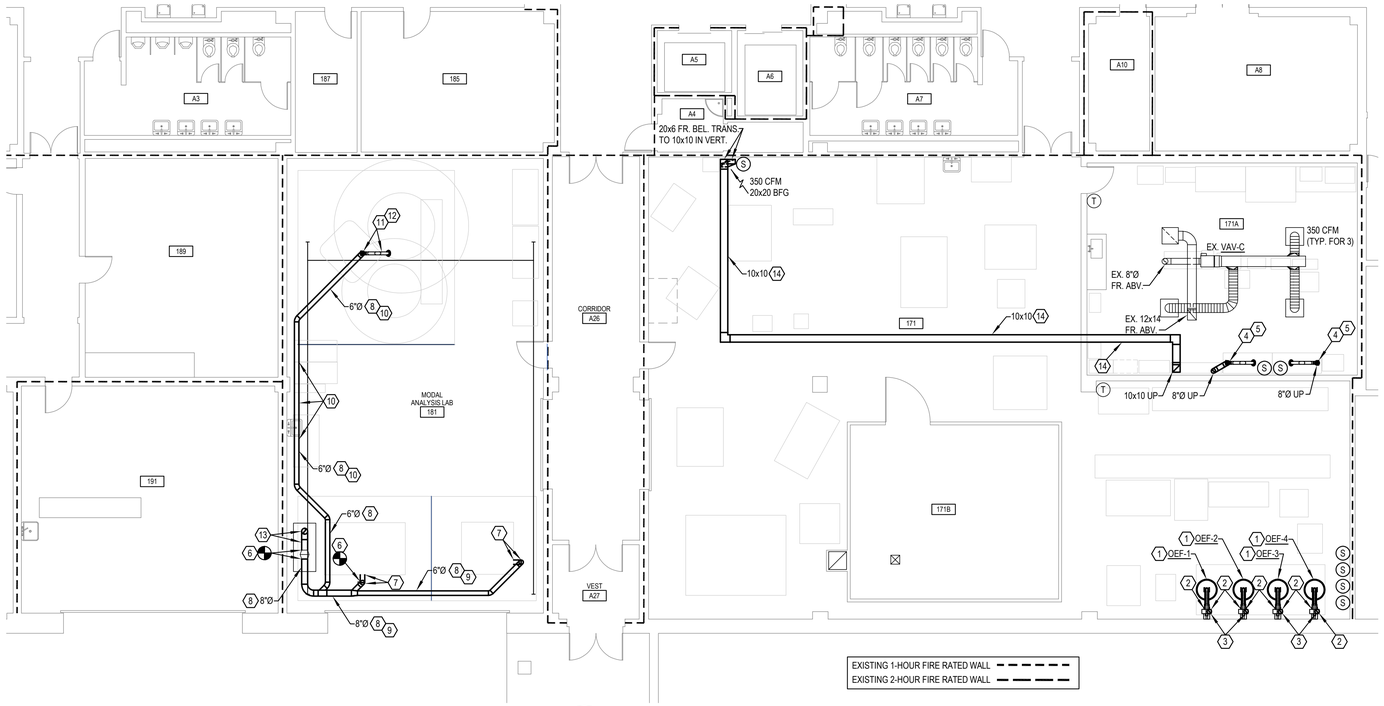


PARTIAL FIRST FLOOR PLAN - DEMOLITION

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

DEMOLITION NOTES:

1. EXISTING DUCTWORK, INSULATION, AND SUPPORTS CONNECTED TO THE EXISTING ANECHOIC CHAMBER TO REMAIN.

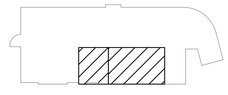


PARTIAL FIRST FLOOR PLAN - NEW WORK

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

PLAN NOTES:

1. NEGATIVE PRESSURE VENTILATION HOOD EXHAUST FAN SYSTEM. INSTALL IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. EXHAUST FAN AND SUPPORT BOOM TO BE WALL MOUNTED ON PRE-MANUFACTURED SUPPORT SYSTEM. REFER TO SPECIFICATIONS ON SHEET M203 AND DETAIL ON SHEET M200.
2. CONNECT SMOOTH INTERIOR EXHAUST DUCT TO EQUIPMENT/EXHAUST FAN, AND EXTEND TO RELIEF PLENUM ABOVE. PROVIDE MOD IN VERTICAL BELOW CEILING. DUCTWORK SHALL BE SUPPORTED ON ANGLE BRACKETS SECURELY FASTENED TO THE WALL.
3. 6"Ø UP. OFFSET IN VERTICAL AS REQUIRED.
4. HANGING FUME EXTRACTION ARM. INSTALL IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. UNIT SHALL BE WALL MOUNTED ON PRE-MANUFACTURED SUPPORT SYSTEM. REFER TO SPECIFICATIONS ON SHEET M203 AND DETAIL ON SHEET M200. BALANCE FOR 350 CFM - MINIMUM 350 FPM FACE VELOCITY AT INTEGRAL 13" HOOD.
5. CONNECT 8"Ø SMOOTH INTERIOR EXHAUST DUCT TO HANGING FUME EXTRACTION ARM IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
6. RE-INSTALL OWNER'S EXISTING IN-LINE SPARK ARRESTER, MOTORIZED ISOLATION DAMPER AND ASSOCIATED WIRING AND CONTROLS.
7. 6"Ø SMOOTH INTERIOR EXHAUST DUCT FROM BELOW. CONNECT TO FULL SIZE OF DMS UNIT EXHAUST OUTLET.
8. ROUTE EXHAUST DUCT BELOW GANTRY CRANE, CRANE STRUCTURE AND ROLL-UP DOOR. DUCT JOINTS IN THE PASSAGEWAY OF THE ROLL-UP DOOR SHALL BE FLANGED AND BOLTED CONNECTION FOR EASY REMOVAL IN THE EVENT OF MOVING EQUIPMENT IN AND OUT OF THE SPACE.
9. SUPPORT DUCT RUN FROM BOTTOM OF GANTRY CRANE STRUCTURE, CLEAR OF CRANE ROLLERS (MAX. 6' O.C.).
10. SUPPORT DUCT RUN FROM STRUCTURAL ANGLE SUPPORTS ON WALL (MAX. 6' O.C.).
11. HANGING FUME EXTRACTION ARM. INSTALL IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. UNIT SHALL BE WALL MOUNTED ON PRE-MANUFACTURED SUPPORT SYSTEM. REFER TO SPECIFICATIONS ON SHEET M203 AND DETAIL ON SHEET M200. BALANCE FOR 600 CFM - MINIMUM 100 FPM CAPTURE VELOCITY AT INTEGRAL 13" HOOD.
12. CONNECT 6"Ø SMOOTH INTERIOR EXHAUST DUCT TO HANGING WELD FUME EXTRACTION ARM IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
13. 8"Ø DOWN. CONNECT TO FULL SIZE OF OWNER'S EXISTING FREE STANDING INDOOR TORIT DUST COLLECTION SYSTEM. PROVIDE NEW DONALDSON-TORIT P191920-016-436 BLUE ULTRA-WEB CARTRIDGE FILTERS.
14. NEW DUCTWORK ABOVE EXISTING CEILING.



KEY PLAN

NO SCALE

GRAPHIC SCALE

8 0 4 8 16 32

(IN FEET)
1/8" = 1'-0"

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COMMONWEALTH OF VIRGINIA
10/10/25
RODNEY D. FANNING
Lic. No. 034568
PROFESSIONAL ENGINEER

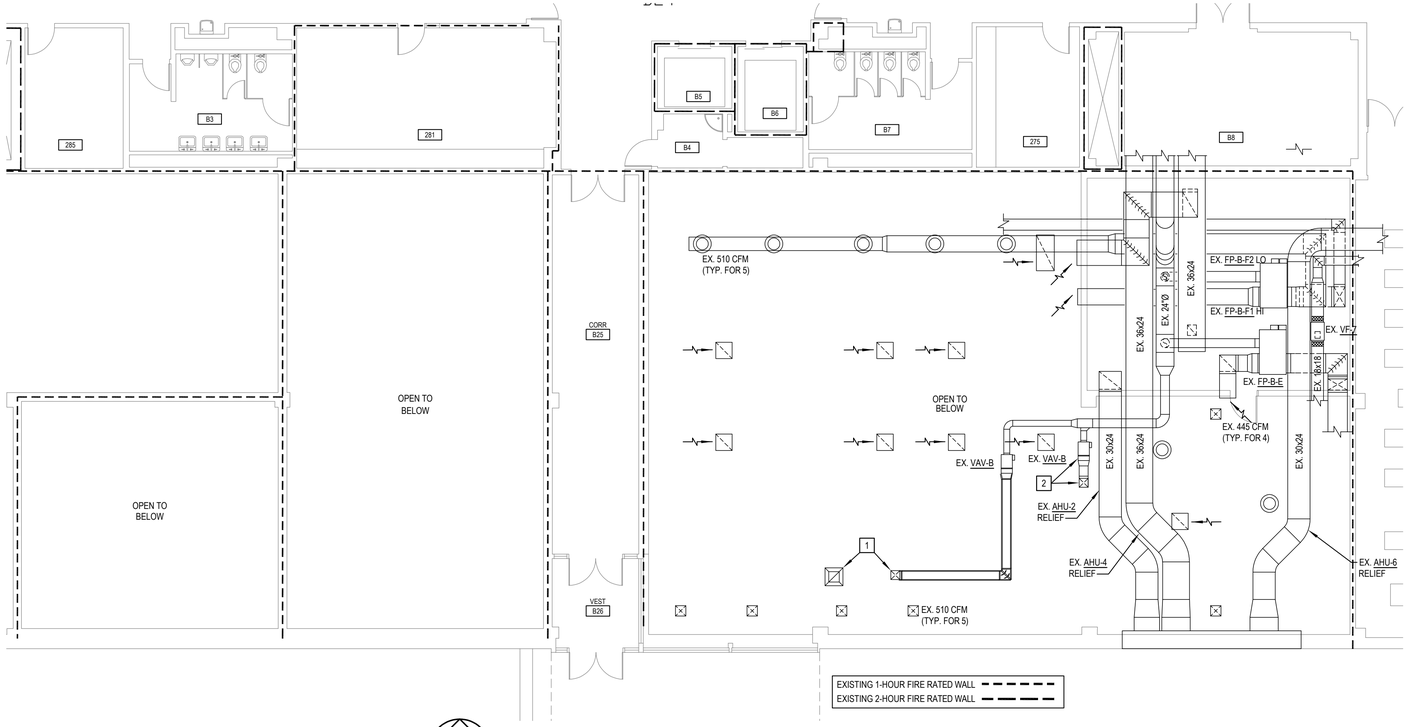
REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

PRATIAL FIRST FLOOR PLAN
DEMOLITION AND NEW WORK - HVAC

DESIGNED MEH	DRAWN MEH
CHECKED XXX	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET
M-201

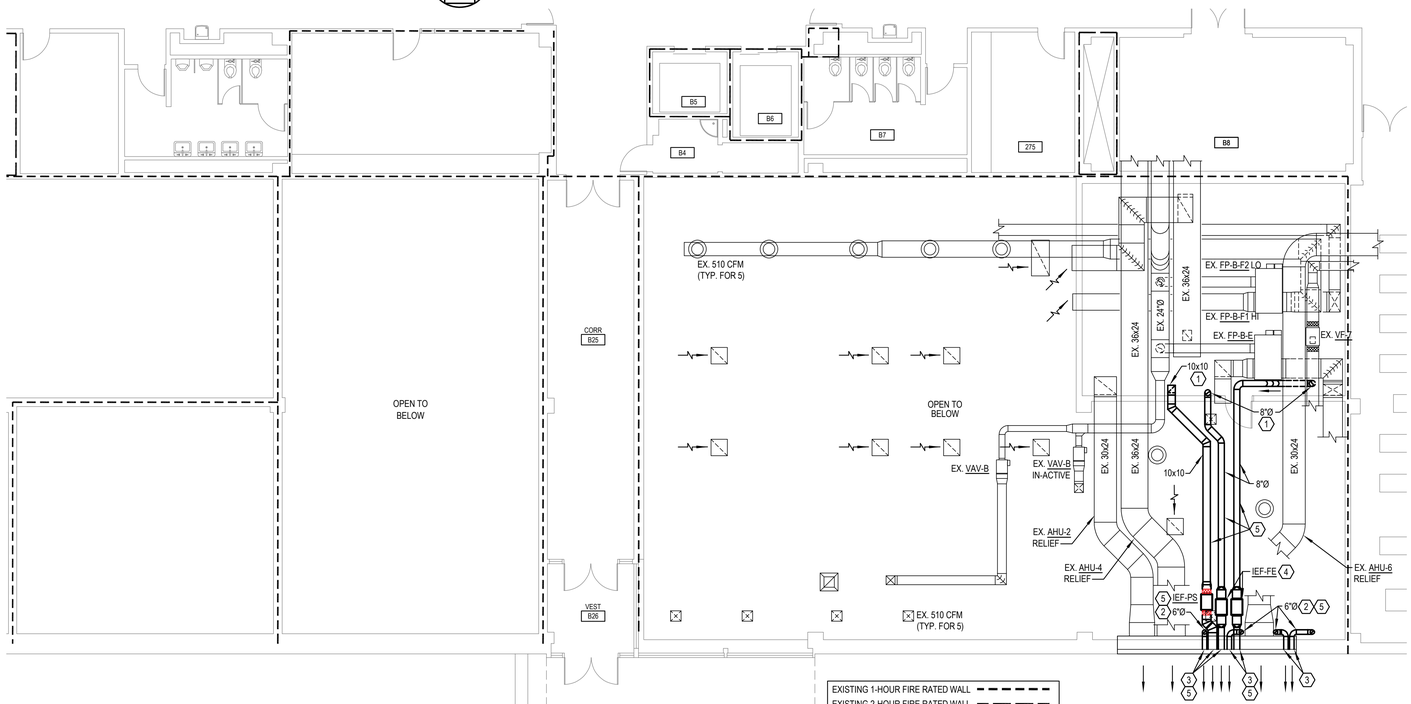


PARTIAL SECOND FLOOR PLAN - DEMOLITION

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

DEMOLITION NOTES:

1. EXISTING DUCTWORK, INSULATION, AND SUPPORTS CONNECTED TO THE EXISTING ANECHOIC CHAMBER TO REMAIN.
2. EXISTING VV BOX DISCONNECTED AND INACTIVE - UNIT TO REMAIN INACTIVE.



PARTIAL SECOND FLOOR PLAN - NEW WORK

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

PLAN NOTES:

1. EXHAUST DUCT FROM BELOW AND UP. HOLD TIGHT TO CEILING AND ROUTE INTO HIGH CEILING PLENUM BEYOND. COORDINATE LOCATION, FLOOR, AND WALL PENETRATION WITH EXISTING DUCTWORK AND UTILITIES. RE-ROUTE EXISTING UTILITIES AS REQUIRED TO ACCOMODATE.
2. FROM NEGATIVE PRESSURE VENTILATION HOOD EXHAUST FAN SYSTEM BELOW.
3. ROUTE NEW EXHAUST DUCTWORK THROUGH EXISTING RELIEF PLENUM AND EXTEND TO WITHIN 4" OF THE BACK-SIDE OF THE LOUVER. SEAL PLENUM PENETRATION AIR TIGHT. INSULATE EXHAUST DUCTWORK AS SPECIFIED, SHEET EX203.
4. DUCTWORK FOR IEF-FE SHALL BE ALL WELDED TO PREVENT LEAKAGE.
5. NEW DUCTWORK ABOVE EXISTING ACOUSTIC TILE CEILING.

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DEMOLITION AND NEW WORK - HVAC

DESIGNED MEH	DRAWN MEH
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COMM. NO. 25105	DATE 10-10-25

SHEET
M-202

SPECIFICATIONS FOR HVAC WORK

1. SCOPE OF THE WORK: WORK SHALL INCLUDE COMPLETE HVAC SYSTEMS. PROVIDE SUPERVISION, LABOR, MATERIAL, EQUIPMENT, MACHINERY, PLANT AND ITEMS NECESSARY FOR COMPLETE SYSTEMS TESTED AND READY FOR OPERATION.

2. REGULATIONS: MATERIALS AND INSTALLATION SHALL COMPLY WITH LOCAL CODES, APPLICABLE PROVISIONS OF LATEST EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION, LOCAL UTILITY REGULATIONS AND GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION.

3. DRAWINGS: THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED. WHERE VARIANCES OCCUR INCLUDE THE ITEMS OF BETTER QUALITY, GREATER QUANTITY OR HIGHER COST.

4. COORDINATION OF WORK: THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION AND PROPER RELATION OF HIS WORK TO THE BUILDING STRUCTURE AND TO THE WORK OF OTHER TRADES. CONTRACTOR SHALL PROVIDE DIMENSIONS AND LOCATIONS OF ALL OPENINGS, SHAFTS AND SIMILAR ITEMS TO THE PROPER TRADES AND SHALL INSTALL WORK AS REQUIRED SO AS NOT TO DELAY THE BUILDING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY HIS WORK OR WORKMEN. REPAIRING OF DAMAGED WORK SHALL BE DONE BY THE CONTRACTOR AT NO ADDITIONAL COST.

5. VISITING THE SITE: EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE BEFORE PRICING THE JOB TO FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS TO BE MET IN THE EXECUTION OF THE WORK UNDER THIS CONTRACT. NO ADDITIONAL COMPENSATION WILL BE ALLOWED RELATING TO SITE CONDITIONS.

6. INTERRUPTION OF SERVICES: INTERRUPTIONS OF SERVICE TO EXISTING SYSTEMS SHALL BE COORDINATED WITH THE OWNER AS TO TIME AND DURATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY INTERRUPTIONS TO SERVICE AND SHALL REPAIR ANY DAMAGES TO EXISTING SYSTEMS CAUSED BY HIS OPERATIONS.

7. SHOP DRAWINGS: SHOP DRAWINGS ARE REQUIRED FOR ALL MATERIAL AND EQUIPMENT THAT IS SPECIFIED BY A MANUFACTURER'S NAME OR AS INDICATED IN THESE SPECIFICATIONS. FURNISH ELECTRONIC PDFS AS REVIEWED BY THE CONTRACTOR AND SUBCONTRACTOR. SUBMITTAL DATA FOR RELATED EQUIPMENT SHALL BE SUBMITTED AT ONE TIME. INDIVIDUAL SUBMITTALS WILL BE ALLOWED FOR EQUIPMENT WHICH IMPACTS THE CONSTRUCTION PHASING. IDENTIFY SUBMITTALS WITH PROJECT NAME AND NUMBER, CONTRACTOR'S NAME, MANUFACTURER, MODEL OR STYLE, AND CONTRACTOR'S REVIEW STAMP. SUBMITTALS SHALL BE DETAILED, DIMENSIONED DRAWINGS SHOWING CONSTRUCTION, SIZE AND ARRANGEMENT, SERVICE CLEARANCES, PERFORMANCE CHARACTERISTICS, AND CAPACITY. SUBMITTALS NOT PROPERLY IDENTIFIED OR CONTAINING INFORMATION OF A GENERAL NATURE WILL NOT BE REVIEWED AND WILL BE RETURNED UNCHECKED.

8. WORK IN OCCUPIED AREAS: WORK IN OCCUPIED AREAS SHALL BE COORDINATED WITH THE OCCUPANT AND OWNER AS TO TIME AND DURATION. THE CONTRACTOR SHALL PROTECT THE OCCUPIED AREA AND SHALL BE RESPONSIBLE FOR CLEANING AND REPAIRING ANY DAMAGES CAUSED BY HIS WORK. SAFETY OF BUILDING OCCUPANTS SHALL BE ASSURED AT ALL TIMES. TOOLS, MATERIAL, DIRT AND DEBRIS SHALL BE REMOVED FROM OCCUPIED AREAS WHENEVER WORK AREAS ARE LEFT UNATTENDED.

9. ACCESSIBILITY: LOCATE EQUIPMENT WHICH MUST BE SERVICED OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS WHERE POSSIBLE. OTHERWISE, FURNISH ACCESS PANELS OF SUFFICIENT SIZE AND LOCATED SO THAT THE CONCEALED EQUIPMENT CAN BE SERVICED.

10. ROUGH-IN: ROUGH-IN OPENINGS SHALL ALIGN VERTICALLY AND HORIZONTALLY WITH BUILDING STRUCTURE. WALL-MOUNTED THERMOSTATS OR SENSORS SHALL BE MOUNTED 4'-6" ABOVE FINISHED FLOOR TO BOTTOM OF THERMOSTAT OR SENSOR.

11. SLEEVES: LOCATE SLEEVES DURING NORMAL COURSE OF WORK. PROVIDE SLEEVES FOR PIPING PASSING THROUGH CONCRETE FLOOR SLABS AND CONCRETE, MASONRY, TILE AND GYPSUM WALL CONSTRUCTION. WHERE SLEEVES ARE LOCATED THROUGH FIRE-RATED WALLS OR FLOORS, THE SLEEVE ASSEMBLIES SHALL MAINTAIN THE FIRE RATING OF THE WALL OR FLOOR. SLEEVES SHALL BE CONSTRUCTED OF 20 GAUGE GALVANIZED STEEL WITH LOCK SEAM JOINTS FOR ALL SLEEVES SET IN CONCRETE FLOOR SLABS. ALL OTHER SLEEVES SHALL BE CONSTRUCTED OF GALVANIZED STEEL PIPE. SLEEVES THROUGH CONCRETE FLOORS SHALL EXTEND 8 INCHES ABOVE THE FLOOR AND PIPE/SLEEVE OPENING SHALL BE SEALED WATERTIGHT.

12. CUTTING AND PATCHING: THE CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING NECESSARY TO INSTALL HIS WORK. PATCHING SHALL MATCH ADJACENT SURFACES. NO STRUCTURAL MEMBERS SHALL BE CUT WITHOUT THE APPROVAL OF THE ARCHITECT.

13. CLEANING: EQUIPMENT AND PIPING SHALL BE CLEANED TO REMOVE FOREIGN MATERIALS. PROVIDE TEMPORARY FILTERS FOR AIR UNITS THAT ARE OPERATED DURING CONSTRUCTION. PLUG OR CAP OPENINGS IN EQUIPMENT, DUCTWORK, PIPING AND MATERIALS UNTIL CONNECTION IS MADE TO THE SYSTEM. REMOVE FROM THE PREMISES ALL UNUSED MATERIAL AND DEBRIS RESULTING FROM THE PERFORMANCE OF HVAC WORK.

14. WIRING: STARTERS THAT ARE SPECIFIED TO BE FURNISHED AS AN INTEGRAL PART OF THE MECHANICAL EQUIPMENT SHALL BE COMPLETE WITH PROPERLY SIZED OVERLOAD HEATERS. TEMPERATURE CONTROL WIRING, EQUIPMENT CONTROL WIRING AND CONTROL INTERLOCK WIRING FOR MECHANICAL EQUIPMENT SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR. CONTROL WIRING SHALL NOT INCLUDE ANY WIRING WHICH CARRIES MOTOR CURRENT. ALL WIRING SHALL BE IN METAL CONDUIT AND SHALL COMPLY WITH THE ELECTRICAL SPECIFICATIONS.

15. QUIET OPERATION: SYSTEMS SHALL OPERATE UNDER CONDITIONS OF LOAD WITHOUT UNUSUAL OR EXCESSIVE NOISE OR VIBRATION. UNUSUAL OR EXCESSIVE NOISE OR VIBRATION SHALL BE CORRECTED.

16. TESTING AND BALANCING (SUBMITTAL REQUIRED): HVAC CONTRACTOR SHALL TEST ALL HVAC EQUIPMENT TO ASSURE THAT THE PROPER SEQUENCE OF CONTROL IS ESTABLISHED AND OPERATING IN A SAFE MANNER. THE CONTRACTOR SHALL PROVIDE THE SERVICES OF A FIRM CERTIFIED BY THE ASSOCIATED AIR BALANCING COUNCIL OR THE NATIONAL ENVIRONMENT BALANCING BUREAU TO ADJUST AND BALANCE THE HVAC SYSTEMS. THE AIR QUANTITIES FOR EQUIPMENT, DIFFUSERS AND REGISTERS SHALL BE BALANCED FOR THE CFM AS INDICATED ON THE DRAWING. THE WATER QUANTITIES FOR THE CHILLED AND HEATING WATER COILS SHALL BE BALANCED FOR THE GPM AS INDICATED ON THE DRAWINGS. REFER TO SHEET M0.1 FOR PRE-CONSTRUCTION TESTING AND BALANCING REQUIRED.

17. INSTRUCTIONS TO OWNER: INSTRUCT THE OWNER IN THE PROPER OPERATION AND MAINTENANCE OF THE MECHANICAL SYSTEMS UNTIL THE OWNER IS FULLY PREPARED TO OPERATE AND MAINTAIN THE SYSTEMS. HOWEVER, LENGTH OF INSTRUCTION TIME SHALL BE LIMITED TO ONE (1) FULL DAY.

18. OPERATING AND MAINTENANCE (SUBMITTAL REQUIRED): PROVIDE THE OWNER WITH TWO (2) BOUND SETS OF OPERATING AND MAINTENANCE INSTRUCTIONS FOR ALL HVAC EQUIPMENT AND CONTROLS.

19. GUARANTEE: EQUIPMENT, MATERIALS AND LABOR REQUIRED BY THESE CONTRACT DRAWINGS SHALL BE GUARANTEED TO BE FREE FROM DEFECTIVE MATERIALS OR WORKMANSHIP FOR ONE (1) YEAR AFTER FINAL ACCEPTANCE OF THE PROJECT UNLESS SPECIFIED FOR A LONGER PERIOD IN OTHER PORTIONS OF THE SPECIFICATIONS. DEFECTIVE MATERIALS OR WORKMANSHIP OCCURRING DURING THIS PERIOD SHALL BE CORRECTED AT NO ADDITIONAL COST.

20. PAINTING: GENERAL - PAINT MECHANICAL EQUIPMENT AND MATERIALS (WHERE NOT CONCEALED). PAINTING (IN CONCEALED SPACES) SHALL BE LIMITED TO EQUIPMENT AND MATERIALS NOT OTHERWISE PROTECTED FROM RUSTING SUCH AS HANGERS AND SUPPORTS. PAINT SHALL BE PRODUCTS OF SHERWIN-WILLIAMS, PITTSBURGH, PRATT-LAMBERT OR EQUAL. SURFACE PREPARATION, PRIMING AND PAINT APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. GALVANIZED SURFACES SHALL BE PRETREATED WITH A PHOSPHORIC ACID CLEANING SOLUTION AND PRIMED. AFTER PREPARATION EACH ITEM SHALL BE PAINTED, EXCEPT COLOR OF PAINT FOR EQUIPMENT AND MATERIAL WHERE NOT CONCEALED SHALL MTCH EXISTING AND NEARBY PAINT COLORS. ITEMS NOT CONCEALED IN ROOMS SHALL BE PAINTED OF THE SAME COLOR TO MATCH ADJACENT WALLS OR CEILINGS. PAINTING IS NOT REQUIRED OF ITEMS WITH A FACTORY-FINISH COAT. PATCH PAINTING IS REQUIRED OF ANY DAMAGED AREAS TO MATCH FACTORY-FINISH COAT. NAMEPLATES ON EQUIPMENT SHALL NOT BE PAINTED.

21. IDENTIFICATION OF PIPES AND EQUIPMENT: EACH MAJOR PIECE OF EQUIPMENT, SUCH AS BLOWER COIL UNITS, FANS, AND PIPING SHALL BE IDENTIFIED BY MARKING THAT WILL READ THE SAME AS THE IDENTIFICATION SHOWN ON THE DRAWINGS. STENCIL LETTERS SHALL BE 2 INCHES HIGH UPPER CASE PAINTED WITH WHITE ENAMEL ON EQUIPMENT AND BLACK ENAMEL ON PIPING AND CONDUIT. IDENTIFICATION SHALL BE PAINTED ON EACH PIPE OR CONDUIT WHERE EXPOSED OR ACCESSIBLE AND SHALL BE PLACED EVERY 15 FEET ALONG THE PIPE OR CONDUIT.

22. AIR DEVICES (SUBMITTAL REQUIRED):

A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE PRICE OR EQUAL. CEILING DEVICES SHALL HAVE WHITE BAKED ENAMEL FINISH.

B. DIFFUSERS: SQUARE CEILING DIFFUSERS SHALL BE MODEL ASCDA COMPLETE WITH ROUND NECK AND VOLUME CONTROL UNIT. DIFFUSER FACE SHALL BE 24" X 24", AS INDICATED ON THE DRAWINGS, WITH FULL LOUVER FACE AND ALUMINUM CONSTRUCTION.

C. RETURN AIR REGISTERS AND RELIEF AIR GRILLE SHALL BE MODEL 630DAL ALUMINUM CONSTRUCTION WITH 45 DEGREE DEFLECTING VANES AND SHALL HAVE FREE AREA NOT LESS THAN 75%. REGISTER DAMPERS SHALL BE ALUMINUM OPPOSED-BLADE FACE-OPERATED TYPE.

23. DUCTWORK (SUBMITTAL REQUIRED):

A. GENERAL: DUCTWORK SHALL BE ZINC-COATED SHEET STEEL OR ALUMINUM, CONSTRUCTED AND INSTALLED AS RECOMMENDED BY THE LATEST EDITION OF SMACNA FOR 2 INCHES WG STATIC PRESSURE RATING. DUCTWORK FOR FUME EXTRACTOR EXHAUST AND FOR PROCESS OVEN HEAT CAPTURE SHALL HAVE SMOOTH INNER WALL. DUCTWORK FOR FUME EXTRACTOR ARMS SHALL BE OF SPARK-PROOF CONSTRUCTION.

B. DUCT CLEARANCE SHALL BE ESTABLISHED AT THE JOB SITE BEFORE ANY DUCTS ARE FABRICATED. THE CONTRACTOR WILL NOT BE ALLOWED ANY EXTRA COSTS FOR DUCTS FABRICATED AND THEN FOUND NOT TO FIT.

C. MANUAL VOLUME CONTROL DAMPERS SHALL HAVE ACCESSIBLE OPERATING MECHANISM. BLADE HEIGHT SHALL NOT EXCEED 8 INCHES.

D. TURNING VANES SHALL BE PROVIDED IN ALL SQUARE ELBOWS AND DUCT-MOUNTED SUPPLY OUTLETS.

E. MOTORIZED DAMPERS SHALL BE PARALLEL BLADE CONSTRUCTION FOR TWO-POSITION SERVICE. MOTORIZED DAMPERS SHALL BE CONSTRUCTED WITH BRASS BEARINGS, CHANNEL IRON FRAME AND INTERLOCKING BLADES WITH AIR-TIGHT FELT SEALS.

F. ADJUSTABLE AIR DEFLECTORS: FACTORY-FABRICATED FOR AIR DIVERSION AND VOLUME CONTROL WITH OPERATOR AS REQUIRED FOR LOCATION IN AN ACCESSIBLE POSITION. ADJUSTABLE DEFLECTORS SHALL BE YOUNG AIR EXTRACTOR MODEL 890 WITH WORM GEAR OPERATOR WHEN BEHIND GRILLES, WITH 301 OPERATOR WHEN ABOVE PLASTER CEILINGS, AND WITH 433 OPERATOR WHEN IT IS ACCESSIBLE.

G. HINGED ACCESS DOORS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 90A AT ALL AUTOMATIC DAMPERS, FIRE DAMPERS, HEATERS, THERMOSTATS, ON EACH SIDE OF AIR HANDLING UNIT AND OTHER APPARATUS REQUIRING SERVICE AND INSPECTION IN THE DUCT SYSTEM. ACCESS DOORS SHALL BE 15" X 18" OR AS LARGE AS PRACTICAL.

H. DUCT SUPPORTS SHALL CONSIST OF NOT LESS THAN 1" X 16-GAUGE GALVANIZED STRAP IRON HANGERS SPACED NOT OVER 4'-0" ON CENTER.

I. FLEXIBLE DUCTS SHALL BE FLEXIBLE METAL OR METAL AND NEOPRENE-COATED CANVAS HOSE INSULATED WITH 1" THICK FIBERGLASS WITH VINYL VAPOR BARRIER. ALL ROUND DUCT TAKE-OFFS SHALL BE MADE WITH SPIN-IN FITTINGS WITH BALANCING DAMPER. THE DUCT DIAMETER SHALL MATCH THE AIR DIFFUSER SIZE UNLESS OTHERWISE INDICATED.

24. THERMAL COVERING (SUBMITTAL REQUIRED):

A. INSULATION SHALL BE JOHNS MANVILLE, OWENS CORNING, ARMSTRONG OR EQUAL FACED DUCT WRAP FIBERGLASS INSULATION - FRK TYPE 100, ASTMC 553-92 (BLANKET, FLEXIBLE), DENSITY 1 PCF, K = 0.31, FOR TEMPERATURES UP TO 250 DEG. F. INSULATION SHALL NOT BE APPLIED UNTIL AFTER THE EQUIPMENT, PIPES OR DUCTS TO BE INSULATED HAVE PROVEN SATISFACTORY UNDER TESTS. ALL MATERIALS USED SHALL HAVE COMPOSITE FLAME-SPREAD RATING NOT EXCEEDING 25 AND A SMOKE-DEVELOPED RATING NOT EXCEEDING 50. CONCEALED EXHAUST AIR DUCTWORK WITHIN BUILDING'S THERMAL ENVELOPE AND WITHIN 10 FEET OF CONNECTION TO OUTDOORS SHALL BE 1-1/2 INCH THICK INSULATION.

26. PROCESS OVEN HEAT CAPTURE SYSTEM (SUBMITTAL REQUIRED):

A. THE PROCESS OVEN HEAT CAPTURE SYSTEM SHALL BE THE VENT-A-KILN MODEL 1227-NP-SWB,1 NEGATIVE PRESSURE VENTILATION SYSTEM WITH CONICAL METAL SPUN ALUMINUM HOOD AND A SINGLE SPEED MOTOR WITH FAN (BLOWER) MOUNTED TO WALL BY MEANS OF A SUPPORT BRACKET. UNIT SHALL DRAW AND PROPEL EXHAUST FUMES AND HEAT VIA A FLEXIBLE HOSE TO A EXTERIOR SURFACE MOUNTED GRAVITY OPERATED LOUVER. THE PLACEMENT OF THE HOOD AND BLOWER SUBASSEMBLY SHALL BE USER ADJUSTABLE VIA A SWINGING WALL BRACKET WITH A CONTINUOUS FRICTION HINGE DESIGN. THE SUBASSEMBLY SHALL ALSO INCLUDE A PULLEY AND COUNTERWEIGHT SYSTEM.

B. CONICAL COLLECTION HOOD AHLL BE METAL SPUN FROM 0.063 GAGE ALUMINUM, ALLOY 1100-0.

C. NON-EXPLOSION PROOF BLOWER SHALL BE 1/20 HP, 1/60/115 MOTOR; 250 CFM @ 0.0" W.G., 1.7 AMPS, 1550 RPM. MAXIMUM CONTINUOUS MOTOR TEMPERATURE 250 DEG. F. FAN SOUND DATA: APPROXIMATE db AT 5 FEET: HIGH 62db, LOW 59db.

D. FLEXIBLE EXHAUST HOSE: TRIPLE PLY LAMINATE, ALUMINIZED POLYESTER FACE AND AN ALUMINUM FOIL BACKING. CORROSION, MOISTURE, TEMPERATURE (250 DEG. F.) AND FLAME RESISTANT, 5.0" DIAMETER, 10' (FT) LENGTH. FLEXIBLE HOSE FASTENED BY PLASTIC HOSE CLAMPS (QTY=2). UL LISTED NUMBER 723. CUT TO SHORTEST LENGTH PERMISSIBLE.

E. EXTERIOR SURFACE MOUNTED LOUVER: 5.0" DIAMETER DISCHARGE WITH BIRD SCREEN AND THREE (3) GRAVITY OPERATED SHUTTERS.

F. 3/16" DIAMETER PLASTIC COATED STEEL CABLE: 10' (FT) LENGTH. TWO (2) 3/16" GALVANIZED STEEL CABLE CLAMPS FOR FASTENING CABLE TO COUNTERWEIGHT AND BLOWER.

G. COUNTERWEIGHT: 3.0" DIAMETER COLD ROLLED STEEL, PAINTED VAF/VAK BLACK.

H. SWING WALL BRACKET WITH PULLEY SYSTEM: CONTINUOUS FRICTION HINGE DESIGN. 1.0"x1.0"x35.0" LENGTH STRUCTURAL TUBING. TWO (2) BALL BEARING PULLEYS AND ONE (1) RESISTANCE PULLEY. TWO (2) SLIDE BRACKETS FOR HANGING OF SYSTEM. TWO (2) PULLEY SAFETY STRAPS. WALL TO CENTER OF HOOD WHEN SWB IS PERPENDICULAR TO WALL IS 36.0".

I. BLOWER WALL SUPPORT BRACKET: 12 GAGE STEEL. PAINTED VAF/VAK BLACK.

27. FUME EXTRACTION ARM (SUBMITTAL REQUIRED):

A. THE FUME EXTRACTION ARM SHALL BE IAP AIR PRODUCTS HANGING FUME ARM MODEL FA-0608-H, 6" TUBE DIAMETER, 8.5' ARM LENGTH WITH MINIMUM 10" HOOD.

B. ARM CONSTRUCTION: ARM SHALL CONSIST OF TWO GALVANIZED STEEL TUBES, THREE FLEX HOSES AT JOINTS (RATED TO 195°F), ALUMINUM HOOD, HEAVY GAUGE STEEL SWIVEL BASE AND SUPPORT SPRING. UNIT SHALL HAVE EXTERNALLY SUPPORTED ADJUSTMENTS AT THE JOINTS.

C. DAMPER: UNIT SHALL INCLUDE INTERNAL DAMPER WITH EXTERNAL ADJUSTMENT.

D. ACCESSORIES: UNIT SHALL INCLUDE MOUNTING BRACKET FOR SIDEWALL INSTALLATION, LIGHT KIT, AND SPARK PROTECTOR.

28. IN-LINE CENTRIFUGAL FANS (SUBMITTAL REQUIRED):

A. TYPE: PENN MODEL AS INDICATED ON DRAWINGS OR EQUAL BY GREENHECK OR COOK, CENTRIFUGAL FAN, BACKWARD INCLINED.

B. CONSTRUCTION: STRAIGHT-THROUGH BLOWER COMPLETE WITH BACKWARD-CURVED NON-OVERLOADING ALUMINUM BLADES, RUBBER-MOUNTED MOTOR, SQUARE STEEL ENCLOSURE (UNITS FOR FUME EXTRACTION SHALL HAVE ALUMINUM ENCLOSURE), RUBBER-IN-SHEAR VIBRATION ISOLATORS, AND DISCONNECT SWITCH WIRED TO MOTOR. UNIT SHALL BE SUITABLE FOR MOUNTING AT ANY ANGLE. POWER UNIT SHALL BE ACCESSIBLE WITHOUT DISCONNECTING DUCTWORK. HOUSING SHALL BE INTERNALLY LINED WITH 1" THICK FIBERGLASS INSULATION.

C. MOTOR AND DRIVE: REFER TO SECTION 23 00 00, HEATING, VENTILATING AND AIR-CONDITIONING (HVAC). DRIVE SHALL BE DIRECT OR BELT CONNECTED AS INDICATED ON THE DRAWINGS. BEARINGS SHALL BE PRE_LUBRICATED AND SEALED AT THE FACTORY.

D. ALL FANS SHALL BEAR THE AMCA CERTIFIED RATINGS SEAL FOR BOTH AIR AND SOUND PERFORMANCE.

29. TEMPERATURE CONTROL SYSTEM (SUBMITTAL REQUIRED):

A. GENERAL - THE SYSTEM SHALL BE AN EXTENSION OF AND SHALL COMMUNICATE SEAMLESSLY WITH THE EXISTING SIEMENS BUILDING AUTOMATION CONTROL SYSTEM (BAS). DIRECT DIGITAL CONTROL (DDC) TECHNOLOGY SHALL BE USED TO PROVIDE THE FUNCTIONS NECESSARY FOR CONTROL AS DESCRIBED IN THE "SEQUENCE OF CONTROL". TEMPERATURE CONTROL CONTRACTOR SHALL BE RESPONSIBLE FOR ACHIEVING THE "SEQUENCE OF CONTROL". THE SYSTEM SHALL BE INSTALLED BY COMPETENT, TRAINED MECHANICS. PROVIDE ALL EQUIPMENT AND MATERIALS AS REQUIRED TO ACCOMPLISH THE "SEQUENCE OF CONTROL".

B. APPLICATION SPECIFIC CONTROLLERS SHALL BE MICROPROCESSOR-BASED DDC CONTROLLERS, WHICH THROUGH HARDWARE OR FIRMWARE DESIGN ARE DEDICATED TO CONTROL A SPECIFIC PIECE OF EQUIPMENT. THEY SHALL BE CUSTOMIZED FOR OPERATION WITHIN THE CONFINES OF THE EQUIPMENT THEY ARE DESIGNED TO SERVE. EACH SHALL BE CAPABLE OF STAND-ALONE OPERATION AND SHALL CONTINUE TO PROVIDE CONTROL FUNCTIONS WITHOUT BEING CONNECTED TO THE NETWORK AND UNIT SHALL CONTAIN SUFFICIENT I/O CAPACITY TO CONTROL THE TARGET SYSTEM.

C. INPUT/OUTPUT INTERFACE:

(1) HARD-WIRED INPUTS AND OUTPUTS MAY TIE INTO THE SYSTEM THROUGH BUILDING, CUSTOM, OR APPLICATION SPECIFIC CONTROLLERS.
(2) ALL INPUT POINTS AND OUTPUT POINTS SHALL BE PROTECTED SUCH THAT SHORTING OF THE POINT TO ITSELF, ANOTHER POINT, OR GROUND WILL CAUSE NO DAMAGE TO THE CONTROLLER. ALL INPUT AND OUTPUT POINTS SHALL BE PROTECTED FROM VOLTAGE UP TO 24V OF ANY DURATION, SUCH THAT CONTACT WITH THIS VOLTAGE WILL CAUSE NO DAMAGE TO THE CONTROLLER.
(3) BINARY INPUTS SHALL ALLOW THE MONITORING OF ON/OFF SIGNALS FROM REMOTE DEVICES. THE BINARY INPUTS SHALL PROVIDE A WETTING CURRENT OF AT LEAST 12 MA TO BE COMPATIBLE WITH COMMONLY AVAILABLE CONTROL DEVICES.
(4) PULSE ACCUMULATION INPUT POINTS. THIS TYPE OF POINT SHALL CONFORM TO ALL THE REQUIREMENTS OF BINARY INPUT POINTS, AND ALSO ACCEPT UP TO 3 PULSES PER SECOND FOR PULSE ACCUMULATION, AND SHALL BE PROTECTED AGAINST EFFECTS OF CONTACT BOUNCE AND NOISE.
(5) ANALOG INPUTS SHALL ALLOW THE MONITORING OF LOW VOLTAGE (0-10 VDC), CURRENT (4-20 MA), OR RESISTANCE SIGNALS (THERMISTOR, RTD). ANALOG INPUTS SHALL BE COMPATIBLE WITH, AND FIELD CONFIGURABLE TO COMMONLY AVAILABLE SENSING DEVICES.
(6) BINARY OUTPUTS SHALL PROVIDE FOR ON/OFF OPERATION. BINARY OUTPUTS ON CUSTOM APPLICATION CONTROLLERS SHALL HAVE 3-MODE (ON/OFF/AUTO) PROGRAM OVERRIDE CONTROL FROM THE PANEL WITH OUTPUT STATUS LIGHTS.
(7) ANALOG OUTPUTS SHALL PROVIDE A MODULATING SIGNAL FOR THE CONTROL OF END DEVICES. OUTPUTS SHALL PROVIDE EITHER A 0-10 VDC OR A 4-20 MA SIGNAL AS REQUIRED TO PROVIDE PROPER CONTROL OF THE OUTPUT DEVICE. ANALOG OUTPUTS ON CUSTOM APPLICATION CONTROLLERS SHALL HAVE A 2-MODE (AUTO/MANUAL) PROGRAM OVERRIDE CONTROL, WITH MANUAL OUTPUT ADJUSTMENT OVER 0-100% OF RANGE.

D. AUXILIARY CONTROL DEVICES:

(1) MOTORIZED DAMPERS SHALL BE AS FOLLOWS:
(1)a. DAMPER FRAMES SHALL BE 16 GAUGE GALVANIZED SHEET METAL OR 1/8" EXTRUDED ALUMINUM WITH REINFORCED CORNER BRACING.
(1)b. DAMPER BLADES SHALL NOT EXCEED 8" IN WIDTH. BLADES SHALL BE NOT LESS THAN 16 GAUGE.
(1)c. ALL BLADE EDGES AND TOP AND BOTTOM OF THE FRAME SHALL BE PROVIDED WITH COMPRESSIBLE SEALS. SIDE SEALS SHALL BE COMPRESSIBLE STAINLESS STEEL. THE BLADE SEALS SHALL PROVIDE FOR A MAXIMUM LEAKAGE RATE OF 10 CFM PER SQUARE FOOT AT 2.5" W.C. DIFFERENTIAL PRESSURE.
(1)d. ALL LEAKAGE TESTING AND PRESSURE RATINGS WILL BE BASED ON AMCA PUBLICATION 500.

(2) ELECTRIC DAMPER/VALVE ACTUATORS:
(2)a. THE ACTUATOR SHALL HAVE ELECTRONIC OVERLOAD OR DIGITAL ROTATION SENSING CIRCUITRY TO PREVENT DAMAGE TO THE ACTUATOR THROUGHOUT THE ROTATION OF THE ACTUATOR.
(2)b. ACTUATORS SHALL BE UNDERWRITERS LABORATORIES STANDARD 873 LISTED.

(3) TEMPERATURE SENSORS:
(3)a. TEMPERATURE SENSORS SHALL BE RESISTANCE TEMPERATURE DEVICE (RTD) OR THERMISTOR.
(3)b. DUCT SENSORS SHALL BE RIGID OR AVERAGING AS SHOWN. AVERAGING SENSORS SHALL BE A MINIMUM OF 1.5M [5 FEET] IN LENGTH.
(3)c. IMMERSION SENSORS SHALL BE PROVIDED WITH A SEPARABLE STAINLESS STEEL WELL. PRESSURE RATING OF WELL IS TO BE CONSISTENT WITH THE SYSTEM PRESSURE IN WHICH IT IS TO BE INSTALLED.
(3)d. SPACE SENSORS SHALL BE EQUIPPED WITH SET-POINT ADJUSTMENT OF 3°F (ADJUSTABLE THROUGH THE BAS).
(3)e. PROVIDE MATCHED TEMPERATURE SENSORS FOR DIFFERENTIAL TEMPERATURE MEASUREMENT. DIFFERENTIAL ACCURACY SHALL BE WITHIN 0.1 C [0.2 F].

(4) HUMIDITY SENSORS:
(4)a. DUCT AND ROOM SENSORS SHALL HAVE A SENSING RANGE OF 20% TO 80% WITH ACCURACY OF ±5% R.H.
(4)b. DUCT SENSORS SHALL BE PROVIDED WITH A SAMPLING CHAMBER.
(4)c. OUTDOOR AIR HUMIDITY SENSORS SHALL HAVE A SENSING RANGE OF 20% TO 95% R.H. IT SHALL BE SUITABLE FOR AMBIENT CONDITIONS OF -40° F TO 170° F.
(4)d. HUMIDITY SENSOR'S DRIFT SHALL NOT EXCEED 1% OF FULL SCALE PER YEAR.

(5) FLOW SWITCHES:
(5)a. FLOW-PROVING SWITCHES SHALL BE DIFFERENTIAL PRESSURE TYPE.
(5)b. DIFFERENTIAL PRESSURE TYPE SWITCHES SHALL BE UL LISTED, SPDT SNAP-ACTING, PILOT DUTY RATED (125 VA MINIMUM), NEMA 1 TYPE ENCLOSURE, WITH SCALE RANGE AND DIFFERENTIAL SUITABLE FOR INTENDED APPLICATION, OR AS SPECIFIED.

(6) TRANSFORMERS AND POWER SUPPLIES:
(6)a. CONTROL TRANSFORMERS SHALL BE UL LISTED, CLASS 2 CURRENT-LIMITING TYPE, OR SHALL BE FURNISHED WITH OVER-CURRENT PROTECTION IN BOTH PRIMARY AND SECONDARY CIRCUITS FOR CLASS 2 SERVICE.
(6)b. UNIT OUTPUT SHALL MATCH THE REQUIRED OUTPUT CURRENT AND VOLTAGE REQUIREMENTS. CURRENT OUTPUT SHALL ALLOW FOR A 50% SAFETY FACTOR. OUTPUT RIPPLE SHALL BE 3.0 MV MAXIMUM PEAK-TO-PEAK. REGULATION SHALL BE 0.10% LINE AND LOAD COMBINED, WITH 50 MICROSECOND RESPONSE TIME FOR 50% LOAD CHANGES. UNIT SHALL HAVE BUILT-IN OVER-VOLTAGE PROTECTION.
(6)c. UNIT SHALL OPERATE BETWEEN 0° C AND 50° C.
(6)d. UNIT SHALL BE UL RECOGNIZED.

(7) CURRENT SWITCHES: CURRENT-OPERATED SWITCHES SHALL BE SELF-POWERED, SOLID STATE WITH ADJUSTABLE TRIP CURRENT. THE SWITCHES SHALL BE SELECTED TO MATCH THE CURRENT OF THE APPLICATION AND OUTPUT REQUIREMENTS OF THE DDC SYSTEM.

E. SEQUENCE OF CONTROL:

E.A. SPECIALTY EXHAUST FANS (IEF-FE, IEF-PS, OEF-1 THRU OEF-4):
E.A.1. SPECIALTY EXHAUST FANS SHALL BE INTERLOCKED TO THE EQUIPMENT THEY SERVE. UPON ACTIVATION OF THE ASSOCIATED EQUIPMENT, THE MOTOR OPERATED DAMPER SHALL OPEN AND THE INTERLOCKED EXHAUST FAN SHALL BE ENERGIZED TO RUN. UPON DEACTIVATION OF THE EQUIPMENT, THE REVERSE SHALL OCCUR. IF EXHAUST FAN INTERLOCKS ON THE EQUIPMENT ARE NOT AVAILABLE, THE SPECIALTY EXHAUST FANS SHALL BE ENERGIZED AND DE-ENERGIZED BY WALL MOUNTED TIMER SWITCHES. UPON ACTIVATION, THE BAS SHALL COMMAND THE ASSOCIATED FPB- OR VAV- TO OPEN. UPON DEACTIVATION, THE REVERSE SHALL OCCUR. BAS SHALL MONITOR SPECIALTY FAN STATUS AND ALARM OF OFF NORMAL CONDITIONS.

E.B. EXISTING AHU-4
E.B.1. AHU-4 SHALL CONTINUE TO FUNCTION UNDER IT'S CURRENT OCCUPANCY AND SAFETY CONTROLS WITH THE FOLLOWING MODIFICATIONS:
E.B.1.1. WHEN FPB-/VAV- SUPPLY AIR VALVES MODULATE OPEN TO PROVIDE MAKE-UP AIR UPON ACTIVATION OF THE SPECIALTY EXHAUST FANS, THE BAS SHALL MODULATE THE RETURN AIR AND RELIEF AIR DAMPERS CLOSED PROPORTIONALLY. WHEN THE SPECIALTY EXHAUST FANS ARE DE-ENERGIZED, THE REVERSE SHALL OCCUR.
E.B.2.
E.C. EXISTING FPB- & VAV-
E.C.1. EXISTING FPB- & VAV- UNITS SHALL CONTINUE TO OPERATE IN ACCORDANCE WITH THEIR CURRENT SEQUENCE OF CONTROLS TO MAINTAIN SPACE TEMPERATURE. UPON ACTIVATION OF ANY SPECIALTY EXHAUST FAN, THE BAS SHALL POLL THE SPECIALTY EXHAUST FANS IN OPERATION (CFM) AND POLL THE RESPECTIVE FPB-/VAV- (CFM) AND MODULATE THE SUPPLY AIR VALVE PROPORTIONALLY TO PROVIDE THE REQUIRED MAKE-UP AIR. WHEN THE FANS ARE DE-ENERGIZED, THE REVERSE SHALL OCCUR. SPECIALTY FANS AND VAV ASSOCIATIONS ARE AS FOLLOWS:

ROOM 171 FPB-E, FPB-F1, F2: OEF-1 THRU 4 AND IEF-PS
ROOM 171A VAV-C: IEF-FE1 AND 2

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REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

SPECIFICATIONS FOR HVAC

DESIGNED MEH	DRAWN MEH
CHECKED RDF	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET
M-203

ELECTRICAL LEGEND - GENERAL

MTG. HGT.	SYMBOL	DESCRIPTION
	✳	ASTERISK DENOTES BOTTOM OF OUTLET BOX MOUNTED 8 IN. ABOVE TOP OF COUNTER. DISTANCE INCLUDES HEIGHT OF BACKSPLASH.
		NEW CONNECTED TO EXISTING AT THIS POINT.
		EXISTING REMOVED FROM THIS POINT.
	1	PLAN NOTE DESIGNATION.
	1	REVISION DESIGNATION.
	NLA1A-3	CIRCUIT DESIGNATION. DESIGNATION SHOWN INDICATES PANEL NLA1A AND CIRCUIT NUMBER 3.

NOTES (ELECTRICAL LEGEND):

1. THESE ARE STANDARD ELECTRICAL SYMBOLS AND MAY NOT ALL APPEAR ON THE PROJECT DRAWINGS. HOWEVER, WHEREVER AN ELECTRICAL SYMBOL APPEARS ON THE PROJECT DRAWINGS, THE ITEM SHALL BE FURNISHED AND INSTALLED.
2. MOUNTING HEIGHTS ARE FROM FINISHED FLOOR TO TOP OF OUTLET OR EQUIPMENT, UNO. WHERE THE MOUNTING HEIGHT INDICATED ON THE DRAWINGS IS DIFFERENT FROM THE LEGEND, THE DRAWING TAKES PRECEDENT. SEE DRAWINGS FOR MOUNTING HEIGHTS NOT INDICATED IN THE LEGEND.
3. SEE ELECTRICAL ABBREVIATIONS FOR ALPHABETIC SUBSCRIPT WITH SYMBOL, UNO.

ELECTRICAL LEGEND - RACEWAYS

MTG. HGT.	SYMBOL	DESCRIPTION
		CONDUIT EXPOSED.
		CONDUIT CONCEALED IN OR BELOW FLOOR SLAB OR BELOW GRADE.
		CONDUIT CONCEALED IN WALL OR ABOVE CEILING.
		EXISTING CONDUIT TO BE REMOVED.
		CONDUIT TURNED UP.
		CONDUIT TURNED DOWN.
	PS1	PLUG STRIP. NUMBER, WHERE SHOWN, INDICATES TYPE AS SCHEDULED ON DRAWINGS OR IN SPECIFICATIONS.
	SR1	SURFACE RACEWAY. NUMBER, WHERE SHOWN, INDICATES TYPE AS SCHEDULED ON DRAWINGS OR IN SPECIFICATIONS.
	2C4	CONDUIT SLEEVES, THROUGH WALL. MOUNT 4" ABOVE HIGHEST ACCESSIBLE CEILING ON EITHER SIDE OF WALL OR MINIMUM 8'-6" AFF WHERE EXPOSED, UNO. FIRST NUMBER INDICATES QUANTITY OF CONDUITS AND SECOND NUMBER INDICATES DIAMETER OF CONDUITS IN INCHES. BUSH CONDUITS AT EACH END.
	CT12	CABLE TRAY, WALL MOUNTED OR SUSPENDED WITH BOTTOM MINIMUM 4" ABOVE ACCESSIBLE CEILING OR MINIMUM 8'-6" AFF TO BOTTOM WHERE EXPOSED, UNO. CLEAR SPACE ABOVE CABLE TRAY SHALL BE 6" MINIMUM. NUMBER INDICATES CABLE TRAY WIDTH IN INCHES.
	CT12	CABLE TRAY, WALL MOUNTED OR SUSPENDED WITH BOTTOM MINIMUM 4" ABOVE ACCESSIBLE CEILING OR MINIMUM 8'-6" AFF TO BOTTOM WHERE EXPOSED, UNO. CLEAR SPACE ABOVE CABLE TRAY SHALL BE 6" MINIMUM. NUMBER INDICATES CABLE TRAY WIDTH IN INCHES.

ELECTRICAL LEGEND - POWER EQUIPMENT

MTG. HGT.	SYMBOL	DESCRIPTION
		GROUND CONNECTION.
1'-0" TO BOTTOM		GROUND BAR. MOUNT WITH LONG DIMENSION HORIZONTAL..
	GR	GROUND ROD.
	M	ELECTRIC MOTOR CONNECTION.
6'-0"		208/120 VOLT PANELBOARD.
6'-0"		480/277 VOLT PANELBOARD.
5'-0" TO TOP	N3/60	NON-FUSIBLE SAFETY SWITCH, WALL OR EQUIPMENT MOUNTED. NUMBER INDICATES SAFETY SWITCH 3-POLE/60 AMP RATING.

ELECTRICAL LEGEND - POWER DEVICES

MTG. HGT.	SYMBOL	DESCRIPTION
1'-8" TO TOP	E,TR,SS,H, R,C,U,WP	RECEPTACLE, DUPLEX, WALL. ALPHA-NUMERIC OR NUMERIC SUBSCRIPT, WHERE SHOWN, INDICATES CIRCUIT. "E" = EMERGENCY RECEPTACLE (RED IN COLOR). "TR" = TAMPER RESISTANT RECEPTACLE. "SS" = SURGE SUPPRESSOR RECEPTACLE. "H" = HORIZONTALLY MOUNTED. "R" = RECESSED RECEPTACLE WALL BOX. "C" = LOAD CONTROLLED RECEPTACLE VIA OCCUPANCY SENSOR AND RELAY PANEL. "U" = COMBINATION DUPLEX RECEPTACLE AND DUAL USB OUTLETS. "WP" = WHILE-IN-USE WEATHER-PROOF COVER PLATE.
	E,TR,SS,C,U	RECEPTACLE, DUPLEX, CEILING. ALPHA-NUMERIC OR NUMERIC SUBSCRIPT, WHERE SHOWN, INDICATES CIRCUIT. "E" = EMERGENCY RECEPTACLE (RED IN COLOR). "TR" = TAMPER RESISTANT RECEPTACLE. "SS" = SURGE SUPPRESSOR RECEPTACLE. "C" = LOAD CONTROLLED RECEPTACLE VIA OCCUPANCY SENSOR AND RELAY PANEL. "U" = COMBINATION DUPLEX RECEPTACLE AND DUAL USB OUTLETS.
	E,TR,SS,C,U	RECEPTACLE, DUPLEX IN A SINGLE COMPARTMENT FLUSH FLOOR BOX. ALPHA-NUMERIC OR NUMERIC SUBSCRIPT, WHERE SHOWN, INDICATES CIRCUIT. "E" = EMERGENCY RECEPTACLE (RED IN COLOR). "TR" = TAMPER RESISTANT RECEPTACLE. "SS" = SURGE SUPPRESSOR RECEPTACLE. "C" = LOAD CONTROLLED RECEPTACLE VIA OCCUPANCY SENSOR AND RELAY PANEL. "U" = COMBINATION DUPLEX RECEPTACLE AND DUAL USB OUTLETS.
1'-8" TO TOP	E,TR,H,R,WP	RECEPTACLE, DUPLEX GFCI, WALL. ALPHA-NUMERIC OR NUMERIC SUBSCRIPT, WHERE SHOWN, INDICATES CIRCUIT. "E" = EMERGENCY RECEPTACLE (RED IN COLOR). "TR" = TAMPER RESISTANT RECEPTACLE. "H" = HORIZONTALLY MOUNTED. "R" = RECESSED RECEPTACLE WALL BOX. "WP" = WHILE-IN-USE WEATHER-PROOF COVER PLATE.
	E,TR	RECEPTACLE, DUPLEX GFCI, CEILING. ALPHA-NUMERIC OR NUMERIC SUBSCRIPT, WHERE SHOWN, INDICATES CIRCUIT. "E" = EMERGENCY RECEPTACLE (RED IN COLOR). "TR" = TAMPER RESISTANT RECEPTACLE.
1'-8" TO TOP	D,R	RECEPTACLE, SPECIAL PURPOSE AS NOTED ON DRAWINGS.
1'-8" TO TOP	J	JUNCTION BOX, WALL.

GENERAL NOTES:

1. ALL VFD'S SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL MOUNT THE VFD'S (UNLESS THEY ARE INTEGRAL TO THE EQUIPMENT SERVED), CONNECT THE LINE SIDE POWER WIRING AND THE LOAD SIDE POWER WIRING FROM THE VFD'S TO THE EQUIPMENT. ALL CONTROL AND INTERLOCK WIRING FOR THE VFD'S SHALL BE BY THE CONTROL SYSTEM CONTRACTOR.
2. LOAD SIDE CONDUCTOR AND CONDUIT SIZES FROM DISCONNECT SWITCHES, STARTERS AND VFD'S TO EQUIPMENT SHALL BE THE SAME AS LINE SIDE CONDUCTORS AND CONDUIT.
3. CAREFULLY COORDINATE ALL ELECTRICAL EQUIPMENT LOCATIONS WITH DUCTWORK, PIPING AND MECHANICAL EQUIPMENT. MAINTAIN ALL CLEARANCES AND SPACES REQUIRED BY THE NEC.
4. WHERE MULTIPLE CIRCUITS ARE COMBINED IN A SINGLE CONDUIT, DERATE CONDUCTORS PER THE NEC.
5. SEE SPECIFICATION SECTION 260519 FOR REQUIREMENTS REGARDING OVERSIZING CONDUCTORS FOR 1-POLE 15- AND 20-AMP CIRCUITS TO REDUCE VOLTAGE DROP. OVERSIZED CONDUCTORS FOR VOLTAGE DROP ON OTHER CIRCUITS ARE INDICATED IN THE PANEL SCHEDULES.
6. WHERE RE-USE OF EXISTING CONDUIT, WIRING AND/OR OUTLET BOXES IS INDICATED, ALSO PROVIDE NEW MATERIALS IF NECESSARY. IF NEW EXPOSED MATERIALS ARE NEEDED, USE SURFACE RACEWAY (SINGLE-CHANNEL EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE), EXCEPT EXPOSED CONDUIT AND BOXES MAY BE USED IN UNFINISHED AREAS (MECHANICAL/ELECTRICAL/IT ROOMS, STORAGE AND HOUSEKEEPING CLOSETS, ETC.).
7. FOR ALL EXISTING OUTLET BOXES THAT ARE NOT BEING REUSED, PROVIDE BLANK COVER PLATE TO MATCH NEW WALL PLATES IN THAT AREA.
8. MODIFY EXISTING PANEL SCHEDULES TO ACCURATELY REFLECT ALL CHANGES MADE AS PART OF THIS CONTRACT, PROVIDE A NEW "TYPED" PANEL SCHEDULE. PANEL SCHEDULES REVISED WITH PENCIL, PEN, OR MARKER OF ANY TYPE WILL NOT BE ACCEPTED.
9. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID IN ORDER TO VERIFY ALL EXISTING CONDITIONS, TO DETERMINE THE FULL EXTENT OF DEMOLITION WORK REQUIRED, AND TO DETERMINE THE FULL EXTENT OF RELOCATION AND MODIFICATION WORK REQUIRED FOR ELECTRICAL WORK (DUE TO OTHER DISCIPLINES INTERFERING OR ANY OTHER REASON). EXISTING SPACE IS TIGHT IS MANY AREAS (PARTICULARLY ABOVE CEILINGS), AND THE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO COORDINATE ALL ELECTRICAL WORK WITH BOTH NEW AND EXISTING PIPING, DUCTWORK, ETC. NO CHANGE ORDERS WILL BE APPROVED FOR ADDITIONAL WORK DUE TO THE CONTRACTOR NEGLECTING TO VISIT THE SITE AND GATHER ALL NECESSARY INFORMATION.
10. ALL NEW ACT CEILINGS SHALL BE INSTALLED AT THE SAME HEIGHT AS THE EXISTING ACT CEILINGS BEING REMOVED. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY IF EXISTING CEILING HEIGHTS CONFLICT WITH THE INSTALLATION OF THE NEW RECESSED LIGHT FIXTURES EITHER DUE TO STRUCTURE ABOVE THE CEILING OR EXISTING MECHANICAL OR PLUMBING EQUIPMENT ABOVE THE CEILING.
11. ONLY DEMOLISH THE ITEMS SPECIFICALLY SHOWN WITH DASHED LINES OR NOTED TO BE DEMOLISHED ON THE DRAWINGS - ALL OTHER EXISTING ITEMS SHALL REMAIN. COORDINATE WITH THE OWNER FOR WHICH ITEMS ARE TO BE TURNED OVER TO THE OWNER AND WHICH ITEMS THE CONTRACTOR MAY KEEP AND REMOVE FROM THE JOB SITE.
12. EXISTING BOXES, CONDUIT AND WIRING MAY BE RE-USED WHERE PRACTICAL; UNUSED EXISTING CONDUIT AND WIRING MAY BE ABANDONED IN PLACE WHERE CONCEALED, UNLESS NOTED OTHERWISE. PROVIDE COVERS FOR ALL JUNCTION AND OUTLET BOXES THAT ARE UNUSED AFTER DEMOLITION.
13. INSTALLATION OF NEW MECHANICAL EQUIPMENT AND NEW DUCTWORK MAY REQUIRE EXISTING BRANCH CIRCUITS/FEEDERS (CONDUIT AND WIRING) TO HAVE TO BE RELOCATED/REWORKED TO ALLOW ROOM FOR THE NEW EQUIPMENT/DUCTWORK. PROVIDE ALL REQUIRED MATERIALS (PULL BOXES, CONDUIT, WIRING, CONNECTORS, SUPPORTS, ETC.) AND LABOR TO RELOCATE/REWORK ANY EXISTING BRANCH CIRCUITS/FEEDERS.
14. THE CONTRACTOR SHALL PROVIDE COVERPLATES ON ALL EXISTING JUNCTION BOXES ABOVE THE ACCESSIBLE CEILING SPACES AND ANY WALL MOUNTED BOXES IN THE AREA OF RENOVATIONS WHERE EXISTING COVERPLATES ARE MISSING. THE CONTRACTOR SHALL ALSO PROVIDE ADDITIONAL SUPPORTS FOR EXISTING CONDUIT AND JUNCTION BOXES IN THE AREA OF RENOVATIONS THAT CURRENTLY DO NOT MEET CODE REQUIREMENTS.
15. WHERE EXISTING CIRCUITS ARE SPECIFIED TO BE REUSED FOR THE AREA OF RENOVATIONS AND THE CONTRACTOR DISCOVERS IN THE FIELD THAT THE CIRCUITS DO NOT MEET CODE, OR THEY HAVE SHARED NEUTRALS, OR THEY ARE MISSING A GROUND CONDUCTOR THE CONTRACTOR SHALL PROVIDE NEW CONDUIT AND WIRING FROM THE PANEL TO THE EXISTING AND NEW ELECTRICAL EQUIPMENT. ALL NEW CIRCUITS SHALL MEET SPECIFICATIONS FOR VOLTAGE DROP FOR SINGLE-PHASE WIRING.
16. WHERE EXISTING CEILING MOUNTED LIGHT FIXTURES IN THE RENOVATION AREA ARE REMOVED AND REINSTALLED (DUE TO HVAC WORK) IN AN ACCESSIBLE CEILING GRID AND THEY ARE NOT PROVIDED WITH SEPARATE STRUCTURAL SUPPORT FROM THE BUILDING STRUCTURAL FRAMING MEMBERS ABOVE, THE CONTRACTOR SHALL PROVIDE LIGHT FIXTURE SUPPORTS FOR THESE EXISTING LIGHT FIXTURES THAT MEET THE CODE.
17. THE CONTRACTOR IS RESPONSIBLE FOR MEG TESTING ALL RETAIN AND REUSED EXISTING CONDUCTORS TO ENSURE THAT THEY ARE IN GOOD WORKING CONDITION. THE CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY CONDUCTORS THAT FAIL THE MEG TESTING. CONTRACTOR SHALL PROVIDE THE CIRCUIT NUMBER, CONNECTED LOAD(S) AND APPROXIMATE LENGTH TO BE REPLACED.

ELECTRICAL ABBREVIATIONS

A OR AMP	AMPERE
ABD	ABANDONED
ABV	ABOVE
AC	ALTERNATING CURRENT
ACB	ABOVE COUNTER BACKSPLASH
AF OR AFI	ARC FAULT INTERRUPTER
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AIC	AMPERES INTERRUPTING CAPACITY
AIP	ABANDONED IN PLACE
AL	ALUMINUM
AM	AMMETER
AMPL	AMPLIFIER
ASYM	ASYMMETRICAL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAGE
BAS	BUILDING AUTOMATION SYSTEM
BEL	BELOW
BD	BUS DUCT
BOT	BOTTOM
BRKR	BREAKER
C	COUNTERTOP
CA	CABLE
CAB	CABINET
CATV	CABLE TV
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CF	COMPACT FLUORESCENT
CKT	CIRCUIT
CLG	CEILING
CND	CONDUIT
CNTR	CENTER
COMB	COMBINATION
COND	CONDUCTOR
CONN	CONNECTION
CONT	CONTACTOR
CR	CORROSION RESISTANT
CT	CURRENT TRANSFORMER
CTRL	CONTROL
CU	COPPER
CW	COLD WATER
DB	DOOR BELL
DC	DIRECT CURRENT
DIM	DIMENSION
DISC	DISCONNECT
DR	DOOR RELEASE SERVICE
DS	DOOR SWITCH
DWG	DRAWING
E OR EMER	EMERGENCY
ECNC	EXIST CND AND NEW CONDS
EL	EXIST RELOCATED TO THIS LOCATION
ELEC	ELECTRIC OR ELECTRICAL
ELEV	ELEVATOR
EM	EXIST REMOVED
EML	EXIST REMOVED AND RELOCATED
EMN	EXIST REMOVED AND NEW INSTALLED
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENG	ENGINE
EP	EXPLOSIONPROOF
EQUIP	EQUIPMENT
ER	EXIST TO REMAIN
ERC	ELEVATOR RECALL
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXT	EXTERIOR
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FACU	FIRE ALARM CONTROL UNIT
FDR	FEEDER
FC	FOOTCANDLE
FLUOR	FLUORESCENT
FSD	FIRE/SMOKE DAMPER
FSS	FUSIBLE SAFETY SWITCH
FXTR	FIXTURE
GD	GARAGE DOOR
GEN	GENERATOR
GF OR GFI	GROUND FAULT INTERRUPTER
GFP	GROUND FAULT PROTECTION/PROTECTED
GND	GROUND
GTD	GENERATOR TRANSFER DEVICE
H OR HOR	HORIZONTAL
HG	HOSPITAL GRADE
HGT	HEIGHT
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER OR HEAT PUMP
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HW	HOT WATER
HZ	HERTZ
IC	INTERCOM OR INTERRUPTING CAPACITY
IDF	INTERMEDIATE DISTRIBUTION FRAME
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
INC	INCANDESCENT
INIT	INITIAL
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KO	KNOCKOUT
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT-HOUR
LA	LIGHTNING ARRESTER
LED	LIGHT EMITTING DIODE
LPS	LOW PRESSURE SODIUM
LRP	LIGHTING RELAY PANEL
LTG	LIGHTING
LUM	LUMENS OR LUMINAIRE
MAG	MAGNETIC
MAN	MANUAL
MATV	MASTER ANTENNA TELEVISION
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MDF	MAIN DISTRIBUTION FRAME
M/G	MOTOR/GENERATOR
MH	METAL HALIDE OR MOUNTING HEIGHT
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MMS	MANUAL MOTOR STARTER
MNS	MASS NOTIFICATION SYSTEM
MOCP	MAXIMUM OVER CURRENT PROTECTION
MOD	MOTOR OPERATED DAMPER
MOT	MOTOR
MS	MAGNETIC STARTER
MTG	MOUNTED OR MOUNTING
MTR	METER
MV	MERCURY VAPOR
N OR NORM	NORMAL
NEC	NATIONAL ELECTRICAL CODE
NEUT	NEUTRAL
NFSS	NON-FUSIBLE SAFETY SWITCH
NL	NIGHT LIGHT
NO	NUMBER
OH	OVERHEAD
P	POLE
PB	PULL BOX OR PUSHBUTTON
PBS	PUSHBUTTON STATION
PH	PHASE
PNL	PANEL OR PANELBOARD
PNLBRD	PANELBOARD
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
QTY	QUANTITY
RB	RELAY BASE
REC	RECEPTACLE
REFRIG	REFRIGERATOR
RGS	RIGID GALVANIZED STEEL CONDUIT
S/O	SPACE ONLY
SB	SOUNDER BASE
SCCR	SHORT CIRCUIT CURRENT RATING
SDR	MOTOR OPERATED SMOKE DAMPER
SEC	SECONDARY
SL	SINGLE STATION
SMR	SURFACE METAL RACEWAY
SN	SOLID NEUTRAL
SP	SPECIAL PURPOSE
SPD	SURGE PROTECTIVE DEVICE
SPKR	SPEAKER
SR	SURFACE RACEWAY
SS	SURGE SUPPRESSOR
STR	STARTER
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
TC	TIME CLOCK
TEL	TELEPHONE
TR	TAMPER RESISTANT
TV	TELEVISION
TYP	TYPICAL
UC	UNDERCOUNTER
UF	UNDERFLOOR
UG	UNDERGROUND
UL	UNDERWRITERS' LABORATORIES
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLT-AMPERE
VAR	VOLT-AMPERE REACTIVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VM	VOLTMETER
W	WATT OR WIRE
WG	WIRE GUARD
WP	WEATHERPROOF
XFER	TRANSFER
XFMR	TRANSFORMER

NOTE (ELECTRICAL ABBREVIATIONS):

1. ALL ABBREVIATIONS LISTED MAY NOT APPLY TO THIS PROJECT. REFER TO OTHER ABBREVIATION LISTS ELSEWHERE IN THESE DOCUMENTS FOR ABBREVIATIONS NOT LISTED HERE.

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REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

NOTES, ABBREVIATIONS AND LEGEND
ELECTRICAL - PHASE 2

DESIGNED MAR	DRAWN MAR
CHECKED WAM	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET
E-000

ELECTRICAL SPECIFICATIONS:

1. SCOPE OF WORK: PROVIDE SUPERVISION, LABOR, MATERIAL, EQUIPMENT, MACHINERY, PLANT AND OTHER ITEMS NECESSARY FOR A COMPLETE AND OPERABLE ELECTRICAL SYSTEM.

   WHERE VARIANCES OCCUR BETWEEN DRAWINGS AND SPECIFICATIONS OR WITHIN EITHER DOCUMENT ITSELF, INCLUDE IN THE CONTRACT PRICE THE ITEM OR ARRANGEMENT OF BETTER QUALITY, GREATER QUANTITY, OR HIGHER COST.

2. STANDARDS AND CODES: THE MATERIALS AND EQUIPMENT SHALL BE NEW AND LISTED BY UNDERWRITERS LABORATORIES, INC. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE 2021 VIRGINIA UNIFORM STATEWIDE BUILDING CODE (USBC); THE 2021 INTERNATIONAL BUILDING CODE (IBC) AS ADOPTED AND MODIFIED BY THE 2021 VIRGINIA CONSTRUCTION CODE (VCC) ; THE 2021 INTERNATIONAL FIRE CODE (IFC); THE 2020 NFPA-70 (NATIONAL ELECTRICAL CODE, OR NEC); THE 2019 NFPA-72 (NATIONAL FIRE ALARM AND SIGNALING CODE); AND OTHER RELATED CODES AND STANDARDS. THE COMPLETED INSTALLATION SHALL COMPLY WITH THE ADAAG *"AMERICAN WITH DISABILITIES ACT GUIDELINES FOR BUILDINGS AND FACILITIES"*. WORKMANSHIP SHALL MEET THE "STANDARDS OF INSTALLATION" AS PUBLISHED BY THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA). THE 2023 VIRGINIA TECH DESIGN AND CONSTRUCTION STANDARDS.

3. CONDUIT: PROVIDE RIGID GALVANIZED STEEL CONDUIT (RGS) , PROVIDE ELECTRICAL METALLIC TUBING (EMT) FOR EMPTY CONDUIT RUNS AND STUB-UPS, BRANCH CIRCUITS AND PANEL FEEDERS; ALL CONDUIT STUBS SHALL HAVE BUSHINGS. PROVIDE GALVANIZED SINGLE STRIP FLEXIBLE CONDUIT, MINIMUM 18" LONG, FOR MOTOR CONNECTIONS. USE PVC JACKETED FLEXIBLE LIQUID-TIGHT CONDUIT TYPE UA FOR MOTOR CONNECTIONS IN WET LOCATIONS. CONDUIT SHALL BE MINIMUM *3/4"* , EXCEPT SHALL BE MINIMUM 3/4" WHERE EXTERIOR . SUPPORT CONDUIT AS REQUIRED BY THE NEC. FOR ROOF DECKING APPLICATIONS, FOLLOW REQUIREMENTS OF NEC 300.4(E). EXPANSION/DEFLECTION FITTINGS SHALL BE PROVIDED WHERE REQUIRED PER NEC 300.4(H). FOR UNDERGROUND CONDUIT, PROVIDE SEALS WHERE REQUIRED PER NEC 225.27 AND 300.5(G). UNDERGROUND CONDUIT SHALL BE MINIMUM 24" BELOW FINISHED GRADE TO TOP OF CONDUIT, UNLESS NOTED OTHERWISE. FITTINGS SHALL NOT BE CAST POT METAL.

   ALL CONDUITS PASSING THROUGH RATED WALLS OR CEILINGS SHALL BE SLEEVED AND PACKED WITH U.L. LISTED SEALANT TO MAINTAIN RATING.

   TYPE AC, NM, NMC, NMS, SE, USE, SO AND UF CABLE MAY BE USED IN AREAS WHERE PERMITTED BY NEC AND LOCAL CODES, BUT ONLY FOR BRANCH CIRCUITS ABOVE ACCESSIBLE CEILINGS AND IN STUD WALLS. ONLY CABLES WITH 75 DEGREE C RATED INSULATION ARE PERMITTED. WHERE RUNNING INTO A PANEL WHERE THE CEILING SPACE IS INACCESSIBLE, CONDUIT SHALL BE RUN FROM THE PANEL TO A JUNCTION BOX ABOVE THE NEAREST ACCESSIBLE CEILING. CABLES SHALL BE RUN NEATLY IN STRAIGHT PARALLEL RUNS WITH PROPER SUPPORT AND LIMITED SAG. PANEL FEEDERS SHALL BE CONDUIT AND WIRE.

   TYPE AC, MC BX, MI, AND NMC CABLE ARE NOT ALLOWED.**FOR VIRGINIA TECH PROJECTS "DO NOT ALLOW AC, MC, BX, MI, OR NMC CABLING".**

4. JUNCTION, OUTLET AND PULL BOXES : PROVIDE JUNCTION, OUTLET AND PULL BOXES FOR WIRING DEVICES, FIXTURES, CONNECTIONS TO EQUIPMENT AND AS REQUIRED BY THE NEC. BOXES SHALL BE STEEL UNLESS REQUIRED OTHERWISE BY ENVIRONMENT.

5. HANGERS AND SUPPORTS: PROVIDE ALL HANGERS, SUPPORTS, ANCHORS, SLEEVES AND SEALS AS REQUIRED BY THE NEC.

6. WIRING (SHOP DRAWINGS REQUIRED): PROVIDE COPPER CONDUCTORS, XHHW OR XHHW-2 OR THHN OR THWN-2, 600 VOLT, 90 DEGREE C RATED. WIRING THROUGHOUT THE BUILDING SHALL BE COLOR-CODED TO IDENTIFY PHASES, NEUTRAL AND GROUND. ALL TERMINATIONS SHALL BE 75 DEGREES C.

7. GROUNDING AND BONDING : PROVIDE AN EQUIPMENT GROUNDING SYSTEM INSTALLED TO METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, PULL BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT AND OTHER CONDUCTIVE ITEMS IN CLOSE PROXIMITY TO ELECTRICAL CIRCUITS. ALL BRANCH AND FEEDER CIRCUITS SHALL INCLUDE A GREEN GROUNDING CONDUCTOR. PROVIDE GROUND BUS IN ALL SWITCHBOARDS AND PANELBOARDS. PROVIDE SYSTEM GROUND IN ACCORDANCE WITH NEC ARTICLE 250, INCLUDING SERVICE BONDING AS REQUIRED IN NEC 250.92. GROUND RODS SHALL BE INSTALLED BELOW THE PERMANENT MOISTURE LEVEL. PARTICULAR ATTENTION IS CALLED TO BONDING REQUIREMENTS IN NEC 250.97, 250.98 AND 250.104. GROUND CORD-AND-PLUG EQUIPMENT PER THE REQUIREMENTS OF NEC 250.114.

8. IDENTIFICATION : IDENTIFY CABLES/CONDUCTORS, INCLUDING VOLTAGE, PHASE AND FEEDER OR CIRCUIT NUMBER, ON EACH CABLE/CONDUCTOR IN EACH BOX/ENCLOSURE/CABINET WHERE WIRES OF MORE THAN ONE CIRCUIT. WHEREVER REASONABLY REQUIRED FOR SAFETY, MAINTENANCE AND/OR OPERATIONAL PURPOSES, PROVIDE SELF-ADHESIVE PLASTIC SIGNS FOR IDENTIFICATION, INSTRUCTION OR WARNING ON SWITCHES AND OUTLETS, AS WELL AS OTHER CONTROLS, DEVICES AND ENCLOSURE COVERS. PROVIDE A DANGER SIGN WHEREVER IT IS POSSIBLE FOR PERSONS TO COME INTO CONTACT WITH A VOLTAGE HIGHER THAN 120 VOLTS, AS WELL AS ON CRITICAL SWITCHES AND CONTROLS WHERE UNTIMELY OPERATION COULD BE A SAFETY HAZARD. PROVIDE AN ENGRAVED PLASTIC-LAMINATE LABEL ON EACH MAJOR UNIT OF ELECTRICAL EQUIPMENT, INCLUDING BUT NOT LIMITED TO: DISCONNECT SWITCHES AND ENCLOSED CIRCUIT BREAKERS. EQUIPMENT LABELS SHALL INCLUDE WHAT IS REQUIRED IN NEC 408.4(B). ENCLOSURE TYPES SHALL BE MARKED PER NEC 110.28. WIRING COLOR-CODE KEY SHALL BE READILY AVAILABLE OR PERMANENTLY POSTED PER NEC 200.6(D) AND 210.5.

9. CONNECTIONS TO EQUIPMENT: MAKE FINAL ELECTRICAL POWER CONNECTIONS TO MECHANICAL EQUIPMENT. PROVIDE CONDUITS, OUTLET BOXES AND POWER WIRING FROM THE POWER SOURCE TO THE MOTOR OR EQUIPMENT JUNCTION BOX, INCLUDING WIRING THROUGH STARTERS OR SAFETY SWITCHES, IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

10. WIRING DEVICES (SHOP DRAWINGS REQUIRED): WIRING DEVICES SHALL BE ***BLACK*** AND SHALL BE *COMMERCIAL* ***SPECIFICATION*** GRADE. BACK WIRING IS NOT ALLOWED. EXCEPT WHERE NOTED OTHERWISE ON THE DRAWINGS, RECEPTACLES SHALL BE NEMA 5-20R. SPECIAL PURPOSE, SAFETY TYPE AND GROUND FAULT RECEPTACLES SHALL BE BY SAME MANUFACTURER AS DUPLEX RECEPTACLES. GFCI TYPE DUPLEX RECEPTACLES SHALL BE RATED 5 MILLIAMPS, AND SHALL BE READILY ACCESSIBLE WHERE REQUIRED BY NEC 210.8. WIRING DEVICE WALLPLATES SHALL BE *SATIN STAINLESS STEEL* AND SHALL BE BY SAME MANUFACTURER AS WIRING DEVICES.

11. SAFETY SWITCHES (SHOP DRAWINGS REQUIRED): PROVIDE SURFACE-MOUNTED, GENERAL-DUTY OR HEAVY-DUTY AS APPLICABLE, HORSEPOWER-RATED, FUSIBLE OR NON-FUSIBLE AS INDICATED, SAFETY SWITCHES WITH LUGS SUITABLE FOR COPPER OR ALUMINUM CONDUCTORS AND ELECTRO-SILVER PLATED CURRENT CARRYING PARTS, AND WITH EQUIPMENT GROUND BUS WITH APPROPRIATE LUGS. SWITCHES SHALL HAVE HINGED DOOR WITH DEFEATABLE INTERLOCK TO PREVENT DOOR FROM BEING OPENED IN "ON" POSITION; OPERATING LEVER ARRANGED FOR PADLOCKING IN THE "OFF" POSITION; ARC QUENCHERS; CAPACITY AND CHARACTERISTICS AS REQUIRED; NON-TEASABLE QUICK-MAKE AND QUICK-BREAK MECHANISM; DEAD FRONT; LINE SIDE SHIELD.

    MANUFACTURER SHALL BE SQUARE D, GENERAL ELECTRIC, EATON OR SIEMENS.

GENERAL DEMOLITION NOTES:

1. SCOPE : THE SCOPE OF ELECTRICAL DEMOLITION IS DEFINED IN THE FOLLOWING NOTES AND IN LIMITED FASHION ON THE DRAWINGS; THE DRAWINGS ARE ONLY INTENDED TO BE A PARTIAL REPRESENTATION OF THE ACTUAL DEMOLITION WORK REQUIRED. THESE NOTES ONLY APPLY TO THE AREAS OF RENOVATION. I

2. RECEPTACLES AND SWITCHES : EXCEPT WHERE INDICATED OTHERWISE, EXISTING RECEPTACLES AND SWITCHES AND CIRCUITS SHALL BE REMOVED. WHERE FLUSH MOUNTED RECEPTACLES TO BE REMOVED OR RELOCATED OCCUR ON EXISTING WALLS TO REMAIN, REMOVE DEVICE AND COVER PLATE, REMOVE WIRES, AND PROVIDE BLANK COVER PLATE. COVER PLATE SHALL MATCH COVER PLATES FOR NEW WORK. WHERE SURFACE MOUNTED SWITCHES AND RECEPTACLES TO BE REMOVED OCCUR ON EXISTING WALLS TO REMAIN, ALSO REMOVE ASSOCIATED EXPOSED BOXES, CONDUIT AND SURFACE RACEWAY. FOR FLOOR OUTLETS, REMOVE DEVICE AND CUT WIRES, FILL WITH GROUT AND FINISH TO MATCH FLOOR SURFACE.

3. CONDUIT : WHERE EXISTING CONDUIT IS EXPOSED DUE TO DEMOLITION OF WALLS, CONDUIT SHALL BE REMOVED, UNLESS INDICATED TO REMAIN OR NECESSARY TO MAINTAIN SERVICE TO EXISTING ITEMS TO REMAIN. WHERE CONDUIT RISES FROM FLOOR TO FEED REMOVED ITEMS, CUT CONDUIT FLUSH WITH FLOOR AND FILL IT WITH GROUT. FINISH TO MATCH FLOOR SURFACE. ALL ACCESSIBLE UNUSED CONDUIT SHALL BE REMOVED; ALL INACCESSIBLE UNUSED CONDUIT SHALL BE ABANDONED. ALL CONDUIT TO NEW DEVICES AND EQUIPMENT SHALL BE NEW, UNLESS NOTED OTHERWISE.

4. WIRING : ALL WIRING TO DEMOLISHED DEVICES AND EQUIPMENT SHALL BE REMOVED, UNLESS NOTED OTHERWISE. ALL EXISTING WIRING TO EXISTING-TO-REMAIN DEVICES AND EQUIPMENT SHALL REMAIN, UNLESS NOTED OTHERWISE. ALL ACCESSIBLE UNUSED WIRING SHALL BE REMOVED; ALL INACCESSIBLE UNUSED WIRING SHALL BE ABANDONED. ALL WIRING TO NEW DEVICES AND EQUIPMENT SHALL BE NEW, UNLESS NOTED OTHERWISE.

5. MAINTAIN CIRCUIT CONTINUITY AS NECESSARY IN ALL DEMOLITION WORK.

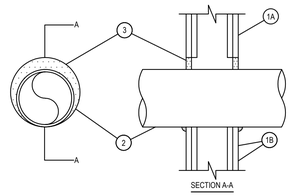
6. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID AND SHALL VERIFY ALL DEMOLITION REQUIRED. ADDITIONAL COMPENSATION WILL NOT BE ALLOWED FOR DEMOLITION DUE TO CONTRACTOR NOT VISITING SITE AND DETERMINING FULL SCOPE OF DEMOLITION REQUIRED.

7. SEE THE DEMOLITION FLOOR PLANS FOR ADDITIONAL DEMOLITION REQUIREMENTS. ON THE DEMOLITION FLOOR PLANS AND RISERS, ALL DASHED ITEMS SHALL BE REMOVED AND ALL SOLID ITEMS SHALL REMAIN, UNLESS NOTED OTHERWISE. SOME DEMOLITION ITEMS ARE AFFECTED BY ADD ALTERNATES, AS INDICATED IN THE FLOOR PLANS. NEW WORK FLOOR PLANS MAY CONTAIN ADDITIONAL DEMOLITION INFORMATION IN SOME LOCATIONS.

System No. W-L-1054

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Items 1 and 3)	F Ratings — 1 and 2 Hr (See Items 1 and 3)
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings — 1 and 2 Hr (See Items 1 and 3)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	FTH Rating — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft L Rating at 400 F — Less Than 1 CFM/sq ft



SECTION A-A

1. WALL ASSEMBLY — THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
   A. STUDS — WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2-1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC. WHEN STEEL STUDS ARE USED AND THE DIAM OF OPENING EXCEEDS THE WIDTH OF STUD CAVITY, THE OPENING SHALL BE FRAMED ON ALL SIDES USING LENGTHS OF STEEL STUD INSTALLED BETWEEN THE VERTICAL STUDS AND SCREW-ATTACHED TO THE STEEL STUDS AT EACH END. THE FRAMED OPENING IN THE WALL SHALL BE 4 TO 6 IN. (102 TO 152 MM) WIDER AND 4 TO 6 IN. (102 TO 152 MM) HIGHER THAN THE DIAM OF THE PENETRATING ITEM SUCH THAT, WHEN THE PENETRATING ITEM IS INSTALLED IN THE OPENING, A 2 TO 3 IN. (51 TO 76 MM) CLEARANCE IS PRESENT BETWEEN THE PENETRATING ITEM AND THE FRAMING ON ALL FOUR SIDES.
   B. GYPSUM BOARD* — 5/8 IN. (16 MM) THICK, 4 FT (122 CM) WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 32-1/4 IN. (819 MM) FOR STEEL STUD WALLS. MAX DIAM OF OPENING IS 14-1/2 IN. (368 MM) FOR WOOD STUD WALLS. THE F AND FH RATINGS OF THE FIRESTOP SYSTEM ARE EQUAL TO THE FIRE RATING OF THE WALL ASSEMBLY.
2. THROUGH-PENETRANTS — ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE SHALL BE MIN 0 IN. TO MAX 2-1/4 IN. (57 MM). PIPE MAY BE INSTALLED WITH CONTINUOUS POINT CONTACT. PIPE, CONDUIT OR TUBING MAY BE INSTALLED AT AN ANGLE NOT GREATER THAN 45 DEGREES FROM PERPENDICULAR. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
   A. STEEL PIPE — NOM 30 IN. (762 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
   B. IRON PIPE — NOM 30 IN. (762 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
   C. CONDUIT — NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) . DIAM STEEL CONDUIT.
   D. COPPER TUBING — NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
   E. COPPER PIPE — NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
3. FILL, VOID OR CAVITY MATERIAL* — SEALANT — MIN 5/8 IN. (16 MM) THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT OR CONTINUOUS CONTACT LOCATIONS BETWEEN PIPE AND WALL A MIN 1/2 IN. (13 MM) DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE PIPE WALL INTERFACE ON BOTH SURFACES OF WALL.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE SEALANT OR FS-ONE MAX INTUMESCENT SEALANT

* INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR CUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR CUL CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

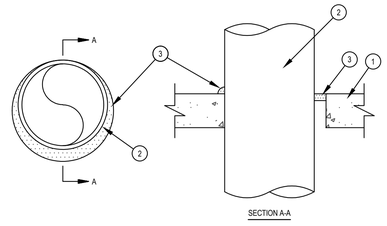
1 & 2 HR FIRE STOP DETAIL

NO SCALE

System No. C-AJ-1291

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



SECTION A-A

1. FLOOR OR WALL ASSEMBLY — MIN 2-1/2 IN. (64 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF OPENING IS 30-7/8 IN. (784 MM).
   SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
2. THROUGH-PENETRANT — ONE METALLIC PIPE OR CONDUIT TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. TO MAX 7/8 IN. (22 MM). PIPE OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR CONDUITS MAY BE USED:
   A. STEEL PIPE — NOM 30 IN. (762 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
   B. IRON PIPE — NOM 30 IN. (762 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
   C. COPPER PIPE — NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
   D. COPPER TUBING — NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
   E. CONDUIT — NOM 6 IN. (152 MM) DIAM (OR SMALLER) STEEL CONDUIT.
   F. CONDUIT — NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT).
3. FILL, VOID OR CAVITY MATERIAL* — SEALANT — MIN 1/2 IN. (13 MM) THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF FLOOR OR WITH BOTH SURFACES OF WALL. AT THE POINT CONTACT LOCATION BETWEEN PIPE AND CONCRETE, A MIN 1/4 IN. (6 MM) DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/PIPE INTERFACE ON THE TOP SURFACE OF FLOOR AND ON BOTH SURFACES OF WALL.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE SEALANT OR FS-ONE MAX INTUMESCENT SEALANT.

* INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR CUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR CUL CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

2 HR FIRE STOP DETAIL

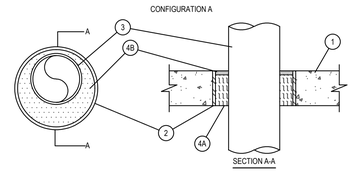
NO SCALE

System No. C-AJ-1630

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

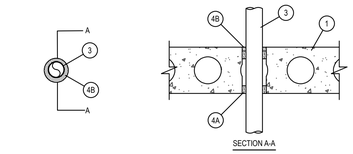
ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2, 3 & 4 Hr (See Item 4)	F Rating — 2, 3 & 4 Hr (See Item 4)
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 2, 3 & 4 Hr (See Item 4)
L Rating At 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
W Rating — Class 1 (See Item 4)	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft

CONFIGURATION A



SECTION A-A

CONFIGURATION B



SECTION A-A

1. FLOOR OR WALL ASSEMBLY — SEE CONFIGURATION A ABOVE. REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/CU METER) CONCRETE AS SPECIFIED IN THE TABLE IN ITEM 4 BELOW. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF SLEEVED OPENING IS 32 IN. (813 MM).
   SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
1A. FLOOR ASSEMBLY — SEE CONFIGURATION B ABOVE. MIN 6 IN. (152 MM) THICK UL CLASSIFIED HOLLOW-CORE PRECAST CONCRETE UNITS*. MAX DIAM OF OPENING IS 7 IN. (178 MM).
   SEE PRECAST CONCRETE UNITS (CFTV) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
2. STEEL SLEEVE (OPTIONAL) — NOM 32 IN. (813 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE SLEEVE CAST OR GROUTED INTO FLOOR OR WALL ASSEMBLY, FLUSH WITH BOTH SURFACES OF FLOOR OR WALL. AS AN OPTION, SLEEVE MAY EXTEND MAX 2 IN. ABOVE TOP SURFACE OF FLOOR OR BEYOND ONE OR BOTH SURFACES OF WALL. STEEL SLEEVE MAY BE USED IN 2 AND 3 HR F RATED SYSTEMS ONLY.
3. THROUGH PENETRANTS — ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. SEE TABLE IN ITEM 4 FOR SIZES OF PENETRANTS A, B, D AND E THAT MAY BE USED. SEE ITEM 3C BELOW FOR SIZE OF CONDUIT THAT MAY BE USED. THE ANNULAR SPACE SHALL BE AS SPECIFIED IN TABLE IN ITEM 4 BELOW. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
   A. STEEL PIPE — SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
   B. IRON PIPE — CAST OR DUCTILE IRON PIPE.
   C. CONDUIT — NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR NOM 6 IN. (152 MM) DIAM (OR SMALLER) STEEL CONDUIT.
   D. COPPER TUBING — TYPE L (OR HEAVIER) COPPER TUBING.
   E. COPPER PIPE — REGULAR (OR HEAVIER) COPPER PIPE.
4. FIRESTOP SYSTEM — THE F RATING OF THE SYSTEM IS DEPENDENT UPON THE TYPE OF CONCRETE, THICKNESS OF CONCRETE, ANNULAR SPACE, FILL AND PACKING MATERIAL THICKNESS, PACKING MATERIAL DENSITY AND PENETRANT SIZE AS SHOWN IN THE TABLE BELOW. W RATING APPLIES TO ANNULAR SPACES OF MIN 0 IN. (POINT CONTACT) TO MAX 1-7/8 IN. AND TO CONFIGURATION A DETAIL ONLY.

F Rating hr	Min Thick Concrete In. (mm)	Annular Space In. (mm)	Min Thick Packing Mtl In. (mm)	Min Density Packing Mtl pcf (kg/cu meter)	Min Thick Fill Mtl, In. (mm)	Penetrant Size, In. (mm) Diam (or Smaller) D, E Copper	Penetrant Size, In. (mm) Diam (or Smaller) A, B (Steel Iron)
2	5-1/2 (140)	0 to 1-7/8 (0 to 48)	5 (127)	4 (64)	1/2 (13)	4 (102)	16 (406)
3	4-1/2 (114)	0 to 2-1/8 (0 to 54)	4-1/4 (108)	4 (64)	1/4 (6)	6 (152)	30 (762)
4	5-1/2 (140)	0 to 1-7/8 (0 to 48)	5 (127)	4 (64)	1/2 (13)	4 (102)	8 (203)

   A. PACKING MATERIAL — MIN 4-1/4 OR 5 IN. (108 OR 127 MM) THICKNESS OF MIN 4.0 PCF (64 KG/CU METER) MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM AS SPECIFIED IN THE TABLE ABOVE. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR TOP END OF SLEEVE, OR FROM BOTH SURFACES OF WALL OR ENDS OF SLEEVE, AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL. FOR HOLLOW-CORE FLOOR APPLICATIONS AS SHOWN IN CONFIGURATION B, ONE HALF OF THE REQUIRED THICKNESS OF MINERAL WOOL PACKING MATERIAL SHALL BE INSTALLED FLUSH WITH THE BOTTOM SURFACE OF THE FLOOR AND THE REMAINING HALF OF THE MINERAL WOOL PACKING MATERIAL INSTALLED AT THE TOP OF THE OPENING AND RECESSED FROM THE TOP SURFACE OF THE FLOOR TO ACCOMMODATE THE REQUIRED THICKNESS OF THE FILL MATERIAL.
   B. FILL, VOID OR CAVITY MATERIAL* — CAULK — MIN 1/4 OR 1/2 IN. (6 OR 13 MM) THICKNESS OF FILL MATERIAL AS SPECIFIED IN THE TABLE ABOVE APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF FLOOR OR TOP END OF SLEEVE, OR WITH BOTH SURFACES OF WALL OR ENDS OF SLEEVE. AT THE POINT CONTACT LOCATION BETWEEN PIPE AND CONCRETE OR SLEEVE, A MIN 1/2 IN. (13 MM) DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AS AN OPTION, FOR HOLLOW-CORE FLOORS, THE PACKING MATERIAL (ITEM 4A) ON THE BOTTOM SURFACE OF THE FLOOR MAY BE RECESSED TO ACCOMMODATE A 1/4 IN. (6 MM) DEPTH OF FILL MATERIAL INSTALLED FLUSH WITH BOTTOM SURFACE OF FLOOR.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL GG (FLOORS OR WALLS) AND CFS-S SIL SL (FLOORS ONLY)

*BEARING THE UL CLASSIFICATION MARK

2, 3, 4 HR FIRE STOP DETAIL

NO SCALE

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COMMONWEALTH OF VIRGINIA
10/10/25
WINSTON A. MATTHEWS
Lic. No. 044469
PROFESSIONAL ENGINEER

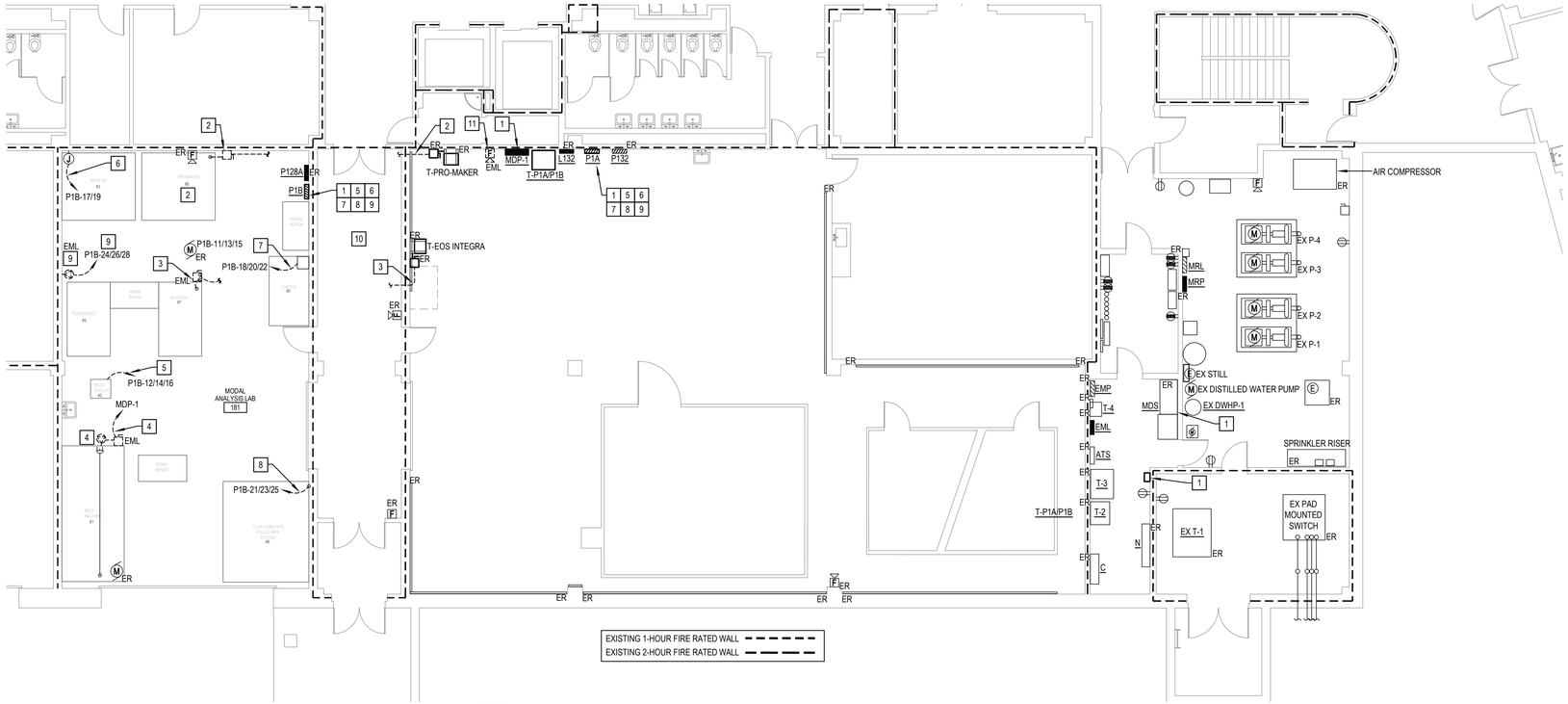
REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

SPECIFICATION SECTIONS
ELECTRICAL - PHASE 2

DESIGNED MAR	DRAWN MAR
CHECKED WAM	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET
E-001



PARTIAL FIRST FLOOR - POWER PLAN - DEMO WORK - PHASE 2

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

GENERAL NOTES:

A. CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE ENTIRE CONTRACT DOCUMENTS TO HAVE A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE OF WORK AND SHALL COORDINATE WITH ALL DISCIPLINES AND THE OWNERS REPRESENTATIVE PRIOR TO ANY WORK.

B. ELECTRICAL DEMOLITION IS DEFINED IN THE FOLLOWING NOTES AND IN LIMITED TO FIELD OBSERVATION AND ACCESSIBILITY TO THE EXISTING CONDITIONS. THE DRAWINGS ARE ONLY INTENDED TO BE A PARTIAL REPRESENTATION OF THE ACTUAL DEMOLITION WORK REQUIRED. THESE NOTES ONLY APPLY TO THE AREAS OF RENOVATION. IN GENERAL, THE DEMOLITION SCOPE IS THE REMOVAL OF EXISTING LIGHTING AND ASSOCIATED CONTROLS IN THE AREAS OF RENOVATION, EXCEPT AS NOTED OTHERWISE IN THESE NOTES AND ON THE CONTRACT DOCUMENTS.

C. CONTRACTOR SHALL COORDINATE ALL REQUIRED SHUTDOWNS WITH PROJECT MANAGER/GC AND OWNER'S REPRESENTATIVE.

D. ALL WIRING FOR ALL SIZES WILL BE SIMPUL OR EQUAL TO IMPREGNATED COLOR CODED INSULATION, FOR EACH VOLTAGE AND PHASES - NO COLOR TAPE WILL BE ACCEPTED - THIS IS TYPICAL FOR THE ENTIRE SCOPE OF WORK, THIS INCLUDES THE MAIN INCOMING ELECTRICAL SERVICE. AGAIN COLOR TAPE WILL NOT BE ACCEPTABLE.

PHASE 2 DEMOLITION PLAN NOTES:

1. EXISTING ELECTRICAL INFRASTRUCTURE (PANELS) SHALL REMAIN AS INSTALLED AND WILL SUPPORT THE PROJECT SCOPE OF WORK. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A NEW (TYPED) PANEL SCHEDULE REFLECTING THE SCOPE OF WORK, NO HAND WRITTEN ENTRIES WILL BE ACCEPTED. CONTRACTOR IS NOT RESPONSIBLE FOR CONFIRMING THE EXISTING CONNECTED LOADS, BUT IS RESPONSIBLE FOR TRANSFERRING THE NOTED EXISTING DESCRIPTION FROM THE EXISTING PANEL SCHEDULE TO THE NEW PANEL SCHEDULE.

2. THE CONTRACTOR SHALL DISCONNECT (ITEM#8) THE PRO-MAKER'S POWER SOURCE FROM ITS CURRENT LOCATION (181) AND RE-WORK THE EXISTING CONDUCTORS AND ASSOCIATED CONDUIT TO ITS NEW LOCATION IN LAB ROOM 171. (MEGGER THE WIRING AFTER RE-WORKING, REPLACE IF DAMAGED). THE RETAIN THE LOCAL DISCONNECT SWITCH WITH THE UNIT. REFER TO E-200 FOR NEW LOCATION. THE CONTRACTOR SHALL FIRE CAULK ALL FIRE RATED WALL PENETRATIONS - DO TO REMOVING OR INSTALLING NEW CONDUITS.

3. THE CONTRACTOR SHALL DISCONNECT (ITEM#7) THE INTEGRA'S POWER SOURCE FROM ITS CURRENT LOCATION (181) AND RE-WORK THE EXISTING CONDUCTORS AND ASSOCIATED CONDUIT TO ITS NEW LOCATION IN LAB ROOM 171. (MEGGER THE WIRING AFTER RE-WORKING, REPLACE IF DAMAGED). THE RETAIN THE LOCAL DISCONNECT SWITCH WITH THE UNIT. REFER TO E-200 FOR NEW LOCATION. THE CONTRACTOR SHALL FIRE CAULK ALL FIRE RATED WALL PENETRATIONS - DO TO REMOVING OR INSTALLING NEW CONDUITS.

4. THE CONTRACTOR SHALL DISCONNECT (ITEM#1) THE MELD CONTINUOUS FEED'S POWER SOURCE FROM ITS CURRENT LOCATION (181) AND RE-WORK THE EXISTING CONDUCTORS AND ASSOCIATED CONDUIT TO ITS NEW LOCATION IN LAB ROOM 171. (MEGGER THE WIRING AFTER RE-WORKING, REPLACE IF DAMAGED). THE RETAIN SPECIAL RECEPTACLE AND THE LOCAL DISCONNECT SWITCH WITH THE UNIT. REFER TO E-200 FOR NEW LOCATION. THE CONTRACTOR SHALL FIRE CAULK ALL FIRE RATED WALL PENETRATIONS - DO TO REMOVING OR INSTALLING NEW CONDUITS.

5. THE CONTRACTOR SHALL SAFE-OFF MELD CHILLER (ITEM #2) 30A, 3 POLE BREAKER IN EXISTING PANEL P1B, POSITION 12/14/16. THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING CONDUCTORS AND CONDUITS BACK TO THE POINT OF ORIGIN.(PANEL P1B). MELD CHIILER WILL BE RELOCATED TO LAB 171. THE CONTRACTOR SHALL REMOVE THE ASSIGNED BREAKER (30A/3P) FROM PANEL P1B AND INSTALL IN EXISTING PANEL P1A, IN POSITION 12/14/16. THE CONTRACTOR SHALL PROVIDE BLANK COVERS IN P1B, 12/14/16.

6. THE CONTRACTOR SHALL SAFE-OFF NEXA-3D (ITEM #3) 40A, 2 POLE BREAKER IN EXISTING PANEL P1B, POSITION 17/19. THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING CONDUCTORS AND CONDUITS BACK TO THE POINT OF ORIGIN.(PANEL P1B). NEXA-3D WILL BE RELOCATED TO LAB 171. THE CONTRACTOR SHALL REMOVE THE ASSIGNED BREAKER (40A/2P) FROM PANEL P1B AND INSTALL IN EXISTING PANEL P1A, IN POSITION 11/13. THE CONTRACTOR SHALL PROVIDE BLANK COVERS IN P1B, 17/19.

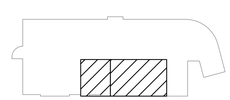
7. THE CONTRACTOR SHALL SAFE-OFF FORTUS (ITEM #5) 30A, 3 POLE BREAKER IN EXISTING PANEL P1B, POSITION 18/20/22. THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING CONDUCTORS AND CONDUITS BACK TO THE POINT OF ORIGIN.(PANEL P1B). FORTUS WILL BE RELOCATED TO LAB 171. THE CONTRACTOR SHALL REMOVE THE ASSIGNED BREAKER (30A/3P) FROM PANEL P1B AND INSTALL IN EXISTING PANEL P1A, IN POSITION 15/17/19. THE CONTRACTOR SHALL PROVIDE BLANK COVERS IN P1B, 18/20/22.

8. THE CONTRACTOR SHALL SAFE-OFF TITAN ROBOTICS PELLET MEX SYSTEM (ITEM #6) 100A, 3 POLE BREAKER IN EXISTING PANEL P1B, POSITION 21/23/25. THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING CONDUCTORS AND CONDUITS BACK TO THE POINT OF ORIGIN.(PANEL P1B). TITAN WILL BE RELOCATED TO LAB 171. THE CONTRACTOR SHALL REMOVE THE ASSIGNED BREAKER (100A/3P) FROM PANEL P1B AND INSTALL IN EXISTING PANEL P1A, IN POSITION 18/20/22. THE CONTRACTOR SHALL PROVIDE BLANK COVERS IN P1B, 21/23/25.

9. THE CONTRACTOR SHALL SAFE-OFF POWER SHOT (ITEM #9) 20A, 3 POLE BREAKER IN EXISTING PANEL P1B, POSITION 24/26/28. THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING CONDUCTORS AND CONDUITS BACK TO THE POINT OF ORIGIN.(PANEL P1B). POWER SHOT WILL BE RELOCATED TO LAB 171. THE CONTRACTOR SHALL REMOVE THE ASSIGNED BREAKER (20A/3P) FROM PANEL P1B AND INSTALL IN EXISTING PANEL P1A, IN POSITION 21/23/25. THE CONTRACTOR SHALL RETAIN AND RELOCATE THE SPECIAL RECEPTACLE WITH (ITEM#9). THE CONTRACTOR SHALL PROVIDE BLANK COVERS IN P1B, 24/26/28.

10. THE CONTRACTOR SHALL RETAIN AND RE-USE AS MUCH OF THE EXISTING REMOVED CONDUITS, FITTINGS, CLAMPS, ETC. FROM THE ABOVE NOTED DEMOLITION ITEMS TO SUPPORT NEW WORK.

11. THE CONTRACTOR SHALL RELOCATE EXISTING FIRE ALARM APPLIANCE, SEE NEW WORK.



KEY PLAN

NO SCALE

GRAPHIC SCALE

8 0 4 8 16 32

(IN FEET)

1/8" = 1'-0"

LPA

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COMMONWEALTH OF VIRGINIA

10/10/25

WINSTON A. MATTHEWS

Lic. No. 044469

PROFESSIONAL ENGINEER

REVISION	DATE

VT DURHAM HALL

ROOMS 171 AND 181 RENOVATIONS - PHASE 2

BLACKSBURG, VIRGINIA

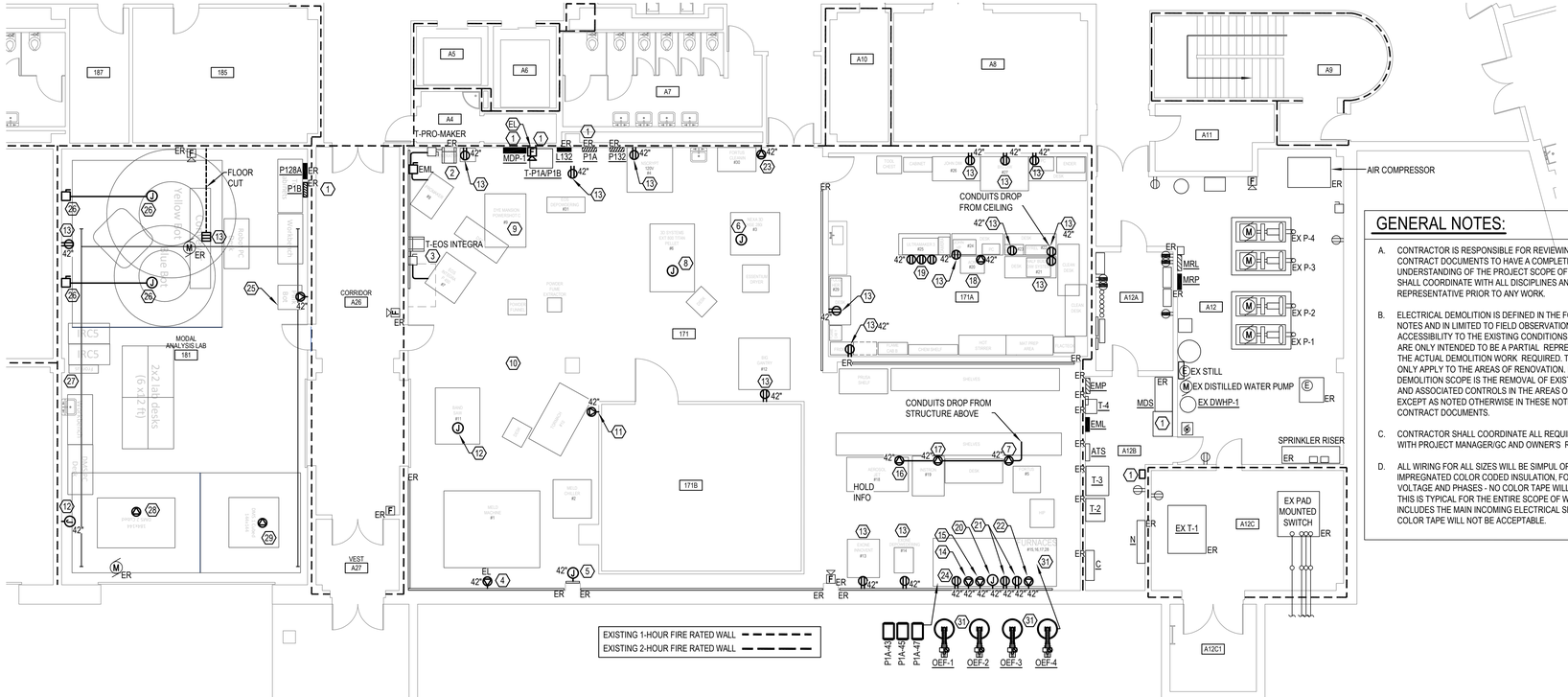
PARTIAL FLOOR PLAN - MODAL ANALYSIS LAB 181 - DEMO WORK

ELECTRICAL - PHASE 2

DESIGNED	DRAWN
MAR	MAR
CHECKED	APPROVED
WAM	LPA
COMM. NO.	DATE
25105	10-10-25

SHEET

ED-200



PARTIAL FIRST FLOOR - POWER PLAN - NEW WORK - PHASE 2

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

Equipment Number		Equipment Name	Photo of nameplate	Actual Voltage required	Hardwired or Plug	Plug NEMA rating
RELOCATED FROM 181	1	MELD Continuous Feed	Yes	480 3 phase Max Overcurrent protection 125A	Plug	PS4100R7-W receptacle
RELOCATED FROM 181	2	MELD Chiller	Yes	208v 3 phase 30 amp	Hardwired	N/A
RELOCATED FROM 181	3	Nexa3D HSE 280i	Yes	208v 1 phase/ 2 phase 40 amp	Hardwired	N/A
	4	Nscrypt 3dn 300	Yes	120v 1 phase 20 amp	Plug	Standard 120v 20amp plug
RELOCATED FROM 181	5	Fortus	Yes	208v 3 phase 30 amp has transformer to boost to 230V 3 phase	Plug	L15-30
RELOCATED FROM 181	6	3D Systems EXT 800 Titan Pellet	Yes	208v 3 phase 100 amp	Hardwired	N/A
RELOCATED FROM 181	7	EOS INTEGRA P 450	Yes	240v 3 Phase 40 amp-need buck boost	Hardwired	N/A
RELOCATED FROM 181	8	Promaker	Yes	208v 3-phase 60 amp to make it 380v	Hardwired	N/A
	9	Dye Mansion Powershot C	Yes	208 3phase 20 amp	Plug	L2120P
	10	Tormach PCNC 1100	Yes	208v 1 phase 20 amp	Plug	6-20p
	11	Bandsaw-JET	Yes	480v 3 phase 20 amp- Currently hardwired	Hardwired	N/A
	12	Big Gantry-Custom	No Rating Plate	120v 1 phase	Plug	Standard 120v plug
	13	ExOne Innovent	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	14	ExOne depowdering box-SAS	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	15	ExOne Curing Oven	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	16	Tube furnace-MTI	Yes	208 1 phase 30 amp	Plug	HBL2621
	17	Muffle furnace-Nabertherm	Yes	208 1-phase 50 amp	Plug	CS-82650 2P-3W Hubbell plug
	18	Aerosol Jet	Yes	120v 1 phase 30 amp	Plug	L14-30p
	19	Instron	Yes	208 1 phase 30 amp	Plug	HBL2321
	20	AON	No Rating Plate	208 1-phase 20 amp	Plug	L6-20p
	21	Half Built DIW system	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	22	Hyrel	No Rating Plate	120v 1 phase 20 amp	Plug	Standard 120v plug
	23	Microscope	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	24	John VP	No Rating Plate	120v 1 phase 20 amp	Plug	Standard 120v plug
	25	Ultimaker 3	Yes	120v 1 phase 9.2 amp	Plug	Standard 120v plug
	25	Prusa Mk3	Yes	120v 1 phase 3.6 amp	Plug	Standard 120v plug
	25	Ultimaker 5	Yes	120v 1 phase 9.2 amp	Plug	Standard 120v plug
	26	John DIW	No Rating Plate	120v 1 phase 20 amp	Plug	Standard 120v plug
	27	Big DIW	No Rating Plate	120v 1 phase 20 amp	Plug	Standard 120v plug
	28	R2 box furnace	Yes	208 single phase no neutral 60 amp	Hardwired	N/A
	28	Box furnace controller	Yes	Auxiliary Equipment	N/A	N/A
	28	Vac pump for tube furnace	No	120v 1 phase 20 amp	Plug	Standard 120v plug
	28	Vac Oven-Lindberg Blue-Thermo	Yes	120V 20 amp	Plug	Standard 120v plug
	28	Yifeng Pressure	Yes	208 1 phase 30 amp	Plug	L6-30
	29	Polisher + vacuprep	Yes	120v 1 phase 20 amp	Plug	Standard 120v plug
	30	Fortus Cleaning station	Yes	208v 1-phase 20 amp	Plug	6-20p
	31	Depowdering station	No	120v 1 phase	Plug	Standard 120v plug
	32	ABB IRB 1200 - 0.7 (Pink) w/ IRC Compact	Yes	208v 1-phase 15 amp	Plug	L6-30p
	33	ABB IRB 4600 - 2.55 (Yellow) w/ IRC5 contr	Yes	480 3 phase 30 amp	Hardwired	N/A
	34	ABB IRB 4600 - 2.05 (Blue) w/IRC5 controller	Yes	480 3 phase 30 amp	Hardwired	N/A
	35	Tilt/Turn IRBP A500 H900	No Rating Plate	Auxiliary Equipment	Connected to 33 or 34	N/A
	36	Conveyer-Hytrol	No Rating Plate	120v 1 phase 20 amp	Plug	Standard 120v plug
	39	Fronius Robot 4600	Yes	480 3 phase 35 amp	Hardwired	N/A
	40	DMS 2Cube - 3 Axis	Yes	480v 3 Phase 70 amp	Plug	PS4100R7-W receptacle
	41	DMS 1 Cube - 3 Axis	Yes	208v 3 Phase 100 amp	Plug	PS4100R9-W receptacle
	42	Robot Work Cell (Car Port)	No Rating Plate	120V 1 Phase 20 amp	Plug	Standard 120v 20 amp recepticle
	43	Donaldson Fume Extraction	Yes	480 3 phase 20 amp	Hardwired	N/A

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PHASE 2 NEW PLAN NOTES:

1. EXISTING ELECTRICAL INFRASTRUCTURE (PANELS) SHALL REMAIN AS INSTALLED AND WILL SUPPORT THE PROJECT SCOPE OF WORK. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A NEW (TYPED) PANEL SCHEDULE REFLECTING THE SCOPE OF WORK, NO HAND WRITTEN ENTRIES WILL BE ACCEPTED. CONTRACTOR IS NOT RESPONSIBLE FOR CONFIRMING THE EXISTING CONNECTED LOADS, BUT IS RESPONSIBLE FOR TRANSFERRING THE NOTED EXISTING DESCRIPTION FROM THE EXISTING PANEL SCHEDULE TO THE NEW PANEL SCHEDULE.

2. THE CONTRACTOR SHALL RE-WORK THE EXISTING POWER SOURCE CONDUCTORS (3)#8 + (1) #8 NEUTRAL W/#10 GROUND FOR (ITEM#8) THE PRO-MAKER AS NOTED ON ED-200, PLAN NOTE #2. RETAIN LOCAL DISCONNECT SWITCH SHALL BE MOUNTED NO HIGHER THAN 6'-6" TO THE CENTER OF THE SWITCH AND PER NEC 110.26 FOR WORKING CLEARANCES.

3. THE CONTRACTOR SHALL RE-WORK THE EXISTING POWER SOURCE CONDUCTORS (3)#8 + (1) #8 NEUTRAL W/#10 GROUND FOR (ITEM#7) THE INTEGRA AS NOTED ON ED-200, PLAN NOTE #3. RETAIN LOCAL DISCONNECT SWITCH SHALL BE MOUNTED NO HIGHER THAN 6'-6" TO THE CENTER OF THE SWITCH AND PER NEC 110.26 FOR WORKING CLEARANCES.

4. THE CONTRACTOR SHALL RE-WORK THE EXISTING POWER SOURCE CONDUCTORS (3) #1/0 W/#6 GROUND IN 2.0" CONDUIT FOR (ITEM#1) THE MELD CONTINUOUS FEED AS NOTED ON ED-200, PLAN NOTE #4. THE CONTRACTOR SHALL MOUNT THE RETAIN SPECIAL RECEPTACLE AND THE LOCAL DISCONNECT SWITCH AT THE UNIT. PROVIDE ALL REQUIRED MOUNTING FRAME WORK (UNISTRUT) CENTER OF SWITCH SHALL NOT EXCEED 6'-6" AND PER NEC 110.26 FOR WORKING CLEARANCES. COORDINATE WITH OWNER PRIOR TO ROUGH-IN FOR EXISTING CORD LENGTH.

5. THE CONTRACTOR SHALL PROVIDE (3) #10 W/#10 GROUND IN .75" CONDUIT FROM THE RELOCATED 30A, 3P BREAKER IN EXISTING PANEL P1A TO THE MELD CHILLER (ITEM #2) UNIT'S POWER CONNECTION POINT. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT. REFER TO PANEL SCHEDULE (P1A).

6. THE CONTRACTOR SHALL PROVIDE (3) #6 W/#10 GROUND IN .75" CONDUIT FROM THE RELOCATED 40A, 2P BREAKER IN EXISTING PANEL P1A TO THE NEXA3D HSE 280I (ITEM #3) UNIT'S POWER CONNECTION POINT. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT. WIRE NUT THE NEUTRAL AT THE UNIT IF NOT NEEDED. REFER TO PANEL SCHEDULE (P1A).

7. THE CONTRACTOR SHALL PROVIDE (4) #10 W/#10 GROUND IN .75" FROM THE RELOCATED 30A, 3 POLE BREAKER IN EXISTING PANEL P1A TO PORTUS (ITEM #5) PROVIDE A SPECIAL RECEPTACLE (L15-30) AND CONNECT POWER SOURCE. COORDINATE WITH OWNER PRIOR TO ROUGH-IN FOR EXISTING CORD LENGTH. REFER TO PANEL SCHEDULE (P1A).

8. THE CONTRACTOR SHALL PROVIDE (4) #2 W/#8 GROUND IN 1.25" CONDUIT FROM THE RELOCATED 100A, 3P BREAKER IN EXISTING PANEL P1A TO THE (ITEM #6) TITAN ROBOTICS PELLET MEX SYSTEM'S POWER CONNECTION POINT. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT. WIRE NUT THE NEUTRAL AT THE UNIT IF NOT NEEDED. REFER TO PANEL SCHEDULE (P1A).

9. THE CONTRACTOR SHALL PROVIDE (4) #12 W/#12 GROUND IN .75" CONDUIT FROM THE RELOCATED 20A 3P BREAKER IN EXISTING PANEL P1A TO THE (ITEM #9) POWER SHOT (RETAIN/RELOCATED) SPECIAL RECEPTACLE (L2120P). COORDINATE WITH OWNER PRIOR TO ROUGH-IN FOR THE EXISTING CORD LENGTH.

10. THE CONTRACTOR SHALL RETAIN AND RE-USE AS MUCH OF THE EXISTING REMOVED CONDUITS, FITTINGS, CLAMPS, ETC. FROM THE ABOVE NOTED DEMOLITION ITEMS TO SUPPORT NEW WORK.

11. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED 20A,2P BREAKER IN EXISTING PANEL (P1A) IN POSITION (27/29). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL NEMA (6-20P) RECEPTACLE, MOUNT AT 42" AFF. COORDINATE WITH EQUIPMENT #10'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (3)#12 W/#12 GROUND IN .75" CONDUIT TO THE (6-20P) RECEPTACLE. THE SHALL WIRE NUT THE NEUTRAL ON BOTH ENDS IF NOT USED.

12. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED 25A, 3P BREAKER IN EXISTING DISTRIBUTION PANEL (MDP-1) (480V, 3 PHASE) (POSITION ON SCHEDULE IS 13/15/17). THE CONTRACTOR SHALL PROVIDE (3) #10 W/#10 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE BANDSAW-JET (ITEM #11) UNIT'S POWER CONNECTION POINT. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT. REFER TO PANEL SCHEDULE (MDP-1).

13. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED 20A SINGLE POLE BREAKER(S) (120V) IN PANEL (P1A IN 171 AND P1B IN 181) IN POSITIONS AS SHOWN IN THEE PANEL SCHEDULE TO SUPPORT GENERAL RECEPTACLES, THAT ARE COMMON AND OTHERS SUPPORTING EQUIPMENT AS NOTED IN THE SCHEDULES. THE CONTRACTOR SHALL PROVIDE (2)#12 W/#12 IN .75" TO RECEPTACLES AS NOTED.

14. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (30A 2P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (31/33). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL RECEPTACLE HBL2621 TO SUPPORT TUBE-FURNACE-MTI (ITEM #16), MOUNT AT 42" AFF. COORDINATE WITH EQUIPMENT #16'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (4)#10 W/#10 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE (BHL2621) RECEPTACLE.

15. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (50A 2P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (39/41). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL RECEPTACLE (CS-82650) (2P-3W) TO SUPPORT MUFFLE FURNACE-NABERTHERM (ITEM #17), MOUNT AT 42" AFF. COORDINATE WITH EQUIPMENT #17'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (3)#8 W/#10 GROUND IN 1.0" CONDUIT FROM THE ASSIGNED BREAKER TO THE HUBBELL (CS-82650) RECEPTACLE.

16. HOLD FOR INFORMATION FOR (JU) ITEM #18 - PROVIDE A NEW L14-30P RECEPTACLE FOR PROVIDED EQUIPMENT.

17. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (30A 2P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (24/26). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL (HBL2321) TO SUPPORT INSTRON ITEM #19), MOUNT AT 42" AFF. COORDINATE WITH EQUIPMENT #19'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (3) #10 W/#10 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE SPECIAL (HBL2321) RECEPTACLE. IF THE NEUTRAL IS NOT USED WIRE NUT ON BOTH ENDS.

18. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (20A 2P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (28/30). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL PROVIDE A NEW L6-20P RECEPTACLE FOR PROVIDED EQUIPMENT. COORDINATE WITH EQUIPMENT #20'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (2) #12 W/#12 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE SPECIAL (L6-20P) RECEPTACLE.

19. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (20A 1P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (7) TO SUPPORT (HALF BUILT DIW SYSTEM). REFER TO SCHEDULE. THE CONTRACTOR PROVIDE THREE STANDARD 120V RECEPTACLES FOR ITEM #25-1, ITEM #25-2, AND ITEM #25-3. COORDINATE WITH EQUIPMENT'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN.

20. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (60A 2P) BREAKER IN THE EXISTING PANEL (P1A) IN POSITION (32/34). THE CONTRACTOR SHALL HARDWIRE ITEM #28-1, THE CONTRACTOR SHALL PROVIDE (2) #6 W/#10 GROUND IN 1.0" CONDUIT FROM THE ASSIGNED BREAKER TO THE POWER CONNECTION POINT ON ITEM#28-1, PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT.

21. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (20A 1P) BREAKER IN IN EXISTING PANEL (P1A) IN POSITION (44) TO SUPPORT ITEM #28-3 AND #28-4 VAC PUMP & VAC OVEN. THE CONTRACTOR SHALL PROVIDE TWO STANDARD 120V RECEPTACLES, CONFIRM EXISTING CORD LENGTH PRIOR TO ROUGH-IN. REFER TO PANEL SCHEDULE.

22. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (30A 2P) BREAKER IN THE EXISTING PANEL (P1A) IN POSITION (36/38) TO SUPPORT (ITEM#28-5) (YIFENG PRESSURE). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL (L6-30) RECEPTACLE FOR ITEM #28-5.THE CONTRACTOR SHALL PROVIDE (2) #10 W/#10 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE SPECIAL (L6-30) RECEPTACLE. COORDINATE WITH EQUIPMENT'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN.

PHASE 2 NEW PLAN NOTES:

23. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (20A 2P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (40/42). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL PROVIDE A NEW L6-20P RECEPTACLE FOR PROVIDED EQUIPMENT. COORDINATE WITH EQUIPMENT #30'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (2) #12 W/#12 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE SPECIAL (L6-20P) RECEPTACLE.

24. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (20A 1P) BREAKER IN EXISTING PANEL (P1A) IN POSITION (5) TO SUPPORT (EXONE CURING OVEN). REFER TO SCHEDULE. THE CONTRACTOR PROVIDE (1) STANDARD 120V RECEPTACLES FOR ITEM #15, COORDINATE WITH EQUIPMENT'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN.

25. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (15A 2P) BREAKER IN THE EXISTING PANEL (P1B) IN POSITION (17/19) TO SUPPORT (ITEM#32) (ABB IRB 1200-.07 (PINK). THE CONTRACTOR SHALL PROVIDE A NEW SPECIAL (L6-30) RECEPTACLE FOR ITEM #32 THE CONTRACTOR SHALL PROVIDE (2) #12 W/#12 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE. COORDINATE WITH EQUIPMENT'S EXISTING CORD LENGTH PRIOR TO ROUGH-IN.

26. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (2) (30A 3P) BREAKER IN EXISTING DISTRIBUTION PANEL (MDP-1) IN PANEL SCHEDULE POSITION (19/21/23) & (20/22/24). THE CONTRACTOR SHALL PROVIDE A SQUARE D OR EQUAL TO (2)) HEAVY DUTY LOCKABLE NON-FUSED, NEMA 12R, DISCONNECT SWITCH RATED FOR 30A, 3 POLE, 600V, NEMA 12 TO SUPPORT (ITEM#33 YELLOW AND ITEM#34 BLUE). THE CONTRACTOR SHALL PROVIDE MOUNTING FRAME WORK (UNISTRUT) SECURED TO THE FLOOR AND THE CENTER OF THE SWITCH SHALL NOT EXCEED 6'-6" AFF. THE SHALL COORDINATE WITH OWNER FROM FINAL APPROVED MOUNTING LOCATION, PRIOR TO ROUGH-IN. NEC 110 FOR WORKING CLEARANCES. THE CONTRACTOR SHALL PROVIDE (1 SET PER UNIT) (4) #10 W/#10 GROUND IN 1.0" FROM THE ASSIGNED BREAKERS TO THE LINE-SIDE OF EACH DISCONNECTION SWITCH, PROVIDE THE SAME ON THE LOAD-SIDE AND CONNECT TO THE POWER CONNECTION POINT ON THE UNIT. PROVIDE A MINIMUM OF 3'-0" OF SEAL TIGHT FLEXIBLE CONDUIT FROM THE POWER CONNECTION POINT. IF THE NEUTRAL IS NOT USED, WIRE NUT AT BOTH ENDS. ALL WALL PENETRATIONS SHALL BE FIRE CAULK.

27. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (50A 3P) BREAKER IN EXISTING DISTRIBUTION PANEL (MDP-1) IN PANEL SCHEDULE POSITION (25/27/29). THE CONTRACTOR SHALL PROVIDE A SQUARE D OR EQUAL TO HEAVY DUTY LOCKABLE NON-FUSED, NEMA 12R, DISCONNECT SWITCH RATED FOR 60A, 3 POLE, 600V, NEMA 12 TO SUPPORT (ITEM#39 FRONIUS ROBOT 45600). THE CONTRACTOR SHALL PROVIDE MOUNTING FRAME WORK (UNISTRUT) SECURED TO THE FLOOR AND THE CENTER OF THE SWITCH SHALL NOT EXCEED 6'-6" AFF. THE SHALL COORDINATE WITH OWNER FROM FINAL APPROVED MOUNTING LOCATION, PRIOR TO ROUGH-IN. NEC 110 FOR WORKING CLEARANCES. THE CONTRACTOR SHALL PROVIDE (4) #8 W/#10 GROUND IN 1.0" FROM THE ASSIGNED BREAKERS TO THE LINE-SIDE OF THE DISCONNECTION SWITCH, PROVIDE THE SAME ON THE LOAD-SIDE AND CONNECT TO THE POWER CONNECTION POINT ON THE UNIT. PROVIDE A MINIMUM OF 3'-0" OF SEAL TIGHT FLEXIBLE CONDUIT FROM THE POWER CONNECTION POINT. IF THE NEUTRAL IS NOT USED, WIRE NUT AT BOTH ENDS. ALL WALL PENETRATIONS SHALL BE FIRE CAULK.

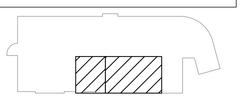
28. THE CONTRACTOR SHALL PROVIDE A 100A 3P BREAKER IN DISTRIBUTION PANEL (MDP-1) IN ROOM 171. THE CONTRACTOR SHALL PROVIDE A PIN & SLEEVE WATERTIGHT 100A, 3P 480V PS4100R7-W RECEPTACLE TO SUPPORT (ITEM#40) DMS 2 CUBE - 3 AXIS. THE CONTRACTOR SHALL PROVIDE (4)#2 W/#8 GROUND IN 1.25: CONDUIT FROM THE ASSIGNED BREAKER TO THE NOTED PIN/SLEEVE RECEPTACLE. THE CONTRACTOR SHALL COORDINATE WITH THE EXISTING EQUIPMENT PRIOR TO ROUGH-IN. ALL WALL PENETRATIONS SHALL BE FIRE CAULKED.

29. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED (100A 3P) BREAKER IN BRANCH PANEL (P1B) IN POSITION (21/23/25). THE CONTRACTOR SHALL PROVIDE A NEW PS4100R3-W RECEPTACLE TO SUPPORT (ITEM#41) DMS 1 CUBE - 3 AXIS. COORDINATE WITH THE EXISTING EQUIPMENT'S CORD PRIOR TO ROUGH-IN. THE CONTRACTOR SHALL PROVIDE (4)#2 W/#8 GROUND IN 1.25: CONDUIT FROM THE ASSIGNED BREAKER TO THE NOTED RECEPTACLE.

30. THE CONTRACTOR SHALL INSTALL THE PRE-PURCHASED 20A 3P BREAKER IN DISTRIBUTION PANEL (MDP-1) IN ROOM 171 IN POSITION (14/16/18) TO SUPPORT (ITEM#43) DONALDSON FUME EXTRACTION). THE CONTRACTOR SHALL PROVIDE (4)#12 W/#12 GROUND IN .75" CONDUIT FROM THE ASSIGNED BREAKER TO THE (ITEM#42'S) POWER CONNECTION POINT. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3'-0" OF SEAL-TIGHT FLEXIBLE CONDUIT FROM THE UNIT'S POWER CONNECTION POINT. WIRE NUT THE NEUTRAL AT THE UNIT IF NOT NEEDED.

31. THE CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR THE (4) OEF EXHAUST FANS ½ HP OVER THE FURNACE AREA. THE CONTRACTOR SHALL PROVIDE A WORK SWITCH AT EACH UNIT FOR MEANS OF DISCONNECTION. USE CIRCUIT 44, WHICH IS SUPPORT #28-3 AND 28-4.

32. (3) EXHAUST FANS ABOVE THE CEILING, ABOVE FURNACE AREA. PROVIDE WORK SWITCHES, COORDINATE WITH MECHANICAL CONTRACTOR. SEE PANEL SCHEDULE FOR DETAILS.



KEY PLAN

NO SCALE

GRAPHIC SCALE

8 0 4 8 16 32

(IN FEET)

1/8" = 1'-0"

LPA
LAWRENCE PERRY & ASSOCIATES
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Fax: (540) 344-3410

COMMONWEALTH OF VIRGINIA
10/10/25
WINSTON A. MATTHEWS
Lic. No. 044469
PROFESSIONAL ENGINEER

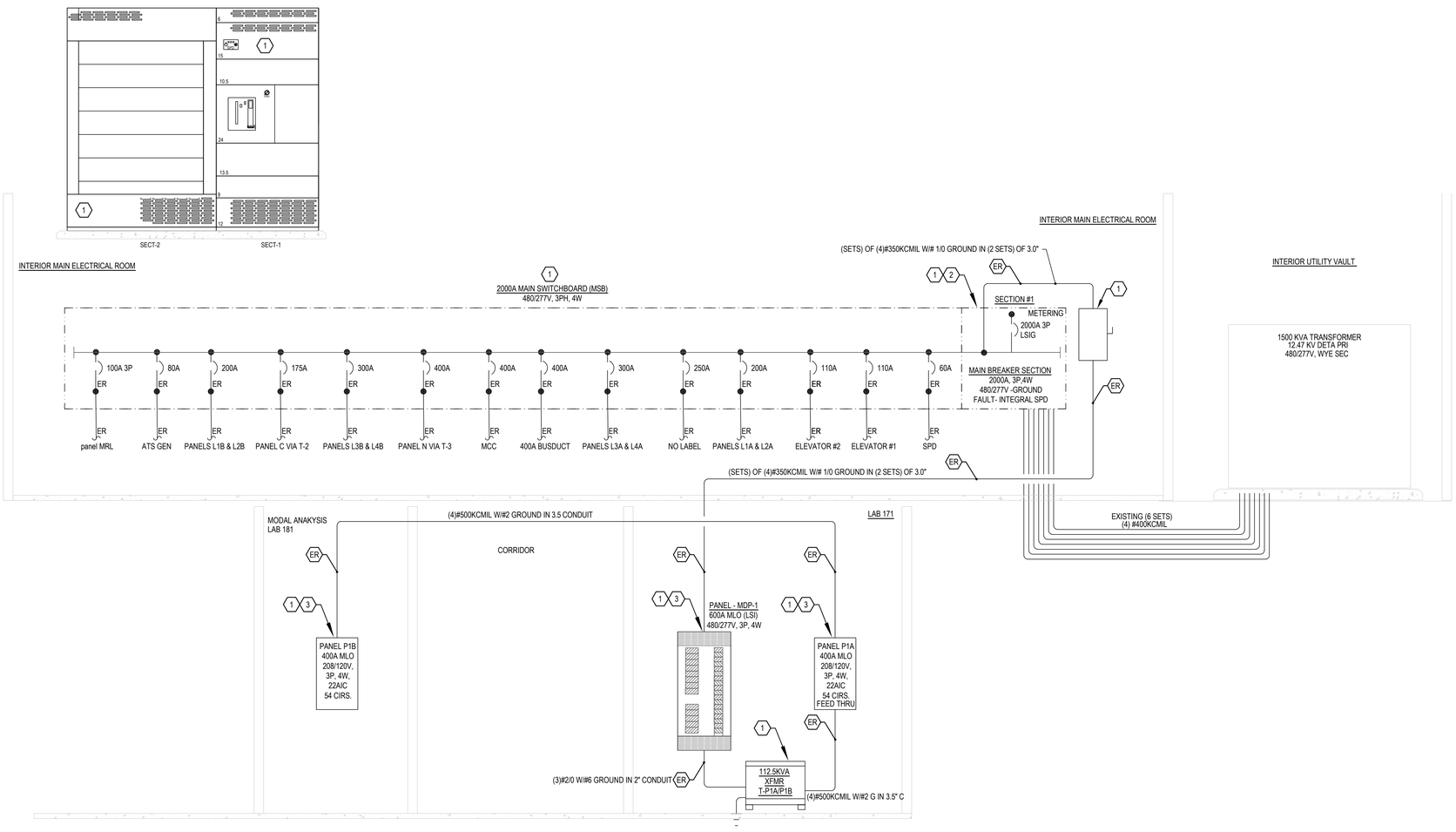
REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

PARTIAL FLOOR PLAN - MODAL ANALYSIS LAB 181 - NEW WORK
ELECTRICAL - PHASE 2

DESIGNED MAR	DRAWN MAR
CHECKED WAM	APPROVED LPA
COMM. NO. 25105	DATE 10-10-25

SHEET E-200



SINGLE LINE DIAGRAM - NEW - PHASE 2

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

GENERAL NOTES:

A. CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE ENTIRE CONTRACT DOCUMENTS TO HAVE A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE OF WORK AND SHALL COORDINATE WITH ALL DISCIPLINES AND THE OWNERS REPRESENTATIVE PRIOR TO ANY WORK.

B. ELECTRICAL DEMOLITION IS DEFINED IN THE FOLLOWING NOTES AND IN LIMITED TO FIELD OBSERVATION AND ACCESSIBILITY TO THE EXISTING CONDITIONS. THE DRAWINGS ARE ONLY INTENDED TO BE A PARTIAL REPRESENTATION OF THE ACTUAL DEMOLITION WORK REQUIRED. THESE NOTES ONLY APPLY TO THE AREAS OF RENOVATION. IN GENERAL, THE DEMOLITION SCOPE IS THE REMOVAL OF EXISTING LIGHTING AND ASSOCIATED CONTROLS IN THE AREAS OF RENOVATION, EXCEPT AS NOTED OTHERWISE IN THESE NOTES AND ON THE CONTRACT DOCUMENTS.

C. CONTRACTOR SHALL COORDINATE ALL REQUIRED SHUTDOWNS WITH PROJECT MANAGER/GC AND OWNER'S REPRESENTATIVE.

D. ALL WIRING FOR ALL SIZES WILL BE SIMPUL OR EQUAL TO IMPREGNATED COLOR CODED INSULATION, FOR EACH VOLTAGE AND PHASES - NO COLOR TAPE WILL BE ACCEPTED - THIS IS TYPICAL FOR THE ENTIRE SCOPE OF WORK, THIS INCLUDES THE MAIN INCOMING ELECTRICAL SERVICE. AGAIN COLOR TAPE WILL NOT BE ACCEPTABLE.

PHASE 2 NEW PLAN NOTES:

1. EXISTING ELECTRICAL INFRASTRUCTURE (PANELS) SHALL REMAIN AS INSTALLED AND WILL SUPPORT THE PROJECT SCOPE OF WORK. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A NEW (TYPED) PANEL SCHEDULE REFLECTING THE SCOPE OF WORK, NO HAND WRITTEN ENTRIES WILL BE ACCEPTED. CONTRACTOR IS NOT RESPONSIBLE FOR CONFIRMING THE EXISTING CONNECTED LOADS, BUT IS RESPONSIBLE FOR TRANSFERRING THE NOTED EXISTING DESCRIPTION FROM THE EXISTING PANEL SCHEDULE TO THE NEW PANEL SCHEDULE.

2. NOTE TO THE REVIEWER, THE METER READING IS INDICATING 300KVA LOAD - (360AMPS), THE INFORMATION WAS PROVIDE BY VTES - THE (360 AMPS) WAS THE MAX DEMAND OVER THE PAST 5 YEARS. THE TOTAL SCOPE WORK HAS ADDED AN ADDITIONAL LOAD OF (304 AMPS), WHICH IS A TOTAL LOAD OF (640 AMPS) ON A 2000A SYSTEM.

3. THE CONTRACTOR SHALL REFER TO DRAWING E-600 AND E-601 FOR PANEL SCHEDULE INFORMATION.

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COMMONWEALTH OF VIRGINIA
10/10/25
WINSTON A. MATTHEWS
Lic. No. 044469
PROFESSIONAL ENGINEER

REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

SINGLE LINE DIAGRAM- NEW
ELECTRICAL - PHASE 2

DESIGNED: MAR	DRAWN: MAR
CHECKED: WAM	APPROVED: LPA
COMM. NO.: 25105	DATE: 10-10-25

SHEET
E-500

EXISTING PANEL MDP-1

VOLTAGE: 480Y/277V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 600A MLO
BUS RATING: 600A
GROUND BUS: YES

INTEGRAL SPD: YES
MOUNTING: SURFACE
INTERRUPT RATING: 42,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	TRANSFORMER (T-P1A/P1B)	175/3	#2/0	-	#6	1-1/2"	SF	21.45			2	MELD MACHINE (ITEM#1)	125/3	#1/0	-	#6	2"	N	26.33		
3	TRANSFORMER (T-P1A/P1B)	-	#2/0	-	-	-	SF		18.25		4	MELD MACHINE (ITEM#1)	-	#1/0	-	-	-	N		26.33	
5	TRANSFORMER (T-P1A/P1B)	-	#2/0	-	-	-	SF			21.45	6	MELD MACHINE (ITEM#1)	-	#1/0	-	-	-	N			26.33
7	15KVA T-PROMAKER (ITEM#8)	30/3	#10	#10	#10	3/4"	N	4			8	15KVA T-EOS-INTEGRA (ITEM#7)	30/3	#10	#10	#10	1/2"	.	4.17		
9	15KVA T-PROMAKER (ITEM#8)	-	#10	-	-	-	N		4		10	15KVA T-EOS-INTEGRA (ITEM#7)	-	#10	-	-	-	.		4.17	
11	15KVA T-PROMAKER (ITEM#8)	-	#10	-	-	-	N			4	12	15KVA T-EOS-INTEGRA (ITEM#7)	-	#10	-	-	-	.			4.17
13	60AS - 25AT SPARE	25/3	-	-	-	-	.	-			14	60AS - 25AT SPARE	25/3	-	-	-	-	.	-		
15	60AS - 25AT SPARE	-	-	-	-	-	.		-		16	60AS - 25AT SPARE	-	-	-	-	-	.		-	
17	60AS - 25AT SPARE	-	-	-	-	-	.			-	18	60AS - 25AT SPARE	-	-	-	-	-	.			-
19	60AS - 30AT SPARE	30/3	-	-	-	-	.	-			20	60AS - 30AT SPARE	30/3	-	-	-	-	.	-		
21	60AS - 30AT SPARE	-	-	-	-	-	.		-		22	60AS - 30AT SPARE	-	-	-	-	-	.		-	
23	60AS - 30AT SPARE	-	-	-	-	-	.			-	24	60AS - 30AT SPARE	-	-	-	-	-	.			-
25	60AS - 40AT SPARE	40/3	-	-	-	-	.	-			26	60AS - 30AT SPARE	30/3	-	-	-	-	.	-		
27	60AS - 40AT SPARE	-	-	-	-	-	.		-		28	60AS - 30AT SPARE	-	-	-	-	-	.		-	
29	60AS - 40AT SPARE	-	-	-	-	-	.			-	30	60AS - 30AT SPARE	-	-	-	-	-	.			-
31	100AS - 70AT SPARE	70/3	-	-	-	-	.	-			32	60AS - 40AT SPARE	40/3	-	-	-	-	.	-		
33	100AS - 70AT SPARE	-	-	-	-	-	.		-		34	60AS - 40AT SPARE	-	-	-	-	-	.		-	
35	100AS - 70AT SPARE	-	-	-	-	-	.			-	36	60AS - 40AT SPARE	-	-	-	-	-	.			-
37	PREPARED SPACE	-/3	-	-	-	-	.	-			38	PREPARED SPACE	-/3	-	-	-	-	.	-		
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49	PREPARED SPACE	-/3	-	-	-	-	.	-			50	PREPARED SPACE	-/3	-	-	-	-	.	-		
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55	PREPARED SPACE	-/3	-	-	-	-	.	-			56	PREPARED SPACE	-/3	-	-	-	-	.	-		
57	PREPARED SPACE	-	-	-	-	-	.		-		58	PREPARED SPACE	-	-	-	-	-	.		-	
59	PREPARED SPACE	-	-	-	-	-	.			-	60	PREPARED SPACE	-	-	-	-	-	.			-
61	PREPARED SPACE	-/3	-	-	-	-	.	-			62	PREPARED SPACE	-/3	-	-	-	-	.	-		
63	PREPARED SPACE	-	-	-	-	-	.		-		64	PREPARED SPACE	-	-	-	-	-	.		-	
65	PREPARED SPACE	-	-	-	-	-	.			-	66	PREPARED SPACE	-	-	-	-	-	.			-
67	PREPARED SPACE	-/3	-	-	-	-	.	-			68	PREPARED SPACE	-/3	-	-	-	-	.	-		
69	PREPARED SPACE	-	-	-	-	-	.		-		70	PREPARED SPACE	-	-	-	-	-	.		-	
71	PREPARED SPACE	-	-	-	-	-	.			-	72	PREPARED SPACE	-	-	-	-	-	.			-

NOTE:THIS SCHEDULE DOES NOT REFLECT A I-LINE PANEL BREAKER MOUNTING

PHASE LOAD TOTALS: 55.95 | 52.75 | 55.95

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.25	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	6.45	1.0	6.45
NON-SEASONAL MOTORS	7.92	1.0	7.92
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	137.77	1.0	137.77	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	152.1	KVA	183.1	AMPS
MIN. FEEDER / PANEL CAPACITY	152.1	KVA	183.1	AMPS
OVERALL DEMAND FACTOR	1.00			

MODIFIED PANEL MDP-1_

VOLTAGE: 480Y/277V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 600A MLO
BUS RATING: 600A
GROUND BUS: YES

INTEGRAL SPD: YES
MOUNTING: SURFACE
INTERRUPT RATING: 42,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	TRANSFORMER (T-P1A/P1B)	175/3	#2/0	-	#6	1-1/2"	SF	39.14			2	MELD MACHINE (ITEM#1)	125/3	#1/0	-	#6	2"	N	26.33		
3	TRANSFORMER (T-P1A/P1B)	-	#2/0	-	-	-	SF		44.87		4	MELD MACHINE (ITEM#1)	-	#1/0	-	-	-	N		26.33	
5	TRANSFORMER (T-P1A/P1B)	-	#2/0	-	-	-	SF			45.21	6	MELD MACHINE (ITEM#1)	-	#1/0	-	-	-	N			26.33
7	15KVA T-PROMAKER (ITEM#8)	30/3	#10	#10	#10	3/4"	N	4			8	15KVA T-EOS-INTEGRA (ITEM#7)	30/3	#10	#10	#10	1/2"	.	4.17		
9	15KVA T-PROMAKER (ITEM#8)	-	#10	-	-	-	N		4		10	15KVA T-EOS-INTEGRA (ITEM#7)	-	#10	-	-	-	.		4.17	
11	15KVA T-PROMAKER (ITEM#8)	-	#10	-	-	-	N			4	12	15KVA T-EOS-INTEGRA (ITEM#7)	-	#10	-	-	-	.			4.17
13	BANDSAW-JET (ITEM#11)	25/3	#10	#10	#10	3/4"	N	1.33			14	DONALDSON FUME EXTRACTION (ITEM#43)	25/3	#10	#10	#10	3/4"	N	1.33		
15	BANDSAW-JET (ITEM#11)	-	#10	-	-	-	N		1.33		16	DONALDSON FUME EXTRACTION (ITEM#43)	-	#10	-	-	-	N		1.33	
17	BANDSAW-JET (ITEM#11)	-	#10	-	-	-	N			1.33	18	DONALDSON FUME EXTRACTION (ITEM#43)	-	#10	-	-	-	N			1.33
19	ABB IRB 4600 (YELLOW)(ITEM#33)	30/3	#10	#10	#10	3/4"	N	3.05			20	ABB IRB 4600 (BLUE) (ITEM#34)	30/3	#10	#10	#10	3/4"	N	3.6		
21	ABB IRB 4600 (YELLOW) (ITEM#33)	-	#10	-	-	-	N		3.05		22	ABB IRB 4600 (BLUE) (ITEM#34)	-	#10	-	-	-	N		3.6	
23	ABB IRB 4600 (YELLOW) (ITEM#33)	-	#10	-	-	-	N			3.05	24	ABB IRB 4600 (BLUE) (ITEM#34)	-	#10	-	-	-	N			3.6
25	FRONIUS ROBOT 4600 (ITEM#39)	50/3	#8	#8	#10	1"	N	4.07			26	60AS - 30AT SPARE	30/3	-	-	-	-	.	-		
27	FRONIUS ROBOT 4600 (ITEM#39)	-	#8	-	-	-	N		4.07		28	60AS - 30AT SPARE	-	-	-	-	-	.		-	
29	FRONIUS ROBOT 4600 (ITEM#39)	-	#8	-	-	-	N			4.07	30	60AS - 30AT SPARE	-	-	-	-	-	.			-
31	DMS 2CUBE - S AXIS (ITEM#40)	100/3	#2	#3	#8	1-1/4"	N	19.39			32	60AS - 40AT SPARE	40/3	-	-	-	-	.	-		
33	DMS 2CUBE - S AXIS (ITEM#40)	-	#2	-	-	-	N		19.39		34	60AS - 40AT SPARE	-	-	-	-	-	.		-	
35	DMS 2CUBE - S AXIS (ITEM#40)	-	#2	-	-	-	N			19.39	36	60AS - 40AT SPARE	-	-	-	-	-	.			-
37	PREPARED SPACE	-/3	-	-	-	-	.	-			38	PREPARED SPACE	-/3	-	-	-	-	.	-		
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69	PREPARED SPACE	-	-	-	-	-	.		-		70	PREPARED SPACE	-	-	-	-	-	.		-	
71	PREPARED SPACE	-	-	-	-	-	.			-	72	PREPARED SPACE	-	-	-	-	-	.			-

NOTE:THIS SCHEDULE DOES NOT REFLECT A I-LINE PANEL BREAKER MOUNTING

PHASE LOAD TOTALS: 106.41 | 112.14 | 112.48

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.25	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	6.45	1.0	6.45
NON-SEASONAL MOTORS	7.92	1.0	7.92
LARGEST MOTOR	20.78	0.25	5.19
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	304.15	1.0	304.15	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	318.5	KVA	383.3	AMPS
MIN. FEEDER / PANEL CAPACITY	323.7	KVA	389.5	AMPS
OVERALL DEMAND FACTOR	1.02			

LAWRENCE PERRY & ASSOCIATES
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COMMONWEALTH OF VIRGINIA
10/10/25
WINSTON A. MATTHEWS
Lic. No. 044469
PROFESSIONAL ENGINEER

REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

PANELBOARD SCHEDULES
ELECTRICAL - PHASE 2

DESIGNED: MAR	DRAWN: MAR
CHECKED: WAM	APPROVED: LPA
COMM. NO.: 25105	DATE: 10-10-25

SHEET
E-600

EXISTING PANEL P1A

VOLTAGE: 208Y/120V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 400A MCB 100% RATED
BUS RATING: 400A
GROUND BUS: YES

INTEGRAL SPD: NO
MOUNTING: SURFACE
INTERRUPT RATING: 22,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	SPARE	20/1	-	-	-	-	-	-			2	SPARE	20/1	-	-	-	-	-	-		
3	SPARE	20/1	-	-	-	-	-		-		4	SPARE	20/1	-	-	-	-	-		-	
5	SPARE	20/1	-	-	-	-	-			-	6	SPARE	20/1	-	-	-	-	-			-
7	SPARE	20/1	-	-	-	-	-	-			8	SPARE	20/1	-	-	-	-	-	-		
9	SPARE	20/1	-	-	-	-	-		-		10	SPARE	20/1	-	-	-	-	-		-	
11	SPACE	-	-	-	-	-	-			-	12	SPACE	-	-	-	-	-	-			-
13	SPACE	-	-	-	-	-	-	-			14	SPACE	-	-	-	-	-	-	-		
15	SPACE	-	-	-	-	-	-		-		16	SPACE	-	-	-	-	-	-		-	
17	SPACE	-	-	-	-	-	-			-	18	SPACE	-	-	-	-	-	-			-
19	SPACE	-	-	-	-	-	-	-			20	SPACE	-	-	-	-	-	-	-		
21	SPACE	-	-	-	-	-	-		-		22	SPACE	-	-	-	-	-	-		-	
23	SPACE	-	-	-	-	-	-			-	24	SPACE	-	-	-	-	-	-			-
25	SPACE	-	-	-	-	-	-	-			26	SPACE	-	-	-	-	-	-	-		
27	SPACE	-	-	-	-	-	-		-		28	SPACE	-	-	-	-	-	-		-	
29	SPACE	-	-	-	-	-	-			-	30	SPACE	-	-	-	-	-	-			-
31	SPACE	-	-	-	-	-	-	-			32	SPACE	-	-	-	-	-	-	-		
33	SPACE	-	-	-	-	-	-		-		34	SPACE	-	-	-	-	-	-		-	
35	SPACE	-	-	-	-	-	-			-	36	SPACE	-	-	-	-	-	-			-
37	SPACE	-	-	-	-	-	-	-			38	SPACE	-	-	-	-	-	-	-		
39	SPACE	-	-	-	-	-	-		-		40	SPACE	-	-	-	-	-	-		-	
41	SPACE	-	-	-	-	-	-			-	42	SPACE	-	-	-	-	-	-			-
43	SPACE	-	-	-	-	-	-	-			44	SPACE	-	-	-	-	-	-	-		
45	SPACE	-	-	-	-	-	-		-		46	SPACE	-	-	-	-	-	-		-	
47	SPACE	-	-	-	-	-	-			-	48	SPACE	-	-	-	-	-	-			-
49	SPACE	-	-	-	-	-	-	-			50	SPACE	-	-	-	-	-	-	-		
51	SPACE	-	-	-	-	-	-		-		52	SPACE	-	-	-	-	-	-		-	
53	SPACE	-	-	-	-	-	-			-	54	SPACE	-	-	-	-	-	-			-

NOTE: FEED THROUGH LUGS TO SUPPORT PANEL P1B

PHASE LOAD TOTALS: 0 | 0 | 0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.00	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	6.45	1.0	6.45
NON-SEASONAL MOTORS	7.92	1.0	7.92
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	46.78	1.0	46.78	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	61.2	KVA	169.9	AMPS
MIN. FEEDER / PANEL CAPACITY	61.2	KVA	169.9	AMPS
OVERALL DEMAND FACTOR	1.00			

MODIFIED PANEL P1A_

VOLTAGE: 208Y/120V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 400A MCB 100% RATED
BUS RATING: 400A
GROUND BUS: YES

INTEGRAL SPD: NO
MOUNTING: SURFACE
INTERRUPT RATING: 22,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	ITEM #12, #14, & #31	20/1	#12	#12	#12	1/2"	N	.66			2	ULTIMAKER 3 (ITEM#25)	20/1	#12	#12	#12	1/2"	N	1.1		
3	EXONE INNOVENT (ITEM#13)	20/1	#12	#12	#12	1/2"	N		1.8		4	PRUSA MK3 (ITEM#25)	20/1	#12	#12	#12	1/2"	N		.43	
5	EXONE CURING OVEN (ITEM#15)	20/1	#12	#12	#12	1/2"	N			1.87	6	ULTIMAKER 5 (ITEM#25)	20/1	#12	#12	#12	1/2"	N			1.1
7	ITEM #21, #23, #24	20/1	#12	#12	#12	1/2"	N	.29			8	ITEM#26, #27, & PC REC	20/1	#12	#12	#12	1/2"	N	.54		
9	HYREL (ITEM#22)	20/1	#12	#12	#12	1/2"	N		1.92		10	POLISHER + VACUPREP (ITEM#29)	20/1	#12	#12	#12	1/2"	N		1.2	
11	NEXA 3D HSE (ITEM#3)	40/2	#8	#8	#10	3/4"	N			3.2	12	MELD CHILLER (ITEM#2)	30/3	#10	-	#10	3/4"	A			2.15
13	NEXA 3D HSE (ITEM#3)	-	#8	-	-	-	N	3.2			14	MELD CHILLER (ITEM#2)	-	#10	-	-	-	A	2.15		
15	FORTUS (ITEM#5)	30/3	#10	-	#10	3/4"	N		1.92		16	MELD CHILLER (ITEM#2)	-	#10	-	-	-	A		2.15	
17	FORTUS (ITEM#5)	-	#10	-	-	-	N			1.92	18	TITAN (ITEM#6)	100/3	#3	-	#8	1-1/4"	N			9.28
19	FORTUS (ITEM#5)	-	#10	-	-	-	N	1.92			20	TITAN (ITEM#6)	-	#3	-	-	-	N	9.28		
21	POWERSHOOT C (ITEM#9)	20/3	#12	-	#12	1/2"	N		1.93		22	TITAN (ITEM#6)	-	#3	-	-	-	N		9.28	
23	POWERSHOOT C (ITEM#9)	-	#12	-	-	-	N			1.93	24	INSTRON (ITEM#19)	30/2	#10	#10	#10	3/4"	N			1.75
25	POWERSHOOT C (ITEM#9)	-	#12	-	-	-	N	1.93			26	INSTRON (ITEM#19)	-	#10	-	-	-	N	1.75		
27	TORMACH PCNC 1100 (ITEM#10)	20/2	#12	#12	#12	1/2"	N		1.04		28	AON (ITEM#20)	20/2	#12	#12	#12	1/2"	N		1.56	
29	TORMACH PCNC 1100 (ITEM#10)	-	#12	-	-	-	N			1.04	30	AON (ITEM#20)	-	#12	-	-	-	N			1.56
31	TUBE FURNACE-MTI (ITEM#16)	30/2	#10	#10	#10	3/4"	N	2.75			32	R2 BOX FURNACE (ITEM#28)	60/2	#6	#6	#10	1"	N	4.35		
33	TUBE FURNACE-MTI (ITEM#16)	-	#10	-	-	-	N		2.75		34	R2 BOX FURNACE (ITEM#28)	-	#6	-	-	-	N		4.35	
35	AEROSOL JET (ITEM#18)	30/2	#10	#10	#10	3/4"	N			2.39	36	YIFENG PRESSURE (ITEM#28)	30/2	#10	#10	#10	3/4"	N			1.75
37	AEROSOL JET (ITEM#18)	-	#10	-	-	-	N	2.39			38	YIFENG PRESSURE (ITEM#28)	-	#10	-	-	-	N	1.75		
39	MUFFLE FURNACE-NABERTHERM (ITEM#17)	50/2	#8	#8	#10	1"	N		4.5		40	FORTUS CLEANING STATION (ITEM#30)	20/2	#12	#12	#12	1/2"	N		1.66	
41	MUFFLE FURNACE-NABERTHERM (ITEM#17)	-	#8	-	-	-	N			4.5	42	FORTUS CLEANING STATION (ITEM#30)	-	#12	-	-	-	N			1.66
43	IEF -FE1 RM 171A ABOVE CEILING	20/1	#12	#12	#12	3/4"	M	.05			44	VAC PUMP & VAC OVEN-LINDBERG (ITEM#28)	20/1	#12	#12	#12	1/2"	N	1.02		
45	IEF -FE1 RM 171A ABOVE CEILING	20/1	#12	#12	#12	3/4"	-		.05		46	SPACE	-	-	-	-	-	-		-	
47	IEF -FE1 RM 171A ABOVE CEILING	20/1	#12	#12	#12	1/2"	-			.5	48	SPACE	-	-	-	-	-	-			-
49	SPACE	-	-	-	-	-	-	-			50	SPACE	-	-	-	-	-	-	-		
51	SPACE	-	-	-	-	-	-		-		52	SPACE	-	-	-	-	-	-		-	
53	SPACE	-	-	-	-	-	-			-	54	SPACE	-	-	-	-	-	-			-

NOTE: FEED THROUGH LUGS TO SUPPORT PANEL P1B

PHASE LOAD TOTALS: 35.13 | 36.54 | 36.6

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.00	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	6.45	1.0	6.45
NON-SEASONAL MOTORS	7.97	1.0	7.97
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	121.76	1.0	121.76	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	136.2	KVA	378.3	AMPS
MIN. FEEDER / PANEL CAPACITY	136.2	KVA	378.3	AMPS
OVERALL DEMAND FACTOR	1.00			

EXISTING PANEL P1B

VOLTAGE: 208Y/120V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 400A MLO
BUS RATING: 400A
GROUND BUS: YES

INTEGRAL SPD: NO
MOUNTING: SURFACE
INTERRUPT RATING: 22,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	SPARE	20/1	-	-	-	-	-	-			2	SPARE	20/1	-	-	-	-	-	-		
3	SPARE	20/1	-	-	-	-	-		-		4	SPARE	20/1	-	-	-	-	-		-	
5	SPARE	20/1	-	-	-	-	-			-	6	SPARE	20/1	-	-	-	-	-			-
7	SPARE	20/1	-	-	-	-	-	-			8	SPARE	20/1	-	-	-	-	-	-		
9	SPARE	20/1	-	-	-	-	-		-		10	SPARE	20/1	-	-	-	-	-		-	
11	EXISTING BRIDGE CRANE	30/3	#10	-	#10	3/4"	M			2.64	12	MELD CHILLER ITEM#2	30/3	#10	-	#10	3/4"	A			2.15
13	EXISTING BRIDGE CRANE	-	#10	-	-	-	M	2.64			14	MELD CHILLER ITEM#2	-	#10	-	-	-	A	2.15		
15	EXISTING BRIDGE CRANE	-	#10	-	-	-	M		2.64		16	MELD CHILLER ITEM#2	-	#10	-	-	-	A		2.15	
17	NEXA 3D HSE (ITEM#3)	40/2	#8	#8	#10	3/4"	N			3.2	18	FORTUS (ITEM#5)	30/3	#10	-	#10	3/4"	N			1.92
19	NEXA 3D HSE (ITEM#3)	-	#8	-	-	-	N	3.2			20	FORTUS (ITEM#5)	-	#10	-	-	-	N	1.92		
21	TITAN (ITEM#6)	100/3	#2	-	#8	1-1/4"	N		9.61		22	FORTUS (ITEM#5)	-	#10	-	-	-	N		1.92	
23	TITAN (ITEM#6)	-	#2	-	-	-	N			9.61	24	POWERSHOOT C (ITEM#9)	20/3	#12	-	#12	3/4"	N			1.93
25	TITAN (ITEM#6)	-	#2	-	-	-	N	9.61			26	POWERSHOOT C (ITEM#9)	-	#12	-	-	-	N	1.93		
27	SPACE	-	-	-	-	-	-		-		28	POWERSHOOT C (ITEM#9)	-	#12	-	-	-	N		1.93	
29	SPACE	-	-	-	-	-	-			-	30	SPACE	-	-	-	-	-	-			-
31	SPACE	-	-	-	-	-	-	-			32	SPACE	-	-	-	-	-	-	-		
33	SPACE	-	-	-	-	-	-		-		34	SPACE	-	-	-	-	-	-		-	
35	SPACE	-	-	-	-	-	-			-	36	SPACE	-	-	-	-	-	-			-
37	SPACE	-	-	-	-	-	-	-			38	SPACE	-	-	-	-	-	-	-		
39	SPACE	-	-	-	-	-	-		-		40	SPACE	-	-	-	-	-	-		-	
41	SPACE	-	-	-	-	-	-			-	42	SPACE	-	-	-	-	-	-			-
43	SPACE	-	-	-	-	-	-	-			44	SPACE	-	-	-	-	-	-	-		
45	SPACE	-	-	-	-	-	-		-		46	SPACE	-	-	-	-	-	-		-	
47	SPACE	-	-	-	-	-	-			-	48	SPACE	-	-	-	-	-	-			-
49	SPACE	-	-	-	-	-	-	-			50	SPACE	-	-	-	-	-	-	-		
51	SPACE	-	-	-	-	-	-		-		52	SPACE	-	-	-	-	-	-		-	
53	SPACE	-	-	-	-	-	-			-	54	SPACE	-	-	-	-	-	-			-

PHASE LOAD TOTALS: 21.45 | 18.25 | 21.45

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.25	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	6.45	1.0	6.45
NON-SEASONAL MOTORS	7.92	1.0	7.92
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	46.78	1.0	46.78	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	61.2	KVA	169.9	AMPS
MIN. FEEDER / PANEL CAPACITY	61.2	KVA	169.9	AMPS
OVERALL DEMAND FACTOR	1.00			

MODIFIED PANEL P1B_

VOLTAGE: 208Y/120V
SYSTEM: 3PH, 4W
SOLID NEUTRAL: YES

MAIN: 400A MLO
BUS RATING: 400A
GROUND BUS: YES

INTEGRAL SPD: NO
MOUNTING: SURFACE
INTERRUPT RATING: 22,000 AIC

CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED	BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3
1	ITEM #36 & ITEM #42	20/1	#12	#12	#12	1/2"	N	.36			2	SPARE	20/1	-	-	-	-	-	-		
3	SPARE	20/1	-	-	-	-	-		-		4	SPARE	20/1	-	-	-	-	-		-	
5	SPARE	20/1	-	-	-	-	-			-	6	SPARE	20/1	-	-	-	-	-			-
7	SPARE	20/1	-	-	-	-	-	-			8	SPARE	20/1	-	-	-	-	-	-		
9	SPARE	20/1	-	-	-	-	-		-		10	SPARE	20/1	-	-	-	-	-		-	
11	EXISTING BRIDGE CRANE	30/3	#10	-	#10	3/4"	M			2.64	12	SPACE	-	-	-	-	-	-			-
13	EXISTING BRIDGE CRANE	-	#10	-	-	-	M	2.64			14	SPACE	-	-	-	-	-	-	-		
15	EXISTING BRIDGE CRANE	-	#10	-	-	-	M		2.64		16	SPACE	-	-	-	-	-	-		-	
17	ABB IRB 1200 (ITEM#32)	15/2	#12	#12	#12	1/2"	N			.73	18	SPACE	-	-	-	-	-	-			-
19	ABB IRB 1200 (ITEM#32)	-	#12	-	-	-	N	.73			20	SPACE	-	-	-	-	-	-	-		
21	DMS 1 CUBE - 3 AXIS (ITEM#41)	100/3	#3	#3	#8	1-1/4"	N		6.24		22	SPACE	-	-	-	-	-	-		-	
23	DMS 1 CUBE - 3 AXIS (ITEM#41)	-	#3	-	-	-	N			6.24	24	SPACE	-	-	-	-	-	-			-
25	DMS 1 CUBE - 3 AXIS (ITEM#41)	-	#3	-	-	-	N	6.24			26	SPACE	-	-	-	-	-	-	-		
27	SPACE	-	-	-	-	-	-		-		28	SPACE	-	-	-	-	-	-		-	
29	SPACE	-	-	-	-	-	-			-	30	SPACE	-	-	-	-	-	-			-
31	SPACE	-	-	-	-	-	-	-			32	SPACE	-	-	-	-	-	-	-		
33	SPACE	-	-	-	-	-	-		-		34	SPACE	-	-	-	-	-	-		-	
35	SPACE	-	-	-	-	-	-			-	36	SPACE	-	-	-	-	-	-			-
37	SPACE	-	-	-	-	-	-	-			38	SPACE	-	-	-	-	-	-	-		
39	SPACE	-	-	-	-	-	-		-		40	SPACE	-	-	-	-	-	-		-	
41	SPACE	-	-	-	-	-	-			-	42	SPACE	-	-	-	-	-	-			-
43	SPACE	-	-	-	-	-	-	-			44	SPACE	-	-	-	-	-	-	-		
45	SPACE	-	-	-	-	-	-		-		46	SPACE	-	-	-	-	-	-		-	
47	SPACE	-	-	-	-	-	-			-	48	SPACE	-	-	-	-	-	-			-
49	SPACE	-	-	-	-	-	-	-			50	SPACE	-	-	-	-	-	-	-		
51	SPACE	-	-	-	-	-	-		-		52	SPACE	-	-	-	-	-	-		-	
53	SPACE	-	-	-	-	-	-			-	54	SPACE	-	-	-	-	-	-			-

PHASE LOAD TOTALS: 9.97 | 8.88 | 9.61

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTING	0	1.25	0
REC TO 10 KVA	0	1.0	0
REC REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	0	1.0	0
NON-SEASONAL MOTORS	7.92	1.0	7.92
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0

LOADS (KVA)	CONNECTED	DEMAND FACTOR	DEMAND	
KITCHEN EQUIPMENT	0	1.0	0	
CONTINUOUS	0	1.25	0	
NON-CONTINUOUS	20.54	1.0	20.54	
DEMAND	0	1.0	0	
TOTAL CONNECTED LOAD	28.5	KVA	79.1	AMPS
MIN. FEEDER / PANEL CAPACITY	28.5	KVA	79.1	AMPS
OVERALL DEMAND FACTOR	1.00			

LPA
LAWRENCE PERRY & ASSOCIATES
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Fax: (540) 344-3410

COMMONWEALTH OF VIRGINIA
10/10/25
WINSTON A. MATTHEWS
Lic. No. 044469
PROFESSIONAL ENGINEER

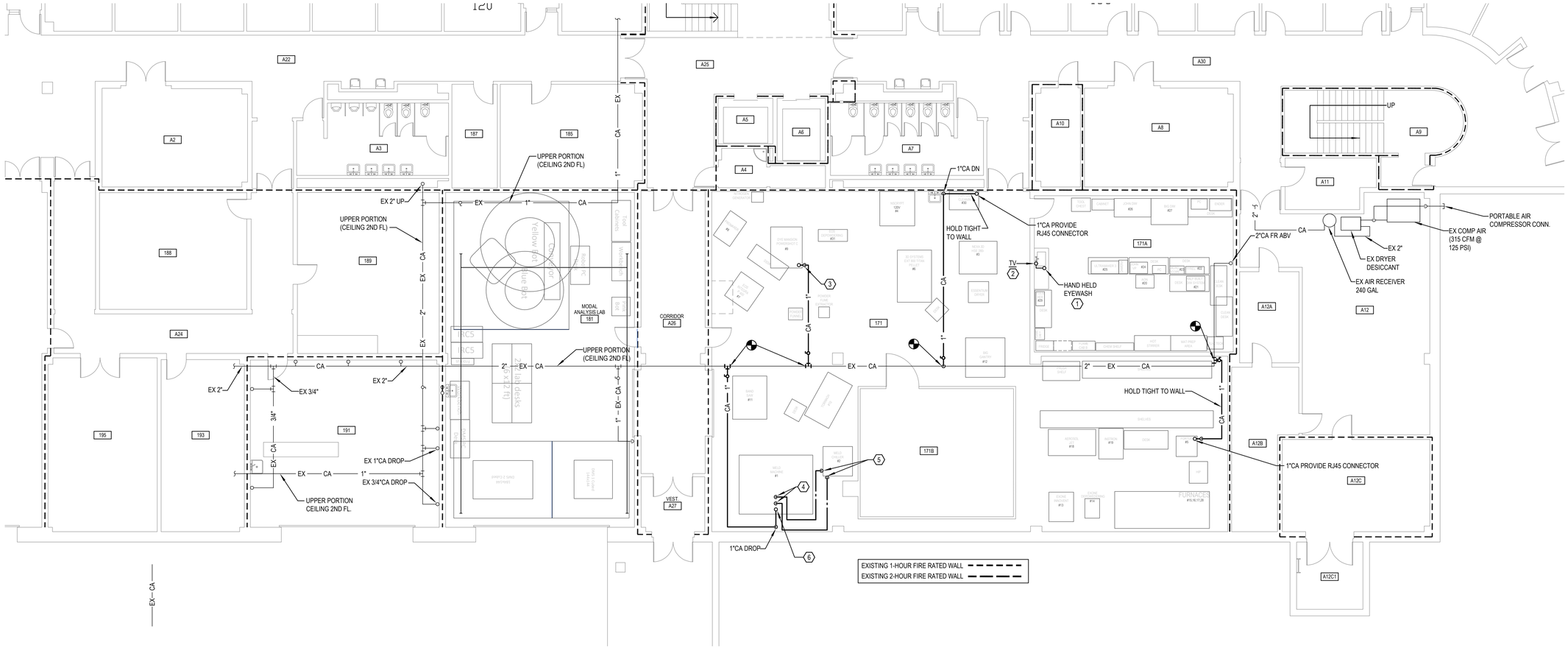
REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

PANELBOARD SCHEDULES
ELECTRICAL - PHASE 2

DESIGNED	DRAWN
MAR	MAR
CHECKED	APPROVED
WAM	LPA
COMM. NO.	DATE
25105	10-10-25

SHEET
E-601



PARTIAL FIRST FLOOR PLAN - NEW WORK - PLUMBING

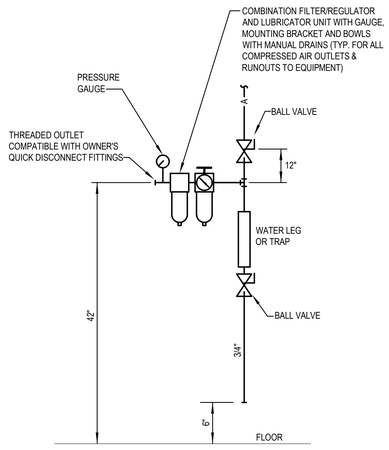
SCALE: 1/8" = 1'-0"

PLUMBING LEGEND

ABOVE	ABV
BACK FLOW PREVENTER	BFP
COMPRESSED AIR PIPE, NEW	CA
EXISTING TO REMAIN	CA
DIRECTION OF FLOW	
DOMESTIC COLD WATER PIPE, NEW	CW
EXISTING TO REMAIN	CW
DOWN	DN
EXISTING	EX
FROM	FR
BALL VALVE	
NEW CONNECTED TO EXISTING	
PIPING INDICATION WITH RESPECT TO WATER FLOW	
BOTTOM TAKEOFF	
SIDE CONNECTION	
CONNECTION (BOTTOM,TEE OR TOP)	
TOP TAKEOFF	
TURN DOWN OR FROM BELOW	
TURN UP OR DOWN	
TURN UP OR FROM ABOVE	
PRESSURE REDUCING VALVE	PRV

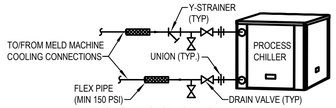
GENERAL PLUMBING NOTES:

1. MAKE PIPING CONNECTIONS AS REQUIRED TO ALL FIXTURES AND EQUIPMENT EVEN THOUGH ALL BRANCH MAINS, ELBOWS AND CONNECTIONS ARE NOT SHOWN.
2. ALL PIPES SHALL BE COORDINATED WITH OTHER NEW AND EXISTING DUCTS, PIPES, LIGHTS, STRUCTURAL SYSTEM, CEILING SUPPORTS AND FRAMING BEFORE INSTALLATION. MINOR PIPE OFFSETS SHALL BE PROVIDED AS REQUIRED. MEASUREMENTS FOR VERTICAL CLEARANCES SHALL BE TAKEN AT THE JOB SITE BEFORE INSTALLATION OF ANY PIPING.
3. DOMESTIC WATER PIPING SHALL BE INSTALLED ABOVE CEILINGS UNLESS NOTED OTHERWISE. DOMESTIC WATER PIPING SHOWN IN PIPE CHASE WALLS SHALL BE INSTALLED IN CHASE SPACE, PIPING OFFSET FOR CLARITY.
4. DOMESTIC WATER PIPING SHALL NOT BE INSTALLED IN LOCATIONS SUBJECT TO FREEZING OR SPACES EXTERIOR TO BUILDING INSULATION.
5. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTRUCTIONS.
6. MATERIALS AND INSTALLATION SHALL COMPLY WITH LOCAL CODES, APPLICABLE PROVISIONS OF LATEST EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION, LOCAL UTILITY REGULATIONS AND GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION.
7. WHERE PIPE CONNECTIONS ARE SHOWN CONNECTING TO EXISTING, CONTRACTOR SHALL DETERMINE EXACT LOCATIONS AND CONNECTION SIZES PRIOR TO INSTALLATION.
8. LIMITS OF CONTRACT: DOMESTIC WATER SERVICE, SANITARY AND STORM WATER PIPING SHALL BE EXTENDED UNDER THIS SECTION OF THE SPECIFICATIONS TO POINTS WITHIN THE BUILDING LINES, UNLESS OTHERWISE INDICATED ON THE DRAWINGS, WHERE THE PIPES SHALL BE CAPPED OR PLUGGED AND LEFT READY FOR CONNECTION AND EXTENSION BY OTHERS, AND THE LOCATIONS MARKED WITH A STAKE OR OTHER APPROVED MEANS.
9. INFORMATION ON EXISTING PLUMBING SHOWN WAS OBTAINED FROM PLANS DATED MARCH 10, 1997. THE CONTRACTOR SHALL ADJUST WORK AS REQUIRED TO SUIT ACTUAL LOCATIONS IF DIFFERENT FROM CONTRACT DOCUMENTS.
10. RETURN AIR PLENUM NOTE: ALL MATERIAL LOCATED IN THE RETURN AIR PLENUMS SHALL MEET THE REQUIREMENTS OF THE INTERNATIONAL MECHANICAL CODE, SECTION 602.2.1.
11. PIPING SHALL NOT BE INSTALLED ABOVE ELECTRICAL PANELS. COORDINATE INSTALLATION OF PIPES WITH ELECTRICAL PANELS WHEN SHOWN NEAR PANELS OR OVER ELECTRICAL ROOMS.



COMPRESSED AIR OUTLET DETAIL

NO SCALE



PROCESS CHILLER CONNECTION DETAIL

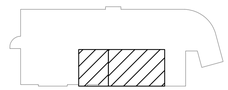
NO SCALE

NOTES:

1. PROCESS CHILLER PROVIDED BY OWNER.
2. PIPING AND SPECIALTIES CONNECTED TO THE MELD MACHINE COOLING WATER SYSTEM PROVIDED AND INSTALLED BY CONTRACTOR IN STRICT ACCORDANCE WITH THE PROCESS EQUIPMENT AND PROCESS CHILLER MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.

PLAN NOTES:⬡

1. PROVIDE BRADLEY DECK-MOUNTED HAND HELD HOSE SPRAY WITH DUAL SPRAY HEADS MODEL S19-460FW ANGLED HEADS WITH 8 FOOT DRENCH HOSE, STAY OPEN HANDLE SQUEEZE AND MODEL S45-2310 SERIES 9D DUAL CHECK BACK FLOW PREVENTER WITH INTERMEDIATE ATMOSPHERIC VENT.
2. PROVIDE BRADLEY MODEL S19-2000 EMERGENCY FIXTURE THERMOSTATIC MIXING VALVE WITH MOUNTING BRACKET ASSE 1071 CERTIFIED 1.5 GPM MINIMUM FLOW.
3. 1" COMPRESSED AIR DOWN. PROVIDE INDUSTRIAL QUICK DISCONNECT FOR UNIT CONNECTION SIZE. PROVIDE PRESSURE REDUCING VALVE MCMASTER- CARR MODEL 4674K48 2". SET FOR 110 PSI.
4. 1"CWS/CWR CONNECT TO FULL SIZE OF MELD MACHINE BELOW
5. 1"CWS/CWR CONNECT TO FULL SIZE OF PROCESS CHILLER BELOW.
6. PROVIDE 1/4" INDUSTRIAL QUICK DISCONNECT HOSE COUPLING. PROVIDE PRESSURE REDUCING VALVE MCMASTER-CARR MODEL 4674K2 3/8" SIZE. SET VALVE FOR 100 PSI.



KEY PLAN

NO SCALE

GRAPHIC SCALE

8 0 4 8 16 32

(IN FEET)

1/8" = 1'-0"

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10/10/25
RODNEY D. FANNING
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PROFESSIONAL ENGINEER

REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

PARTIAL FIRST FLOOR PLAN - NEW WORK - PLUMBING

DESIGNED: DHH	DRAWN: CAD
CHECKED: MGW	APPROVED: LPA
COMM. NO.: 25105	DATE: 10-10-25

SHEET

P-001

PLUMBING SYSTEMS NOTES & SPECIFICATIONS

1. CODES, STANDARDS AND REGULATIONS: MATERIALS, EQUIPMENT, INSTALLATION, DISINFECTION AND TESTING SHALL BE IN COMPLIANCE WITH, BUT NOT LIMITED TO, THE FOLLOWING CODES AND STANDARDS:
   - A. LOCAL CODES OR ORDINANCES.
   - B. VIRGINIA CONSTRUCTION CODE (VCC).
   - C. PIPING, FITTINGS, EQUIPMENT AND FIXTURES THAT ARE CONNECTED TO POTABLE WATER SYSTEM SHALL MEET THE 1996 SAFE WATER DRINKING ACT AND THE 2011 REDUCTION OF LEAD IN DRINKING WATER ACT, AND WHERE APPLICABLE SHALL MEET NSF STANDARD 61 AND SHALL BE LABELED AND CERTIFIED.
   - D. VIRGINIA TECH DESIGN & CONSTRUCTION MANUAL 2022.
2. SHOP DRAWINGS: FURNISH ELECTRONIC FILES OF PLUMBING MATERIALS AND EQUIPMENT TO ARCHITECT FOR REVIEW.
3. DESCRIPTION OF WORK:
   - A. THE WORK INCLUDES PROVIDING A COMPLETE PLUMBING SYSTEM INCLUDING, BUT NOT NECESSARILY RESTRICTED TO, THE FOLLOWING:
     - (1) SANITARY SEWER SYSTEM TO A POINT WITHIN BUILDING WALLS.
     - (2) DOMESTIC WATER SYSTEM TO A POINT WITHIN BUILDING WALLS.
     - (3) COMPRESSED AIR SYSTEMS.
     - (4) NITROGEN GAS SYSTEM
     - (5) INSTALLATION AND CONNECTIONS TO EQUIPMENT FURNISHED BY OWNER.
     - (6) CONNECTIONS TO FIXTURES AND EQUIPMENT PROVIDED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS.
     - (7) MISCELLANEOUS WORK AS DESCRIBED HEREIN, AS SHOWN ON DRAWINGS, AND AS REQUIRED FOR A COMPLETE SYSTEM.
4. VISITING THE SITE: EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE BEFORE BIDDING THE JOB TO FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS TO BE MET IN THE EXECUTION OF THE WORK UNDER THIS CONTRACT. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ANY CHANGES WHICH MAY BE REQUIRED TO MAKE BECAUSE OF SITE CONDITIONS.
5. PIPE AND EQUIPMENT SUPPORTS, PIPE SLEEVES AND WALL CEILING PLATES:
   - A. PROVIDE IN ACCORDANCE WITH THE VIRGINIA CONSTRUCTION CODE.
   - B. PIPE SLEEVES:
     - (1) PROVIDE SLEEVES FOR PIPING AND CONDUIT PASSING THROUGH CONCRETE FLOOR SLABS AND CONCRETE, MASONRY, TILE, AND GYPSUM WALL CONSTRUCTION. SLEEVES SHALL NOT BE PROVIDED FOR PIPING AND CONDUIT RUNNING EMBEDDED IN CONCRETE OR SLAB ON GRADE, EXCEPT THAT COPPER PIPING SHALL REQUIRE SLEEVES THROUGH SLABS ON GRADE. SLEEVES THROUGH STRUCTURAL MEMBERS SHALL BE ONLY AS DIRECTED BY ARCHITECT. IN INTERIOR WALL, PROVIDE 1/4 INCH SPACE ALL AROUND BETWEEN SLEEVE AND CONDUIT, PIPING, OR INSULATION OF PIPING.
     - (2) SLEEVES PLACED IN EXTERIOR WALLS BELOW GRADE SHALL BE O.Z. GEDNEY TYPE 'FSK' OR EQUAL, THUNDERLINE 'LINK SEAL', OR EQUAL SLEEVE ASSEMBLIES SIZED FOR THE PIPE OR CONDUIT ENCOUNTERED, EXCEPT FOR CAST IRON PIPING. SLEEVE ASSEMBLY SHALL PROVIDE WATERTIGHT SEAL AND ELECTRICAL INSULATION TO REDUCE CATHODIC REACTION. WHEN A SLEEVE PASSES THROUGH A WALL BELOW A CONCRETE SLAB ON GRADE, THE SEALING ASSEMBLY SHALL BE ON THE OUTSIDE OF THE WALL. WHEN A SLEEVE PASSES THROUGH A WALL INTO A CRAWL SPACE OR THE BUILDING INTERIOR, THE SEALING ASSEMBLY SHALL BE IN THE CRAWL SPACE OR INTERIOR OF THE BUILDING. PROVIDE SLEEVE ASSEMBLY FOR COPPER PIPING THROUGH SLAB ON GRADE, WITH SEALING ASSEMBLY LOCATED ON INTERIOR SIDE OF FLOOR SLAB. WHERE CAST IRON PIPES PASS THROUGH AN EXTERIOR WALL BELOW GRADE, PROVIDE AN IRON-PIPE SLEEVE TWO (2) PIPE SIZES GREATER THAN PIPE PASSING THROUGH. CAULK BETWEEN PIPE AND SLEEVE WITH A RUBBER-BASED COMPOUND. WHERE SLEEVES ARE LOCATED THROUGH FIRE-RATED WALLS AND FLOOR/CEILING ASSEMBLIES, PROVIDE SLEEVES AND PROTECT THE PENETRATION IN ACCORDANCE WITH UNDERWRITER'S LABORATORIES, INC., FIRE RESISTANCE DIRECTORY, VOLUME II, RATINGS FOR THROUGH FIRESTOP PENETRATIONS.
     - (3) SLEEVES IN MECHANICAL ROOMS WITH FLOOR DRAINS OR HOSE BIBBS SHALL EXTEND 4 INCHES ABOVE FLOOR. PROVIDE FLANGES OR FLASHING RINGS WITH SLEEVES IN FLOORS WITH WATERPROOF MEMBRANE AND CLAMP OR FLASH INTO THE MEMBRANE. PROVIDE SLEEVES FLUSH WITH FLOOR IN OTHER ROOMS.
     - (4) SLEEVES SHALL BE CONSTRUCTED OF 20 GAGE GALVANIZED SHEET STEEL WITH LOCK SEAM JOINTS FOR ALL SLEEVES SET IN CONCRETE FLOOR SLABS TERMINATING FLUSH WITH THE FLOOR. ALL OTHER SLEEVES SHALL BE CONSTRUCTED OF GALVANIZED STEEL PIPE UNLESS OTHERWISE INDICATED.
6. SOIL, WASTE AND VENT PIPING:
   - A. CAST IRON SOIL PIPE AND FITTING: PIPE SHALL BE BELL AND SPIGOT, MODIFIED HUB, OR PLAIN END (NO-HUB) AS REQUIRED BY SELECTED JOINTING METHOD. PIPE AND FITTINGS SHALL BE LISTED BY NSF INTERNATIONAL, IAPMO, ICC OR OTHER THIRD PARTY ORGANIZATION THAT IS ACCREDITED AS AN ANSI-GUIDE 65 ORGANIZATION AS LISTED ON WWW.ANSI.ORG.
     - (1) MATERIAL (PIPE AND FITTINGS): ASTM A888, ASTM A74 OR CISPI 301, SERVICE WEIGHT.
     - (2) JOINTS: PROVIDE ANY ONE OF THE FOLLOWING TYPES TO SUIT PIPE FURNISHED.
       - a. MECHANICAL, COMPRESSION-TYPE (ASTM C564) MOLDED NEOPRENE GASKET. GASKETS SHALL SUIT CLASS OF PIPE BEING JOINTED. DUAL-SERVICE GASKETS WILL NOT BE ACCEPTED.
       - b. MECHANICAL: MECHANICAL JOINT COUPLING (ASTM C564 AND ASTM C1277) SHALL BE HEAVY DUTY AND SHALL CONSIST OF A STAINLESS STEEL COUPLING AND NEOPRENE GASKETS (ASTM C564) (CSA CAN/CSA-B602). DO NOT INSTALL BELOW GRADE.
     - (3) COATING: PROVIDE A HEAVY COAT OF ASPHALT OR BITUMASTIC PAINT ON PIPE BURIED IN EARTH OR INSTALLED IN CINDERS OR CONCRETE CONSTRUCTION.
     - (4) CAST IRON SOIL PIPE MARKINGS: ALL CAST IRON SOIL PIPE SHALL BE CLEARLY MARKED WITH THE MANUFACTURER'S NAME, COUNTRY OF ORIGIN, EIGHT-DIGIT DATE CODE, PIPE DIAMETER AND LENGTH, RELEVANT ASTM STANDARD AND REGISTERED TRADEMARK OF THE THIRD PARTY CERTIFIER.
     - (5) MATERIAL TEST REPORTS: SUPPLIER OF CAST IRON SOIL PIPE SHALL BE ABLE TO SUPPLY MATERIAL TEST REPORTS IN ACCORDANCE WITH THE RELEVANT ASTM STANDARD AND SHALL INCLUDE TESTING AND ANALYSIS ON RADIOACTIVITY, DIMENSIONAL CHARACTERISTICS, TENSILE STRENGTH AND CHEMICAL/METALLURGICAL CONTENT. SUPPLIERS SHALL ALSO SUPPLY MSDS SHEETS ON ALL COATINGS.
   - B. STEEL PIPE AND FITTINGS: VENT PIPING
     - (1) PIPE GALVANIZED: ASTM A 53, SCHEDULE 40.
     - (2) FITTINGS--SANITARY VENT PIPING: MALLEABLE IRON, ASME B16.3, OR CAST IRON, ASME B16.4. ALL TO BE SAME KIND.
     - (3) JOINTS: THREADS SHALL CONFORM TO ASME B1.20.1. PIPE-JOINT COMPOUND OR TAPE SHALL BE APPLIED ON THE MALE THREADS ONLY.
7. INTERIOR DOMESTIC WATER PIPING:
   - A. ALL INTERIOR AND EXTERIOR COPPER TUBING SHALL BE CERTIFIED TUBE (NOT STANDARD TUBE OR STREAMLINE TUBE) MEETING ALL CHEMICAL, MECHANICAL AND DIMENSIONAL REQUIREMENTS OF THE APPLICABLE ASTM STANDARDS.
   - B. COPPER TUBE AND FITTINGS:
     - (1) TUBE: ASTM B88:
       - a. ABOVE GROUND FLOOR: TYPE L, HARD DRAWN.
       - b. BELOW GROUND FLOOR: TYPE K, HARD DRAWN.
     - (2) FITTINGS: WROUGHT COPPER, ASME B16.22 OR CAST COPPER ALLOY ASME B16.18.
     - (3) JOINTS:
       - a. ABOVE GROUND FLOOR: ASTM B32 LEAD FREE SOLDER, ASTM B813 LEAD FREE FLUX. LEAD FREE SHALL MEAN LESS THAN 0.2 PERCENT LEAD.
       - b. BELOW GROUND FLOOR: BRAZED WITH AWS A5.8 FILLER METAL (LEAD FREE).
8. COMPRESSED AIR PIPING:
   - A. PIPE: 2 INCH AND SMALLER - STEEL, ASTM A53 B, SEAMLESS OR TYPE F (CW), SCHEDULE 40; COPPER ASTM B88 TYPE K.
     NIPPLES: STEEL FOR STEEL PIPE.
     FITTINGS: MALLEABLE IRON, CLASS 150, CAST IRON, CLASS 125; WROUGHT COPPER
     JOINTS: THREADED, BRAZED.
9. NITROGEN GAS PIPING:
   - A. PIPE 2 INCH AND SMALLER - STAINLESS STEEL ASTM A312 TP304 OR ALUMINUM UNIPIPE NITRO. STAINLESS STEEL 150 PSI ANSI. COLOR CODE ORANGE.
     NIPPLES: STEEL FOR STEEL PIPE.
     FITTINGS: MALLEABLE IRON CLASS 150 CAST IRON; SOCKET WELD OR BUTT WELD.
10. INTERIOR GAS PIPING:
    - A. PIPE: BLACK STEEL, ASTM A 53 GRADE B OR A 106, SCHEDULE 40.
    - B. NIPPLES: STEEL, ASTM A733, SCHEDULE 40.
    - C. FITTINGS, 2 INCHES AND SMALLER: MALLEABLE IRON, ASME B16.3. (THREADED)
    - D. JOINTS: THREADED ENDS (ASME B1.20.1). PIPE-JOINT COMPOUND OR TAPE APPLIED TO MALE THREADS ONLY (LOCHINVAR USE NO TEFLON TAPE); WELDED. DO NOT USE GAS FITTERS CEMENT, EXCEPT ON OUTLET CAPS.
    - E. GAS PIPING INSTALLED IN CONCEALED LOCATIONS SHALL NOT HAVE UNIONS, TUBING FITTINGS OR RUNNING THREADS.
11. VALVES: (DOMESTIC WATER)
    - A. BALL VALVES: VALVES 2 1/2 INCH AND SMALLER SHALL BE RATED 150 PSI SWP AND 600 PSI NON-SHOCK WOG AND SHALL HAVE 2 PIECE CAST BRONZE BODIES, TFE SEATS, FULL PORT, SEPARATE PACKNUT WITH ADJUSTABLE STEM PACKING, ANTI-BLOWOUT STEMS AND CHROME-PLATED BRASS/BRONZE BALL. VALVE ENDS SHALL HAVE FULL DEPTH ANSI THREADS OR EXTENDED SOLDER CONNECTIONS AND BE MANUFACTURED TO COMPLY WITH MSS-SP110. [NIBCO T585-80-LF (THREADED); S585-80-LF (SOLDER)]
      NOTE: WHERE PIPING IS INSULATED, BALL VALVES SHALL BE EQUIPPED WITH 2" EXTENDED HANDLES OF NON-THERMAL CONDUCTIVE MATERIAL. ALSO, PROVIDE A PROTECTIVE SLEEVE THAT ALLOWS OPERATION OF THE VALVE WITHOUT BREAKING THE VAPOR SEAL OR DISTURBING THE INSULATION. MEMORY STOPS, WHICH ARE FULLY ADJUSTABLE AFTER INSULATION IS APPLIED, SHALL BE INCLUDED. [NIBCO T585/70NS (THREADED); S585-0NS (SOLDER)]
    - B. HOSE BIBBS: CHICAGO NO. 293-6, 1/2" OR EQUAL, LOOSE KEY, CHROME PLATED, WITH WALL FLANGE.
    - C. HOSE BIBBS AND HOSE-END DRAIN VALVES: (EQUIPMENT ROOMS AND SIMILAR SPACES). WATTS LFSC-5 (1/2 INCH) OR LFSC-6 (3/4 INCH), MATCO-NORCA 646 RLF OR EQUAL ROUGH BRASS, LEAD-FREE.
    - D. WATER HAMMER ARRESTORS: MIFAB WHB SERIES, JOSAM "ABSORBOTRON" 75000 SERIES, SMITH 5000 SERIES "HYDROTROLS", ZURN Z1700 "SHOKTROLS", WADE "SHOKSTOP", OR EQUAL, BELLOWS TYPE, LEAD-FREE, STAINLESS STEEL. (SA-A MAX. 11 SFU; SA-B MAX. 32 SFU; SA-C MAX. 60 SFU; SA-D MAX. 113 SFU; SA-E MAX. 154 SFU). PROVIDE ON BOTH HOT AND COLD WATER BRANCHES. JOB FABRICATED AIR CHAMBERS WILL NOT BE PERMITTED. O-RING TYPE SHOCK ABSORBERS WILL NOT BE ACCEPTED. (ASME/ANSI A112.26.1 OR ASSE 1010)
12. VALVES:
    - A. GENERAL: EACH ITEM SHALL HAVE THREADED OR FLANGED, CONNECTIONS AS APPLICABLE TO MATCH JOINTS SPECIFIED FOR ITS RESPECTIVE SERVICE.
    - B. GAS VALVES (4 INCHES AND SMALLER): BRONZE TWO PIECE BALL VALVE, CHROME PLATED BALL, AGA & UNDERWRITERS LABORATORIES LISTED.
13. VALVES: (COMPRESSED AIR & NITROGEN GAS)
    - A. GENERAL: ALL VALVES AND SPECIALTIES SHALL BE SUITABLE FOR 125 PSI WORKING PRESSURE FOR COMPRESSED AIR & NITROGEN VALVES SHALL BE SELECTED ACCORDING TO PRESSURES SUPPLIED BY NITROGEN TANKS EXCEPT AS OTHERWISE INDICATED. EACH ITEM SHALL HAVE THREADED, FLANGED, OR SWEAT CONNECTIONS AS APPLICABLE TO MATCH JOINTS SPECIFIED FOR ITS RESPECTIVE SERVICE.
    - B. COMPRESSED AIR SERVICE: ACCEPTABLE MANUFACTURERS SUBJECTED TO COMPLIANCE WITH REQUIREMENTS ARE NIBCO, APOLLO, CENTER LINE, POWELL, AND MCDONALD.
      - (1) BALL VALVES: VALVES 2 1/2 INCH AND SMALLER SHALL BE RATED 600 PSI COLD WORKING PRESSURE FOR COMPRESSED AIR AND SHALL HAVE 2-PIECE CAST BRONZE BODIES, FTE SEATS, FULL PORT, SEPARATE PACKNUT WITH ADJUSTABLE STEM PACKING, ANTI-BLOWOUT STEMS AND CHROME-PLATED BRASS/BRONZE BALL. VALVE ENDS SHALL HAVE FULL DEPTH ANSI THREADS AND BE MANUFACTURED TO COMPLY WITH MSS SP100. WHERE APPLICABLE FOR ISOLATION, VALVES SHALL BE IN COMPLIANCE WITH OSHA LOCKOUT/TAGOUT STANDARD 1910-147 AND SHALL BE DESIGNED TO VENT AIR TO ATMOSPHERE UPON CLOSURE. VALVES SHALL BE FITTED WITH LOCKING DEVICE SO VALVES CAN BE LOCKED IN OPEN OR CLOSED POSITION. VALVES 2 1/2 INCH AND SMALLER FOR NITROGEN BOTTLED GAS SHALL MEET CGA REQUIREMENTS AND ASME B31.3.
      - (2) GLOBE VALVES: VALVES 2 INCH AND SMALLER SHALL BE CLASS 150, BODY AND BONNET OF ASTM B-62 CAST BRONZE COMPOSITION, THREADED ENDS, SILICON BRONZE ALLOY STEM, REPLACEABLE TEFLON DISC, BRASS PACKING GLAND, TEFLON-IMPREGNATED PACKING AND MALLEABLE HANDWHEEL.
      - (3) CHECK VALVES: (NOTE: IF AIR COMPRESSOR IS RECIPROCATING TYPE, CHECK VALVES SHALL BE DOWNSTREAM OF RECEIVER TANK.) VALVES 2-1/2 INCH AND SMALLER SHALL BE Y-PATTERN SWING-TYPE MANUFACTURED IN ACCORDANCE WITH MSS-SP80, CLASS 125 BRONZE ASTM B-62 BODY WITH TFE SEAT DISC OR SPRING LOADED LIFT-TYPE WITH RESILIENT SEATING. VALVE ENDS SHALL BE THREADED-TYPE.
    - C. AIR LINE REGULATOR: BALCRANK MODEL 820280 OR EQUAL WITH CAST ZINC BODY, STAINLESS STEEL STRAINER AND DIAL PRESSURE GAUGE.
    - D. QUICK DISCONNECTS FOR COMPRESSED AIR CONNECTIONS AS DIRECTED BY THE OWNER.
    - E. DRAIN TRAP FOR COMPRESSED AIR: SARCO FA-450 OR EQUAL, SEMI-STEEL BODY, STAINLESS STEEL FLOAT AND MECHANISM, 400 PSI PRESSURE RANGE.
14. BACKFLOW PREVENTERS:
    - A. PROVIDE BACKFLOW PREVENTION DEVICES AT ALL LOCATIONS SHOWN OR SPECIFIED. DEVICE SHALL BE SAME SIZE AS LINE IN WHICH INSTALLED. LISTED BELOW IS A LIST OF CONNECTION TO THE POTABLE WATER SYSTEM THAT SHALL BE PROTECTED AGAINST BACKFLOW OR BACK SIPHONAGE:
      - (1) REDUCED PRESSURE BACKFLOW PREVENTER (ASSE 1013; AWWA C511; CSA CAN/CSA-B64.4): WATTS SERIES 909, SERIES 009 OR EQUAL, COMPLETE WITH STRAINER, TEST COCKS, AND VALVES. INSTALL TOP OF BACKFLOW PREVENTER 4'-0" ABOVE FLOOR.
        - a. WATER MAKE-UP TO EQUIPMENT COOLING SYSTEMS
      - (2) HOSE VACUUM BREAKER TYPE (ASSE 1011; CSA CAN/CSA-B64.2):
        - a. WATTS NO. NF8C, NF8 OR EQUAL, WITH NON-REMOVABLE AND MANUAL DRAIN FEATURE. WALL HYDRANT (IF NOT PROVIDED AS AN INTEGRAL PART OF THE HYDRANT)
        - b. WATTS NO. LF8A, LF8AC (CHROME FINISHED) OR EQUAL, LEAD FREE, WITH NON-REMOVABLE FEATURE. HOSE BIBBS AND SINKS WITH THREADED OUTLETS
      - (3) INTERMEDIATE ATMOSPHERIC VENT CONTINUOUS PRESSURE TYPE (ASSE 1024; CSA CAN/CSA-B64.6): WATTS NO. LF7R LEAD-FREE OR EQUAL.
        - a. WATER FILTRATION
15. STRAINERS:
    - A. INSTALL ON INLET OF REDUCED PRESSURE ZONE BACKFLOW PREVENTERS AND WHERE SHOWN ON DRAWINGS. STRAINER ELEMENT SHALL BE REMOVABLE WITHOUT DISCONNECTION PIPING. SUITABLE FOR 125 PSI WORKING PRESSURE. PROVIDE WITH BRONZE OR STAINLESS STEEL SCREEN WITH VALVED AND CAPPED BLOW-OFF OUTLET.
      - (1) WATER: 2-1/2 INCH AND SMALLER, 20 MESH SCREEN.
      - (2) BODY: 3 INCH OR SMALLER, BRASS OR BRONZE.
16. PRESSURE GAGES FOR WATER: WEKSLER TYPE HA14-4, 4-1/2 INCH DIAMETER DIAL, 1/4" NPT CONNECTION SIZE, ALL METAL ALUMINUM CASE, BOTTOM CONNECTED. DIALS SHALL BE BLACK ON WHITE BACKGROUND THROUGHOUT, 1 PSI GRADUATION, 20 PSI FIGURE GRADUATION, BRASS BOURDON TUBE AND SOCKET. RANGE SHALL BE 0 TO 160 PSIG. PROVIDE TEE HANDLE COCK AND BRASS PRESSURE SNUBBER FOR WATER SERVICE.
17. THERMOMETERS: WEKSLER TYPE AS5H-9-AL OR EQUAL, ADJUSTABLE ANGLE FORM, BLUE SPIRIT MERCURY-FREE COLUMN APPROXIMATELY 9 INCHES LONG, 30 TO 240 DEG. F. RANGE, AND COMPLETE WITH BRASS WELL.
18. CLEANOUTS:
    - A. SAME SIZE AS PIPE SERVED UP TO 4 INCHES. CLEANOUTS SHALL BE EASILY ACCESSIBLE. ALL CLEANOUT PLUGS SHALL BE BRONZE, SET IN GRAPHITE GREASE. (ASTM A74, ASME A112.3.1, ASME A112.36.2M) COVERS SHALL BE SET FLUSH WITH FINISHED FLOOR OR WALL.
      - (1) BASE OF VERTICAL STACKS: JOSAM 58600-COT, SMITH 4530, ZURN Z-1446 WITH STAINLESS STEEL WALL COVER. LOCATED 24 INCHES ABOVE FLOOR.
      - (2) HORIZONTAL PIPES ABOVE GRADE: CLEANOUTS SHALL BE FERRULE WITH BRONZE SCREW PLUG IN FITTING OR TAPPED CAST IRON FERRULE WITH BRONZE PLUG.
      - (3) FLOORS: FLOOR CLEANOUTS SHALL HAVE CAST IRON BODY, BRONZE PLUG, AND ABS OR CAST IRON FRAME WITH ROUND OR SQUARE ADJUSTABLE HEAVY-DUTY SCORIATED SECURED NICKEL BRONZE TOP.
        - a. MECHANICAL ROOMS AND HEAVY TRAFFIC FLOORS: JOSAM SERIES 55000-X-2-SD CAST IRON FLOOR CLEANOUT WITH SECURED HEAVY-DUTY ROUND OR SQUARE BRONZE TRACTOR COVER.
        - b. FOR ACID WASTE SYSTEM: SHALL BE OF THE SAME MATERIAL USED FOR THE ACID WASTE PIPING SYSTEM WITH COUNTER-SUNK PLUG, ADJUSTABLE TOP NICKEL BRONZE COVER WITH "AWCO" (ACID WASTE CLEANOUT) CAST IN COVER.
19. FLOOR DRAINS:
    - A. ALL FLOOR DRAINS SHALL BE FURNISHED WITH 4-INCH DEEP SEAL P-TRAP. ALL FLOOR DRAINS SHALL CONFORM TO ASME A112.6.3 OR CSA B79.
      - (1) MECHANICAL ROOMS AND JANITOR ROOMS: JOSAM 30000-E SERIES COATED CAST IRON FLOOR DRAIN, ADJUSTABLE SATIN NIKALOY SECURED ROUND OR SQUARE TRACTOR STRAINER, AND PERFORATED STAINLESS STEEL BASKET.
      - (2) ALL OTHER LOCATIONS: JOSAM SERIES 30000-A CAST IRON BODY AND FLANGED COLLAR, AND SECURED SIX INCH (DIAMETER)(SQUARE) NIKALOY STRAINER.
      - (3) ACID WASTE DRAINS: SHALL BE OF THE SAME MATERIAL AS USED FOR THE ACID WASTE PIPING WITH GRATE STRAINER AND 1/2" TRAP PRIMER.
    - B. TRAP SEALER:
      - (1) SURE SEAL MODEL SS PRE-ASSEMBLED INLINE FLOOR DRAIN TRAP SEALER. SEALER SHALL BE CONSTRUCTED OF HIGH DENSITY POLYETHYLENE (HDPE) HOUSING AND KEEPER PIN, HEAVY DUTY SILICONE DIAPHRAGM AND SOFT EPDM SEALING GASKETS. RATED FOR FLOOR ASSE-1072 AF-GW THIRD PARTY TESTING AND LISTED BY IAPMO. PROVIDE IN ALL FLOOR DRAINS.
      - (2) PROSET MODEL (TG22G-2"), (TG33G-3"), (TG34G-4") PREASSEMBLED INLINE FLOOR DRAIN TRAP GUARD INSERT. THE TRAP GUARD DEVICE SHALL BE CONSTRUCTED OF PVC INSERT, "O" RINGS FOR 4 GRADUATED SIZES, ELASTOMERIC PVC FLEXIBLE MATERIAL DIAPHRAGM, SEALED TO PIPE WITH ADHESIVE CAULK. RATED FOR ASME A112.6.3, NSF/ANSI 14 AND CSA B79.
      - (3) MIFAB "MI-GARD" SERIES INLINE FLOOR DRAIN TRAP SEAL DEVICE WITH UV RESISTANT ABS PLASTIC FRAME, SILICON RUBBER SEALING FLAPPER AND FOUR FLEXIBLE SEALING RIBS. TESTED AND CERTIFIED TO ASSE 1072 AND LISTED WITH IAPMO AND ICC.
20. COMPRESSED AIR SYSTEM:
    - A. GENERAL: COMPRESSED AIR SYSTEM SHALL CONFORM TO NFPA 56F AND SHALL BE PROVIDED COMPLETE WITH ALL DISTRIBUTION PIPING, COMPRESSOR PACKAGE WITH ALL OPERATING SAFETY CONTROLS, AND ALL OTHER DEVICES PERTINENT TO THE SAFETY AND OPERATION OF THE SYSTEM. INSTALLATION SHALL BE MADE IN A WORKMANLIKE MANNER.
    - B. COMPRESSOR AC-1: EXISTING TO REMAIN.
    - C. AIR DRYER & RECEIVER: EXISTING TO REMAIN.
    - D. AIR BIBBS SHALL BE PUSH-TYPE SWIVELING QUICK DISCONNECT COUPLINGS WITH 1/4 INCH NPT MALE INLET, LINCOLN MODEL 631004 OR EQUAL, UL APPROVED AND COMPLYING WITH OSHA SAFETY REGULATIONS.
    - E. COMPRESSED AIR VALVES SHALL BE AS SPECIFIED HEREINBEFORE.
    - F. PIPING MATERIALS FOR COMPRESSED AIR SYSTEM SHALL BE AS SPECIFIED HEREINBEFORE. IN ADDITION, UNDERGROUND PIPING SHALL BE PROVIDED WITH A COATING OF HOT COAL TAR.
21. NITROGEN GAS SYSTEM:
    - A. GENERAL: NITROGEN GAS SYSTEM SHALL CONFORM TO NFPA 55 AND NFPA 99 AND SHALL BE PROVIDED COMPLETE WITH ALL DISTRIBUTION PIPING AND ALL OPERATING SAFETY CONTROLS AND ALL OTHER DEVICES PERTINENT TO THE SAFETY AND OPERATION OF THE SYSTEM. INSTALLATION SHALL BE MADE IN A WORKMANLIKE MANNER.
    - B. NITROGEN GAS VALVES SHALL BE AS SPECIFIED HERE IN BEFORE.
22. INSULATION:
    - A. ALL DOMESTIC WATER PIPING SHALL BE INSULATED. INSULATION SHALL BE JOHNS MANVILLE, OWENS CORNING, OR ARMSTRONG. ALL MATERIALS AND PVC TYPE FITTING COVERS USED SHALL HAVE COMPOSITE FLAME_SPREAD RATING NOT EXCEEDING 25 AND A SMOKE_DEVELOPED RATING NOT EXCEEDING 50, AS TESTED UNDER PROCEDURE ASTM E_84, NFPA 90A AND 90B.
    - B. PIPING INSULATION: FIBERGLASS INSULATION SHALL BE 1 INCH THICK AND SHALL HAVE A MAXIMUM THERMAL CONDUCTIVITY (K) FACTOR OF 27.0 PER INCH OF THICKNESS AT A MEAN TEMPERATURE OF 75 DEG. F. FIBERGLASS INSULATION SHALL HAVE A WHITE KRAFT BONDED TO ALUMINUM FOIL, REINFORCED WITH FIBERGLASS YARN JACKET, LAP JOINTS, TAPE AND SEAL.
    - C. ALL EXPOSED INSULATION SHALL BE PROVIDED WITH PVC JACKET WITH NO INSERTS TO PROTECT INSULATION AGAINST IMPACT, UVC EXPOSURE AND WATER.
23. DRAIN TEMPERING VALVE: THERMOMEGATECH CIRCUIT SOLVER OR EQUAL DRAIN TEMPERING VALVE (DTV). WASTEWATER TEMPERING, SELF-OPERATING, THERMAL ACTIVATOR, BRASS BODY, 303 STAINLESS STEEL SPRING AND PISTON, 125 PSIG MAXIMUM INLET WATER PRESSURE AND 250°F MAXIMUM TEMPERATURE. FULL OPEN TEMPERATURE (120°F, 125°F, 130°F AND 140°F). VALVE SHALL HAVE A WARRANTY FOR 18 MONTHS.
24. FIRE-STOPPING: PIPE PENETRATIONS OF RATED WALLS, FLOORS, AND FLOOR-CEILING ASSEMBLIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH UNDERWRITER'S LABORATORIES, INC., FIRE RESISTANCE DIRECTORY, VOLUME II, HOURLY RATINGS FOR THROUGH FIRESTOP PENETRATIONS. THE CONTRACTOR SHALL PROVIDE U.L. FIRESTOP PENETRATIONS ACCORDING TO THE PARTICULAR WALL, FLOOR, OR FLOOR-CEILING ASSEMBLY RATING, CONSTRUCTION TYPE, PIPE MATERIAL, PIPE SIZE, INSULATION REQUIREMENTS, SLEEVE REQUIREMENTS, AND THE CONTRACTOR'S CHOICE OF FIRESTOP PRODUCTS AS LISTED BY U.L. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE WALL, FLOOR, OR FLOOR-CEILING ASSEMBLY CONSTRUCTION TYPES AND RATINGS.
25. INSTALLATION:
    - A. GENERAL:
      - (1) SUSPENDED HORIZONTAL PIPING SHALL BE SUPPORTED BY ADJUSTABLE WROUGHT STEEL CLEVIS HANGERS. WHERE SUPPORTS BEAR ON COPPER PIPE, THEY SHALL BE COPPER PLATED. WHERE SUPPORTS BEAR ON INSULATED PIPING, PROVIDE INSULATION SHIELD. CHAIN, STRAP, WIRE OR OTHER MAKESHIFT DEVICES WILL NOT BE PERMITTED AS HANGERS OR SUPPORTS.
      - (2) INSTALL BRANCH PIPING FOR WATER, WASTE AND GAS, FROM THE RESPECTIVE PIPING SYSTEMS AND CONNECT TO ALL FIXTURES, VALVES, COCKS, OUTLETS, CASEWORK, CABINETS AND EQUIPMENT, INCLUDING THOSE FURNISHED BY THE OWNER OR SPECIFIED IN OTHER SECTIONS OF THESE SPECIFICATIONS.
      - (3) INSTALL TRIM AND FITTINGS PROVIDED WITH CASEWORK, CABINETS AND LABORATORIES, INCLUDING THOSE FURNISHED BY THE OWNER, BUT NOT INSTALLED AT POINT OF FABRICATION.
      - (4) WELDED JOINTS SHALL BE FUSION WELDED BY QUALIFIED WELDERS IN ACCORDANCE WITH ANSI B31.1 SECTION 6, UNLESS OTHERWISE REQUIRED. MITERING OR NOTCHING PIPE TO FORM ELBOWS AND TEES, AND DRILLING OR PUNCHING TO MAKE CONNECTIONS WILL NOT BE PERMITTED.
      - (5) COMPRESSION GASKET JOINTS FOR CAST IRON SEWER PIPE SHALL BE MADE WITH NEOPRENE COMPRESSION GASKETS CONFORMING TO ASTM C564.
      - (6) NO-HUB JOINTS FOR CAST IRON PIPES SHALL BE MADE WITH NEOPRENE GASKETS (ASTM C564) AND STAINLESS STEEL CLAMPS CONFORMING TO ASTM C564 AND ASTM C1277.
      - (7) MECHANICAL JOINTS ELASTOMERIC SEALING SLEEVE FOR CAST IRON PIPE SHALL BE IN ACCORDANCE WITH ASTM C564.
      - (8) SOLVENT CEMENT FOR PVC PIPING SHALL BE HANDLED IN ACCORDANCE WITH ASTM F402.
      - (9) PLASTIC PIPE SHALL NOT BE LOCATED IN RETURN AIR CEILING PLENUMS.
      - (10) PLASTIC PIPE SHALL NOT PENETRATE A FIRE ASSEMBLY OR SMOKESTOP.
      - (11) PROVIDE CHROME PLATED ESCUTCHEONS AT ALL LOCATIONS WHERE PIPING PENETRATES FLOORS, WALLS AND CEILINGS IN EXPOSED LOCATIONS, EXCEPT IN MECHANICAL ROOMS.
      - (12) WHERE SUPPORTS BEAR ON INSULATED PIPING, PROVIDE INSULATION SHIELDS.
    - B. PIPING SHALL CONFORM TO THE FOLLOWING:
      - (1) WASTE:
        - a. SLOPE COMPRESSED AIR AND WASTE PIPING AS FOLLOWS:

PIPE SIZE	MINIMUM PITCH
COMPRESSED AIR	
2-1/2 INCH & SMALLER	1/4" TO THE FOOT
3 INCH & LARGER	1/8" TO THE FOOT

        - b. CHANGES IN DIRECTION OF PIPING SHALL BE MADE WITH FITTINGS.
        - c. CONTRACTOR IS CAUTIONED TO VERIFY INVERT OF SANITARY SEWER AND TO COORDINATE INVERTS OF NEW WORK TO SUIT CONDITIONS ENCOUNTERED.
        - d. SANITARY SEWER SHALL BE PROVIDED COMPLETE WITH ALL PLUMBING FIXTURES, DRAINS, ETC., PROPERLY CONNECTED AND VENTED IN ACCORDANCE WITH THE APPLICABLE CODES. ALL VENTS THROUGH THE ROOF SHALL EXTEND TWELVE INCHES ABOVE THE ROOF.
      - (2) DOMESTIC WATER:
        - a. GRADE ALL LINES TO FACILITATE DRAINAGE. PROVIDE HOSED-END DRAIN VALVES AT LOCATIONS INDICATED ON THE DRAWINGS. ALL UNNECESSARY TRAPS IN CIRCULATING LINES SHALL BE AVOIDED.
        - b. CONNECT BRANCH LINES AT BOTTOM OF MAIN SERVING FIXTURES BELOW AND PITCH DOWN SO THAT MAIN MAY BE DRAINED THROUGH FIXTURE. CONNECT BRANCH LINES TO TOP OF MAIN SERVING ONLY FIXTURES LOCATED ON FLOOR ABOVE.
      - (3) GAS:
        - a. INSTALL GAS PIPING WITH PLUGGED DRIP POCKETS AT LOW POINTS AND AHEAD OF THE CONNECTION TO EACH PIECE OF EQUIPMENT. PLUGS SHALL BE MINIMUM 2 INCHES ABOVE (FLOOR)(ROOF SURFACE). ENTIRE GAS PIPING INSTALLATION SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF VIRGINIA CONSTRUCTION CODE.
        - b. MINIMUM SLOPE SHALL BE 1/4 INCH PER FIFTEEN FEET IN DIRECTION OPPOSITE FLOW.
    - C. BONDING OF GAS PIPING: ALL METAL GAS PIPING ATTACHED TO THE BUILDING SHALL BE BONDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITION OF NFPA 70, ARTICLE 250.104(B) AND SECTION 26 05 26 OF THE ELECTRICAL SPECIFICATIONS.
26. IDENTIFICATION OF PIPES AND VALVES:
    - A. PIPES SHALL BE IDENTIFIED USING PRE-PRINTED MARKERS SIZED APPROPRIATELY FOR THE PIPES BEING IDENTIFIED (SHOP DRAWINGS REQUIRED). MARKERS SHALL BE SETON "SETMARK" TYPE OR APPROVED EQUAL OR EQUIVALENT STENCIL. PIPE IDENTIFICATION SHALL MEET THE MOST CURRENT EDITION OF ANSI SPECIFICATION A13.1. APPLY A MINIMUM OF TWO COMPLETE WRAPS OF TAPE AT EACH END OF PRE-PRINTED PIPE MARKERS EQUAL TO SETON STYLE #AR OR APPROVED EQUAL. MARKERS SHALL BE LOCATED CLOSE TO VALVES OR FLANGES AND ADJACENT TO CHANGES IN DIRECTION, BRANCHES AND WHERE PIPES PASS THROUGH WALLS OR FLOORS, AND AT MAXIMUM INTERVALS OF 15 FEET ON STRAIGHT RUNS. PROVIDE A COLOR CODE CHART, FRAMED WITH GLASS FRONT, INDICATING PIPING SERVICE AND COLOR CODE SCHEDULE. POST IN MECHANICAL ROOM WHERE DIRECTED BY OWNER.
    - B. COLOR CODE SCHEDULE

COLOR BANDING CODE

NUMBER	COLOR	CATALOG NUMBER
1	ORANGE	NO. F65 E 36
2	BLUE	NO. F65 L 3
3	BROWN	NO. F65 N 11
4	RED	NO. F65 R 1
5	BLACK	NO. F65 B 1
6	YELLOW	NO. F65 Y 48
7	GREEN	NO. F65 G 40

    - C. PIPE SHALL BE IDENTIFIED WITH FLOW ARROWS AS DESCRIBED BELOW
      - (1) ARROWS SHALL BE STENCIL TYPE.
      - (2) ARROWS SHALL BE READABLE FROM FLOOR.
      - (3) ARROWS SHALL BE INSTALLED EVERY 15'-0" MAXIMUM.
      - (4) ARROWS SHALL BE PAINTED ON PIPES.
    - D. IDENTIFICATION OF VALVES: PROPERLY MARK SERVICE AND CONTROL VALVES. VALVE MARKERS SHALL BE METAL TAGS WITH DESIGNATIONS STAMPED THEREON OR LAMINATED ENGRAVED PLASTIC CHAINED WITH JACK CHAINS (NOT BEADED CHAINS) TO THEIR RESPECTIVE VALVES. IDENTIFICATION SYMBOLS OR DESIGNATIONS SHALL BE THE SAME AS SHOWN ON THE CONTRACT DOCUMENTS.
    - E. VALVE LOCATIONS ABOVE ACOUSTIC TILE CEILINGS: PROVIDE COLORED BRASS PUSH-PINS COMPLETE WITH A MINIMUM 1/2" SHANK AND 5/8" DIAMETER HEAD. PIN HEAD COLOR SHALL BE BLUE OR COLOR AS SELECTED BY ARCHITECT OR OWNER. LOCATE PUSH-PINS DIRECTLY BELOW ALL SCHEDULED PLUMBING EQUIPMENT.
27. PROTECTION OF ELECTRICAL EQUIPMENT: PLUMBING AND SPRINKLER PIPING SHALL NOT BE INSTALLED DIRECTLY OVER ELECTRICAL PANELBOARDS, SWITCHBOARDS OR MOTOR CONTROL CENTERS, UNLESS THE PIPE IS A MINIMUM OF 6 FEET ABOVE THE ELECTRICAL EQUIPMENT OR ABOVE A STRUCTURAL CEILING (CONCRETE CAP OR SIMILAR). IF COMPLIANCE WITH THIS REQUIREMENT IS NOT POSSIBLE, NOTIFY THE ENGINEER IMMEDIATELY. IF THE PIPING IS DIRECTLY ABOVE AND AT LEAST 6 FEET ABOVE THE ELECTRICAL EQUIPMENT, PROVIDE A GALVANIZED STEEL DRAIN PAN INSTALLED DIRECTLY UNDER THE PIPING. DRAIN PAN SHALL HAVE MINIMUM 2 INCH HIGH SIDES WITH A DRAIN PIPE CONNECTION AT THE LOWEST POINT AND SHALL BE FULL WIDTH OF THE ELECTRICAL EQUIPMENT BEING PROTECTED. EXTEND DRAIN PIPE TO EXTERIOR OR TO NEAREST FLOOR DRAIN.
28. PROTECTION OF PLASTIC PIPE: ALL PLASTIC PIPING SHALL BE INSTALLED WITH SUFFICIENT DISTANCE AND/OR INSULATION RELATIVE TO RECESSED LIGHT FIXTURES IN ACCORDANCE WITH PLASTICS PIPE INSTITUTE (PPI) TECHNICAL NOTE 56 "INSTALLATION OF PLASTIC PRESSURE PIPING MATERIALS NEAR IC-RATED AND NON-IC-RATED RECESSED LIGHTING FIXTURES".
29. TESTS:
    - A. GENERAL: CONTRACTOR SHALL PROVIDE ALL INSTRUMENTS, MATERIALS, AND LABOR REQUIRED. TESTS SHALL BE MADE IN THE PRESENCE OF THE OWNER OR AUTHORITY HAVING JURISDICTION OR AS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVE WHO SHALL BE GIVEN FIVE (5) DAYS NOTICE BY THIS CONTRACTOR OF HIS READINESS TO PERFORM SUCH TESTS. ANY LEAKS THAT DEVELOP DURING THE TESTS SHALL BE REPAIRED BY REMAKING THE JOINT OR REPLACING PIPE AND FITTINGS. TEMPORARY CAULKING WILL NOT BE PERMITTED. NO PIPING SHALL BE INSULATED OR CONCEALED UNTIL IT HAS BEEN TESTED, WITH RESULTS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. AIR TESTING WILL BE ACCEPTABLE WHERE PERMITTED BY THE VIRGINIA CONSTRUCTION CODE. DO NOT PERFORM AIR TESTING ON SYSTEMS WHERE PLASTIC PIPING, INCLUDING CPVC AND PEX PIPING, ARE INSTALLED. TEST SYSTEMS EITHER IN ITS ENTIRETY OR IN SECTIONS.
    - B. SOIL, WASTE AND VENT SYSTEMS:
      - (1) CONDUCT TESTS BEFORE TRENCHES ARE BACKFILLED OR FIXTURES ARE CONNECTED. CONDUCT WATER TEST AS DIRECTED IN ACCORDANCE WITH THE VIRGINIA CONSTRUCTION CODE AND THIS SPECIFICATION.
      - (2) WATER TEST: IF ENTIRE SYSTEM IS TESTED, TIGHTLY CLOSE ALL OPENINGS IN PIPES EXCEPT HIGHEST OPENING AND FILL SYSTEM WITH WATER TO POINT OF OVERFLOW. IF SYSTEM IS TESTED IN SECTIONS, TIGHTLY PLUG EACH OPENING EXCEPT HIGHEST OPENING OF SECTION UNDER TEST, FILL EACH SECTION WITH WATER AND TEST WITH AT LEAST 10-FOOT HEAD OF WATER. IN TESTING SUCCESSIVE SECTIONS, TEST AT LEAST UPPER 10 FEET OF NEXT PRECEDING SECTION SO THAT EACH JOINT OR PIPE EXCEPT UPPERMOST 10-FOOT HEAD OF WATER. KEEP WATER IN SYSTEM, OR IN PORTION UNDER TEST, FOR AT LEAST 15 MINUTES BEFORE INSPECTION STARTS. SYSTEM SHALL THEN BE TIGHT AT ALL JOINTS.
    - C. POTABLE WATER SYSTEM: TEST AFTER INSTALLATION OF PIPING AND DOMESTIC WATER HEATERS, BUT BEFORE PIPING IS CONCEALED, BEFORE COVERING IS APPLIED AND BEFORE PLUMBING FIXTURES ARE CONNECTED. FILL SYSTEMS WITH WATER AND MAINTAIN HYDROSTATIC PRESSURE OF 125 PSIG OR AT 50 PERCENT HIGHER THAN ACTUAL OPERATING PRESSURE WHICH EVER IS GREATER FOR ONE HOUR DURING INSPECTION AND PROVE TIGHT WITHOUT ANY LOSS OF PRESSURE.
    - D. GAS SYSTEM: GAS PIPING SHALL BE TESTED AND INSPECTED IN ACCORDANCE WITH VIRGINIA CONSTRUCTION CODE.
    - E. COMPRESSED AIR SYSTEM: TEST PNEUMATICALLY AT NOT LESS THAN 200 PSI FOR ONE HOUR WITHOUT ANY LOSS OF PRESSURE. EACH JOINT SHALL BE CHECKED WITH SOAP SUDS IF ANY LOSS OF PRESSURE OCCURS.
    - F. NITROGEN GAS SYSTEM: GAS PIPING SHALL BE TESTED AND INSPECTED IN ACCORDANCE WITH VIRGINIA CONSTRUCTION CODE.
    - G. OPTIONAL TESTS FOR CONNECTIONS TO EXISTING SYSTEMS: AFTER INSTALLATION OF PIPING AND CONNECTING TO EXISTING SYSTEMS, AND WHERE HEREIN BEFORE SPECIFIED TESTS ARE IMPRACTICAL, TEST ALL NEW PIPING UNDER ACTUAL OPERATING CONDITIONS AND PROVE TIGHT TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
30. DISINFECTION: AFTER TESTS HAVE BEEN SUCCESSIVELY COMPLETED, THOROUGHLY FLUSH AND DISINFECT THE INTERIOR DOMESTIC WATER DISTRIBUTION SYSTEM IN ACCORDANCE WITH THE VIRGINIA CONSTRUCTION CODE.
31. CLEANING:
    - A. REMOVE TRASH, PLASTER, DUST, PAINT SPOTS AND ALL FOREIGN MATTER FROM INSIDE AND OUTSIDE OF ALL FIXTURES AND EQUIPMENT.
    - B. THE CONTRACTOR SHALL CHECK EACH LENGTH OF PIPE BEFORE IT IS PUT IN PLACE TO MAKE CERTAIN THERE IS NOT FOREIGN MATERIAL (STONES, SAND, ETC.) IN THE SYSTEMS. PROVIDE TEMPORARY BYPASS AROUND EQUIPMENT IF OR AS REQUIRED. ALL PLUMBING PIPES SHALL BE THOROUGHLY FLUSHED WITH WATER TO REMOVE CONSTRUCTION DEBRIS BEFORE FINAL CONNECTIONS ARE MADE TO EQUIPMENT AND FIXTURES.
32. REPORTS: REPORT OF CLEANING, STERILIZING AND TESTING: CONTRACTOR SHALL VERIFY IN WRITING BEFORE COMPLETION OF THE JOB THAT ALL SPECIFIED CLEANING PROCEDURES, TESTS AND STERILIZING HAVE BEEN PERFORMED, WITH RESULTS AS SPECIFIED OR AS REQUIRED BY CODES.

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COMMONWEALTH OF VIRGINIA
10/10/25
RODNEY D. FANNING
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PROFESSIONAL ENGINEER

REVISION	DATE

VT DURHAM HALL
ROOMS 171 AND 181 RENOVATIONS - PHASE 2
BLACKSBURG, VIRGINIA

SPECIFICATIONS - PLUMBING

DESIGNED: DHH	DRAWN: DHH
CHECKED: MGW	APPROVED: LPA
COMM. NO.: 25105	DATE: 10-10-25

SHEET
P-002