

# Montana State University Tietz Hall Cage Washer Replacement, PPA 22-0541

100% Construction Drawings

07/31/23



1 Vicinity Map - Montana State University  
NTS

TIETZ HALL

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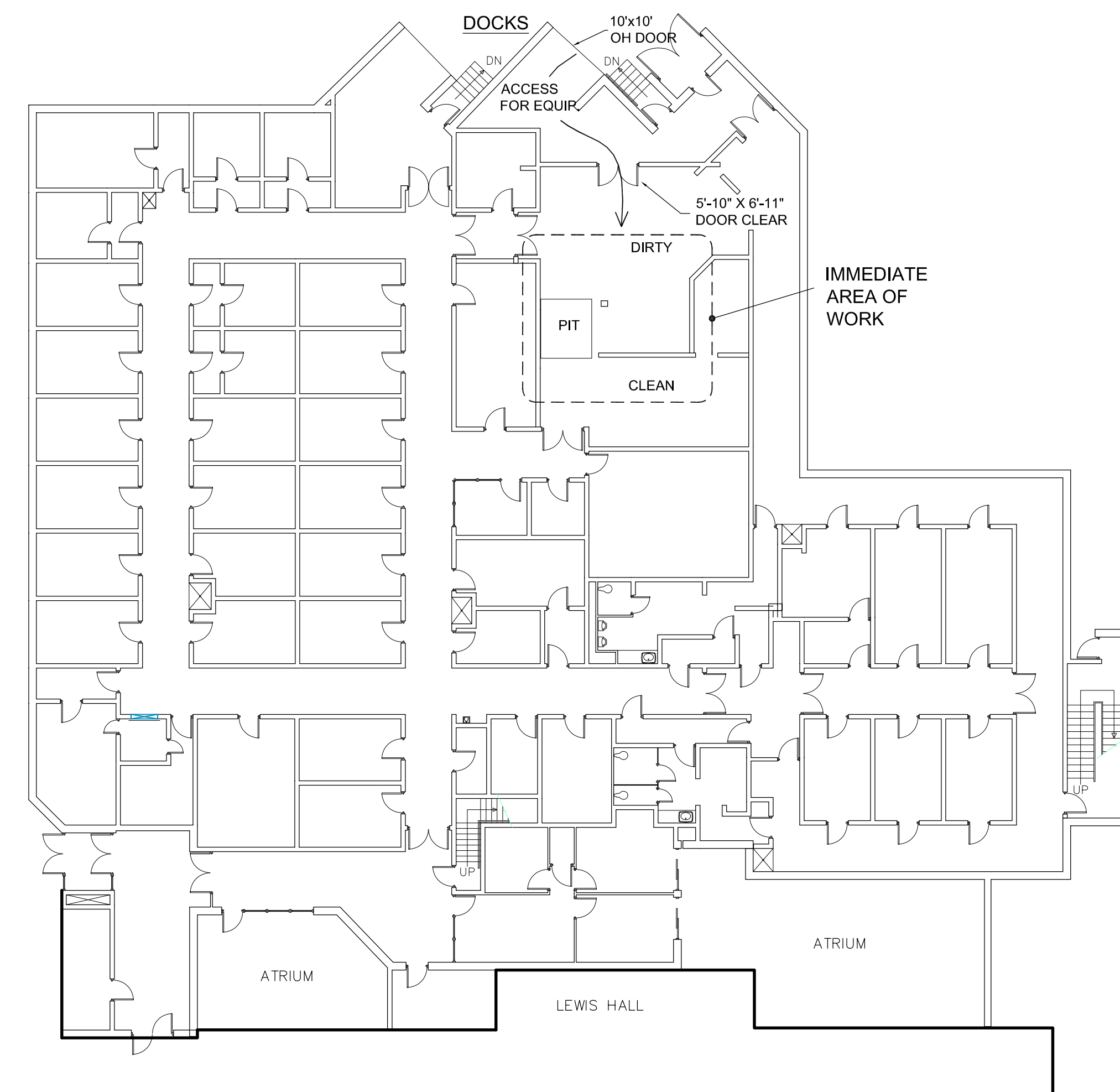
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North  
2 Tietz Hall - Level 1 Overall Floor Plan  
1/16" = 1'-0"

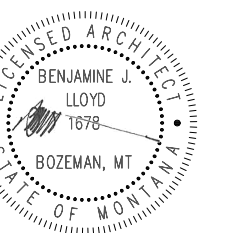


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MSU TIETZ HALL  
CAGE WASHER REPLACEMENT

Hennebery Eddy Architects



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PPA#22-0541

A/E# -

HEA#22051

SHEET TITLE

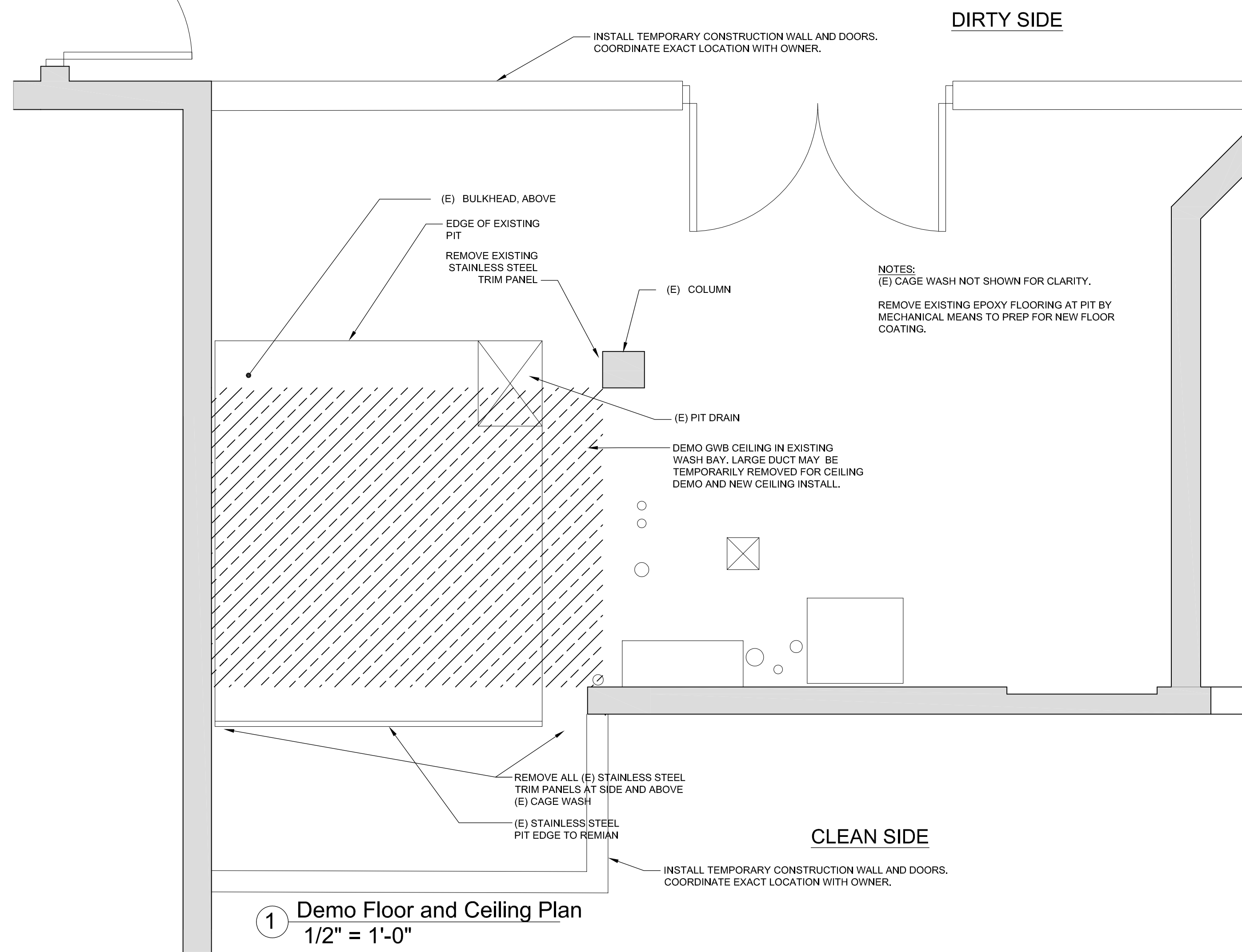
GENERAL INFO

SHEET

**GO.1**

DATE

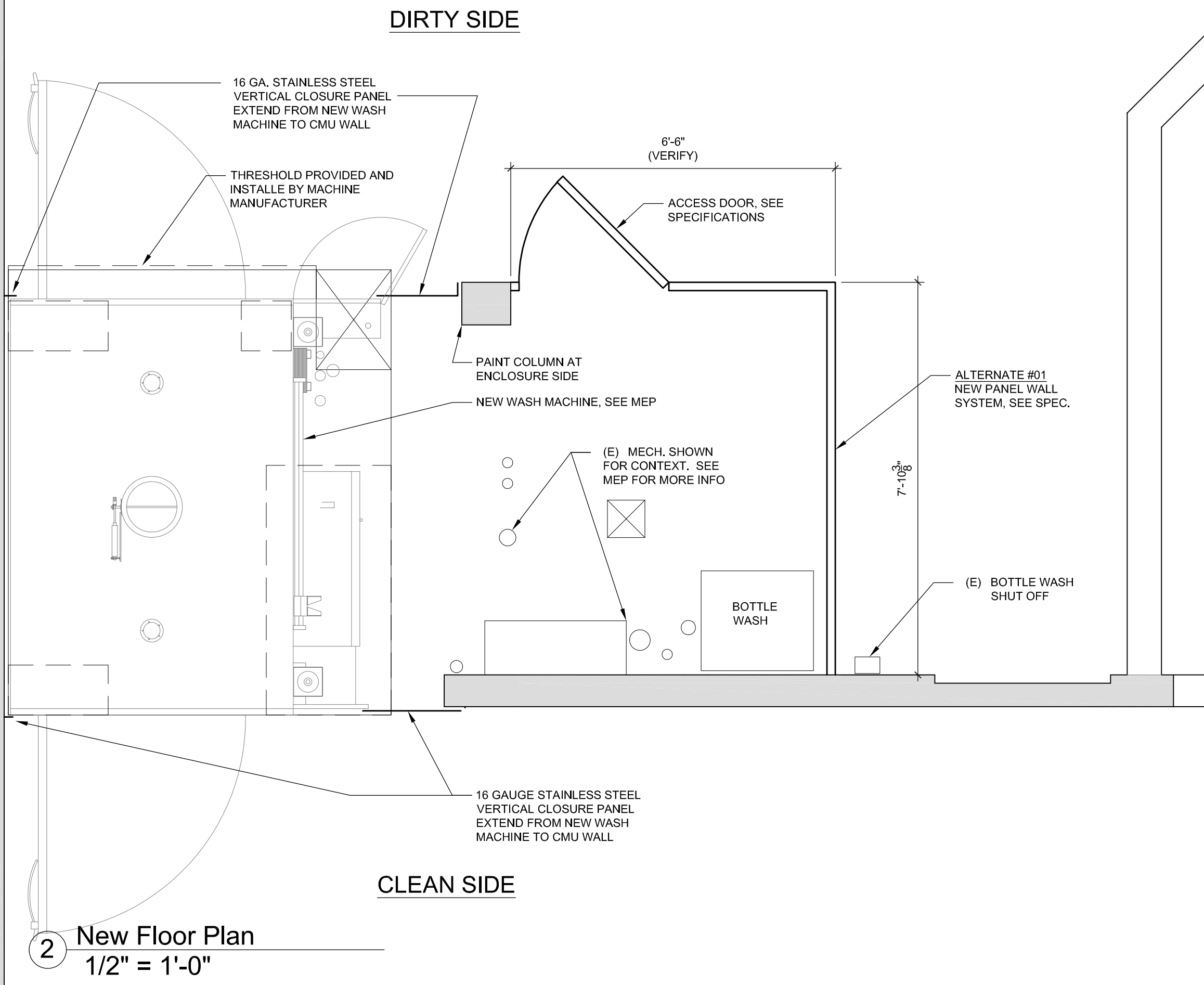
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**1 Demo Floor and Ceiling Plan**  
1/2" = 1'-0"

**ALTERNATE #01**  
- STAINLESS STEEL WALL PANEL ENCLOSURE SYSTEM  
- ALL PAINTING INSIDE PANEL ENCLOSURE (NOT PAINTING AT WASH BAY)

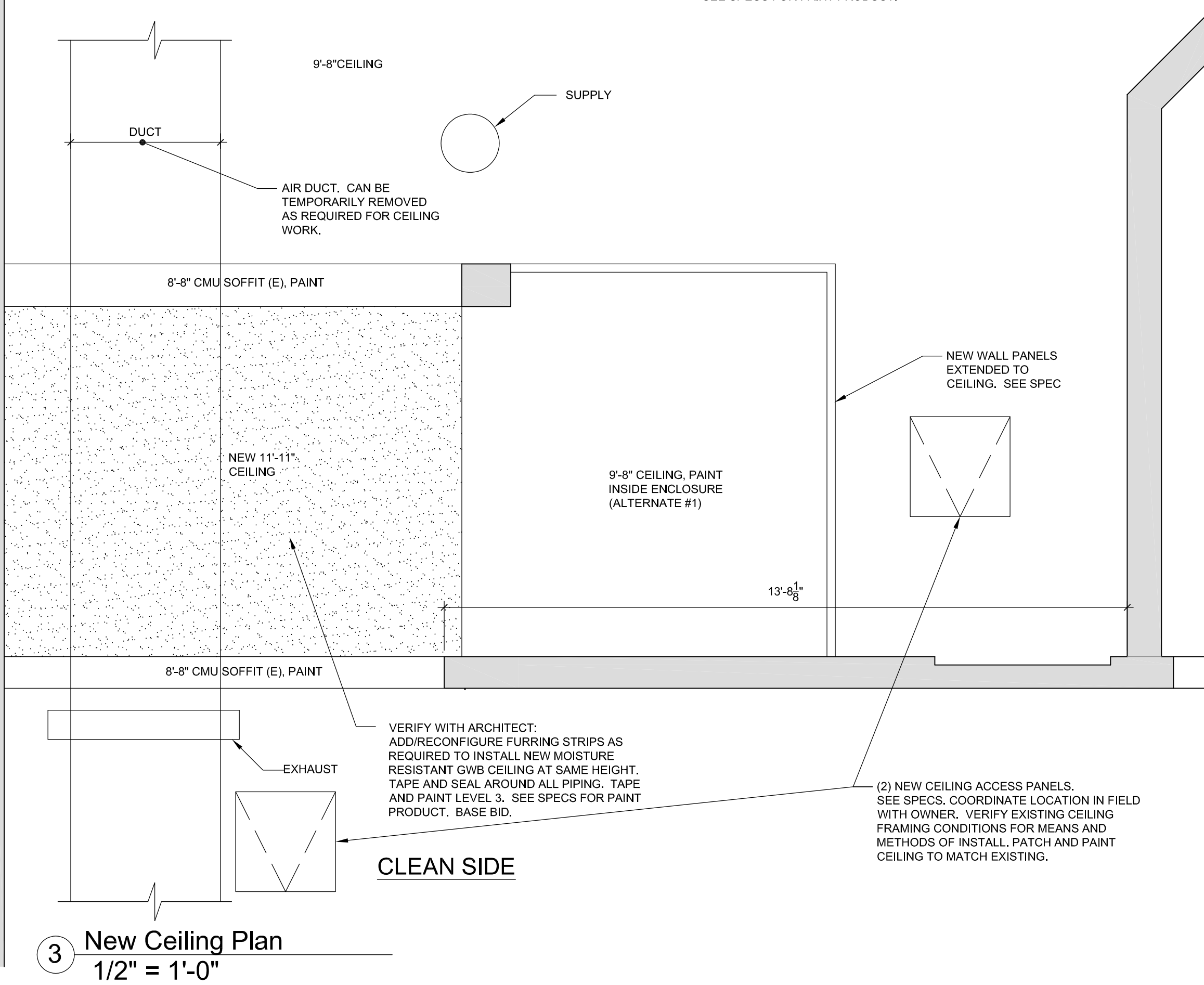
NOTES:  
PATCH AND PAINT AS REQUIRED ALL CEILING, WALL, SOFFIT/BULKHEAD SURFACES IN WASH BAY INCLUDING CEILING, COLUMN, AND SOUTH WALL IN THE PANEL ENCLOSURE AREA.



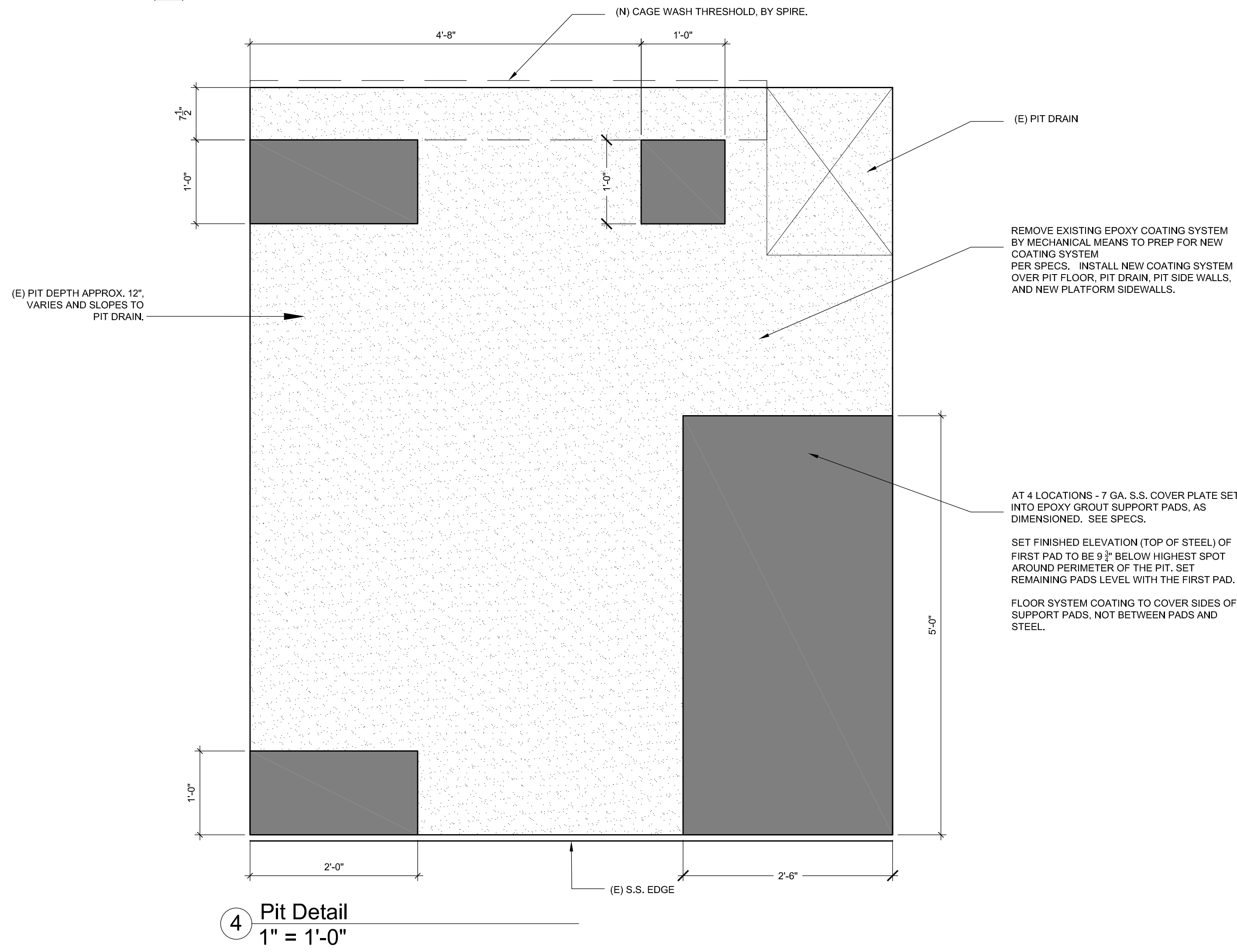
**2 New Floor Plan**  
1/2" = 1'-0"

**ALTERNATE #01**  
- STAINLESS STEEL WALL PANEL ENCLOSURE SYSTEM  
- ALL PAINTING INSIDE PANEL ENCLOSURE (NOT PAINTING AT WASH BAY)

NOTES:  
NOT ALL MEP SHOWN FOR CLARITY. SEE MEP AS NEEDED.  
PAINT NEW WASH BAY CEILING, CEILING INSIDE OF PANEL ENCLOSURE, AND THE SOFFITS/BULKHEADS AROUND WASH BAY. SEE SPECS FOR PAINT PRODUCT.

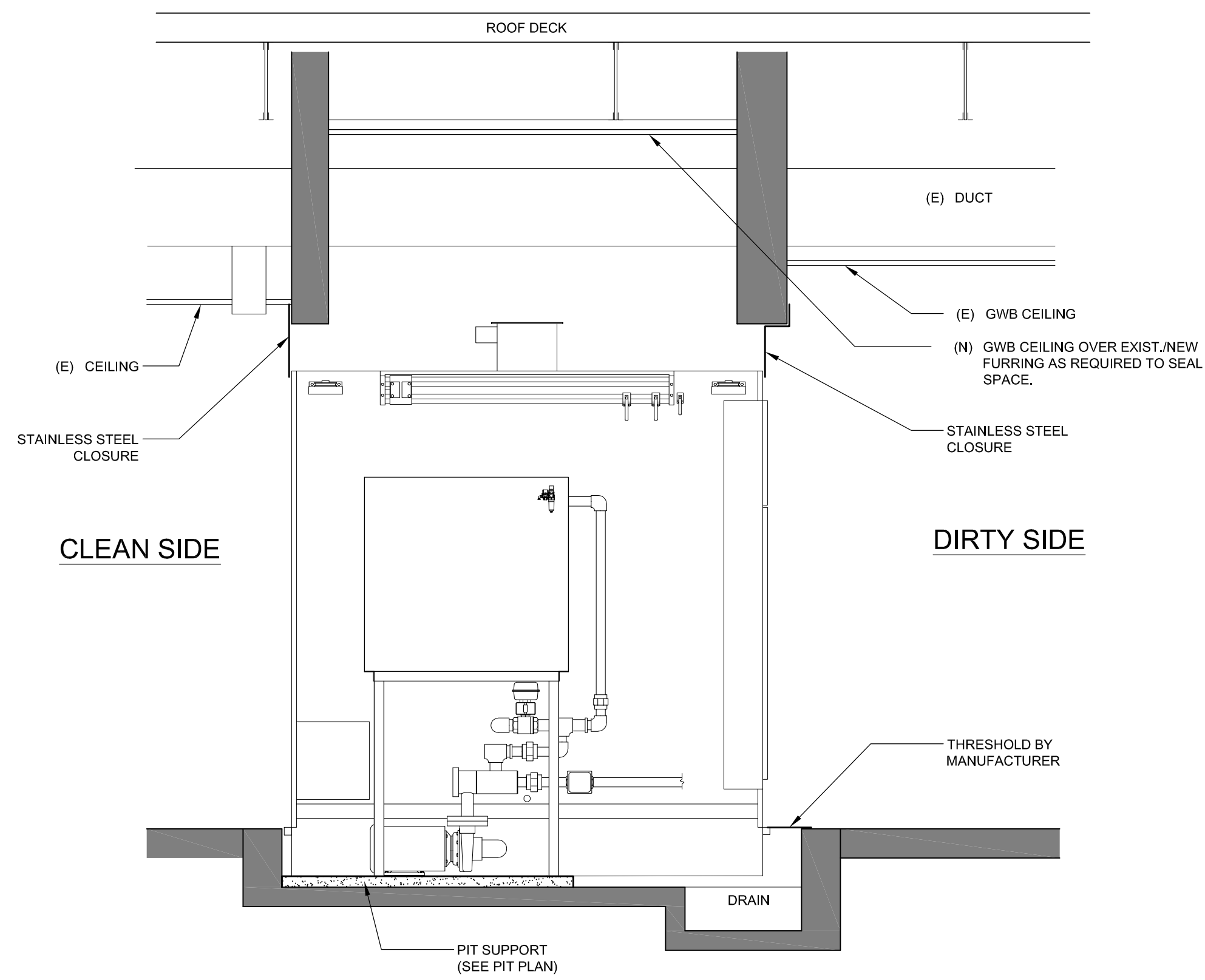


**3 New Ceiling Plan**  
1/2" = 1'-0"

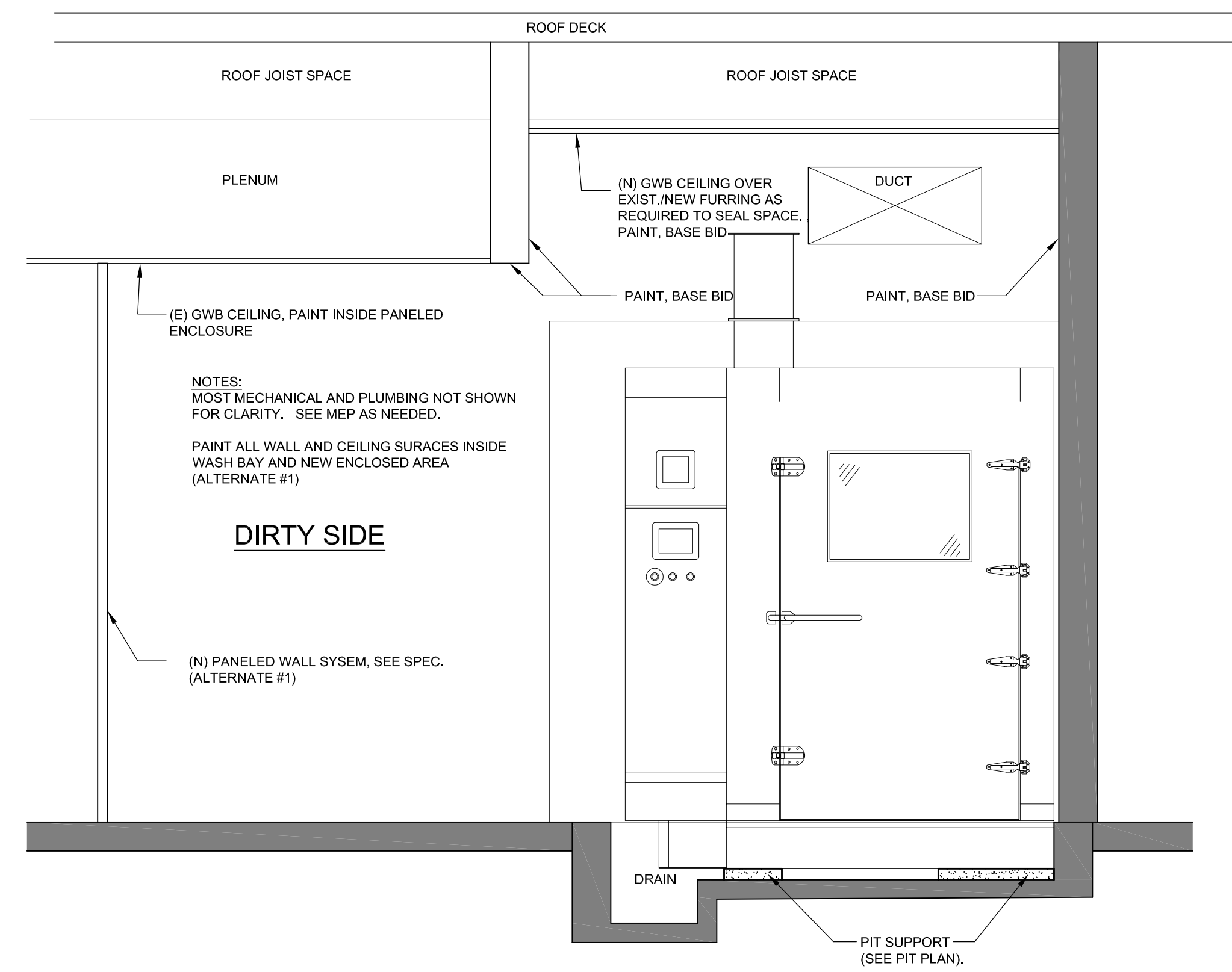


**4 Pit Detail**  
1" = 1'-0"

- ALTERNATE #01
- STAINLESS STEEL WALL PANEL ENCLOSURE SYSTEM
  - ALL PAINTING INSIDE PANEL ENCLOSURE (NOT PAINTING AT WASH BAY)

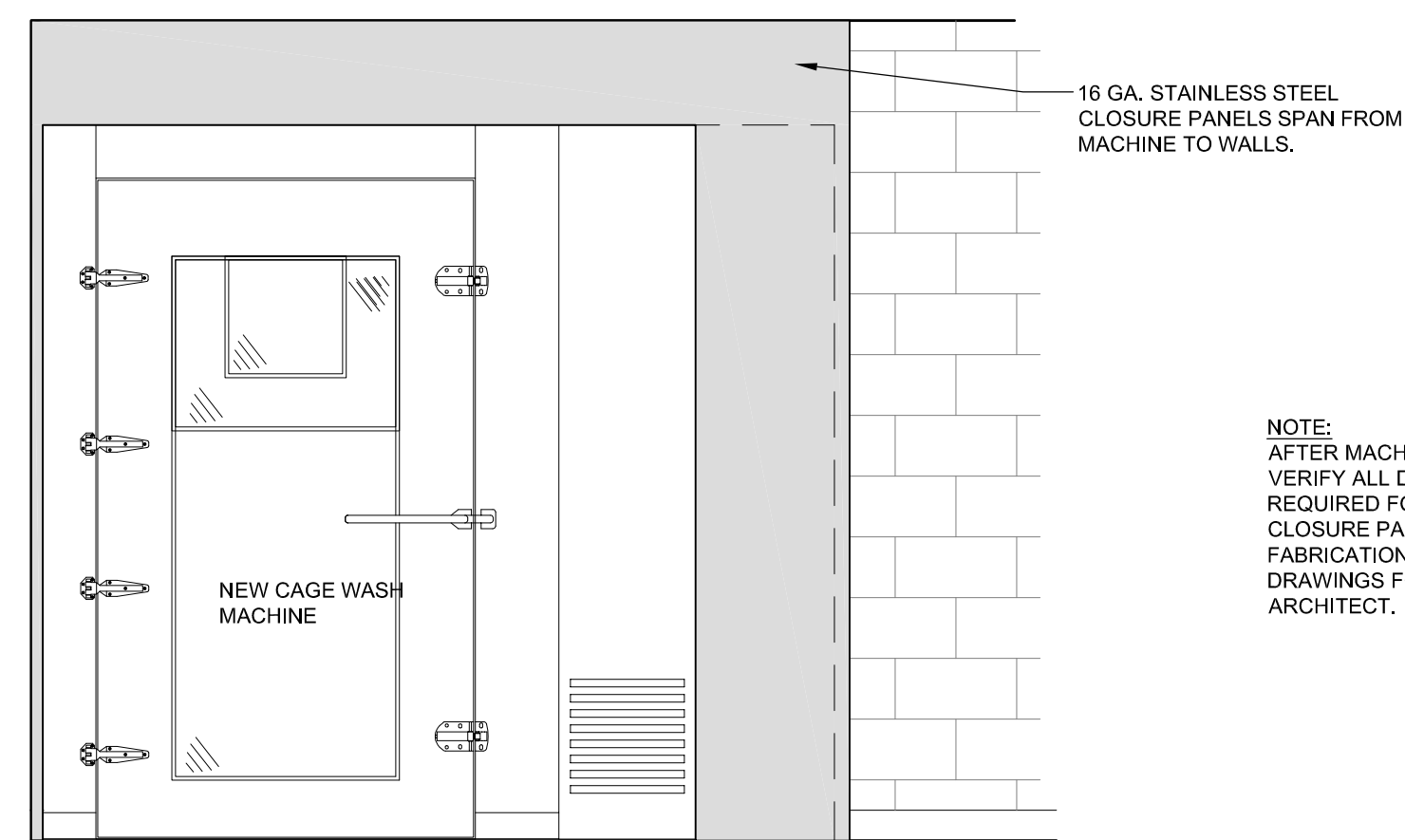


① Clean / Dirty Wall Section  
1/2" = 1'-0"



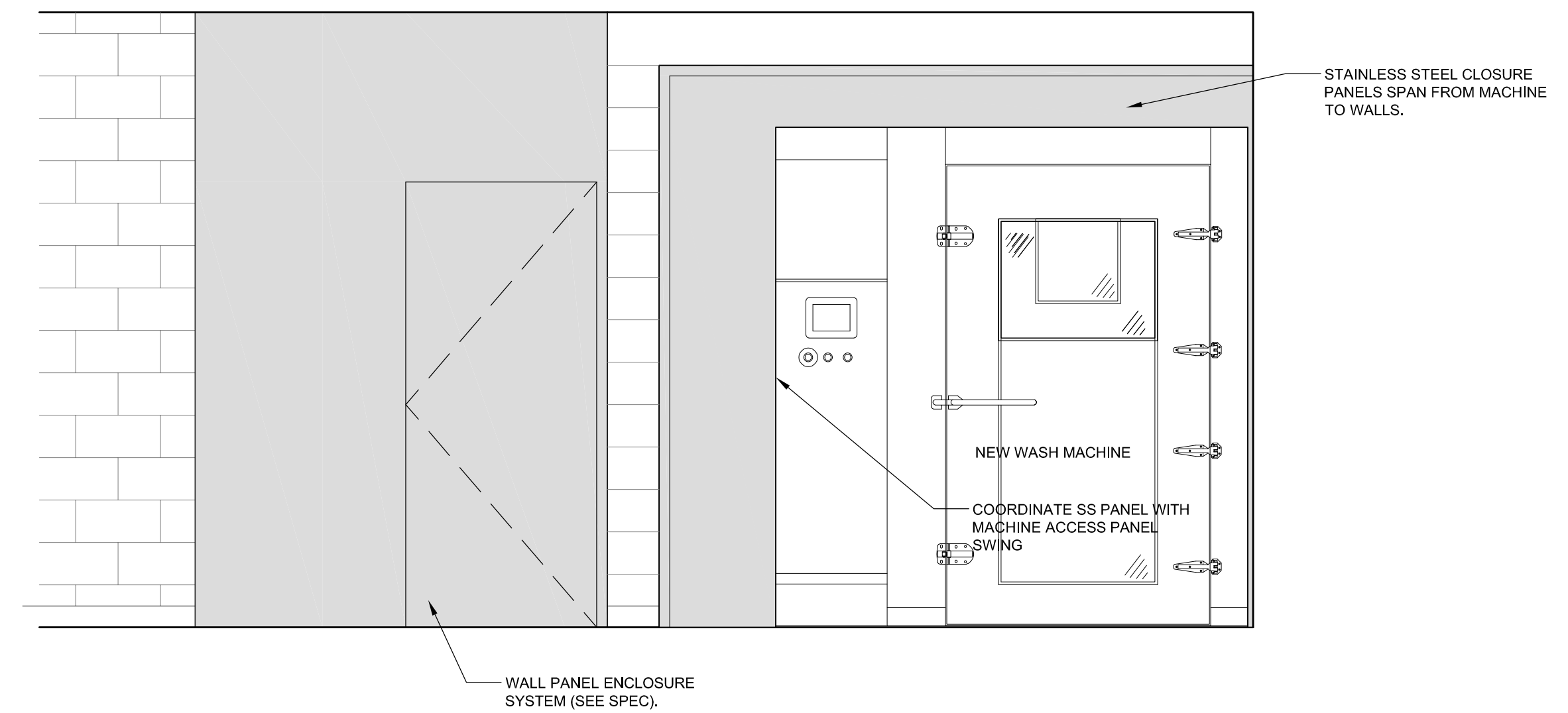
② Dirty Side Wall Section  
1/2" = 1'-0"

- ALTERNATE #01
- STAINLESS STEEL WALL PANEL ENCLOSURE SYSTEM
  - ALL PAINTING INSIDE PANEL ENCLOSURE (NOT PAINTING AT WASH BAY)



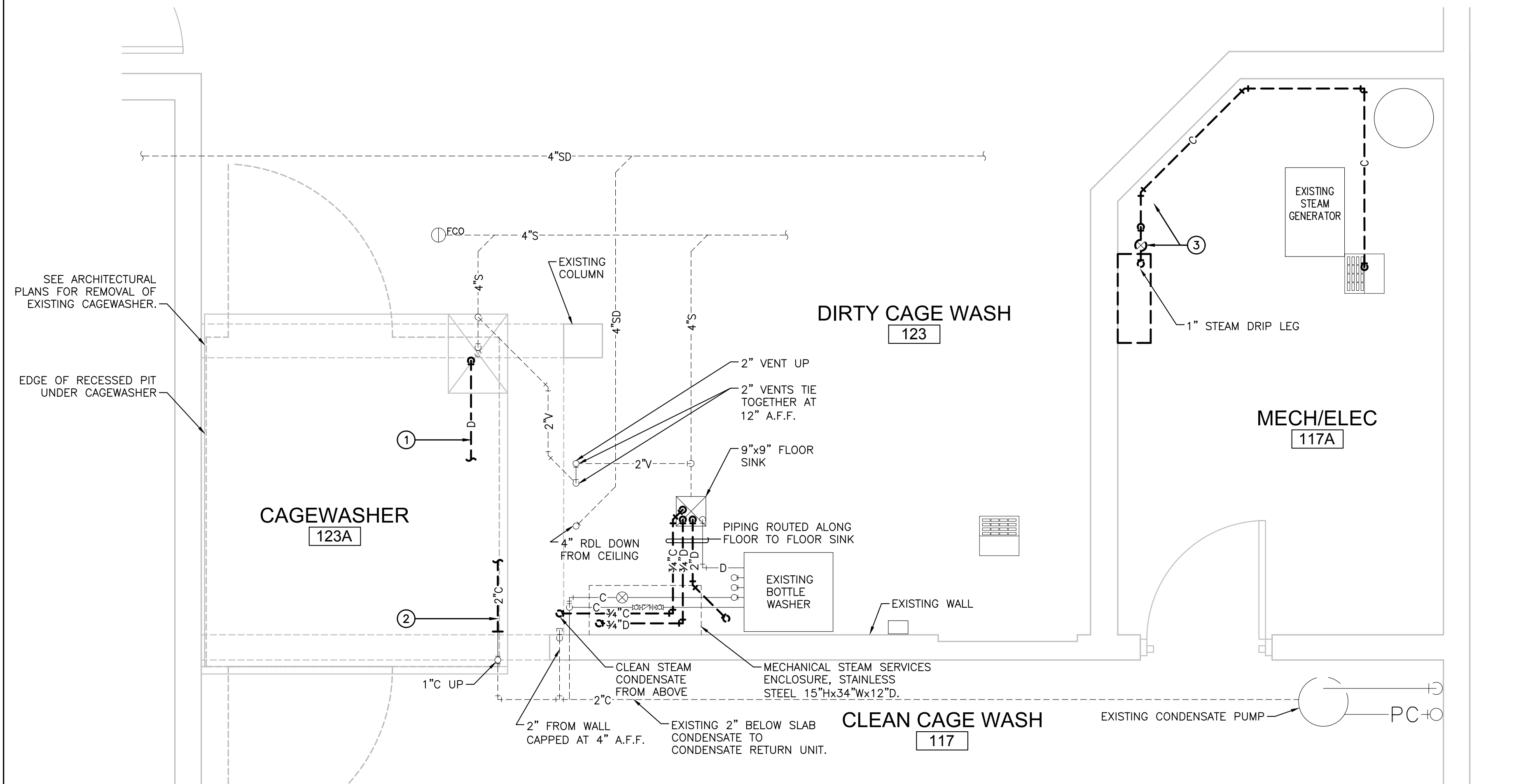
③ Clean Side South Wall Elevation  
1/2" = 1'-0"

NOTE:  
AFTER MACHINE IS INSTALLED, FIELD  
VERIFY ALL DIMENSIONS AS  
REQUIRED FOR STAINLESS STEEL  
CLOSURE PANELS FOR CUSTOM  
FABRICATION. PROVIDE SHOP  
DRAWINGS FOR APPROVAL BY  
ARCHITECT.



④ Dirty Side North Wall Elevation  
1/2" = 1'-0"





**1 FOUNDATION & FLOOR LEVEL MECHANICAL DEMOLITION PLAN**

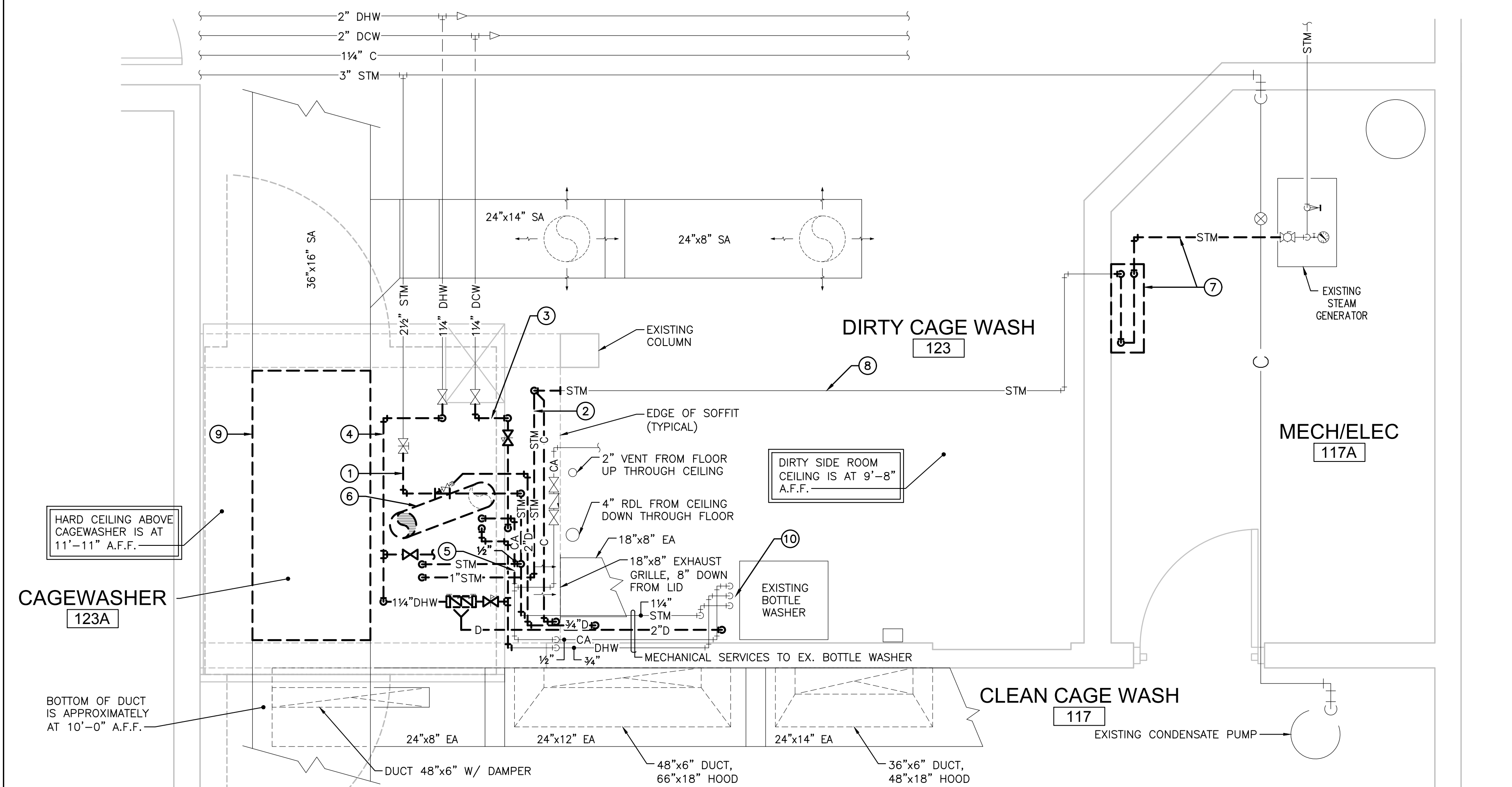


**MECHANICAL NOTES:**

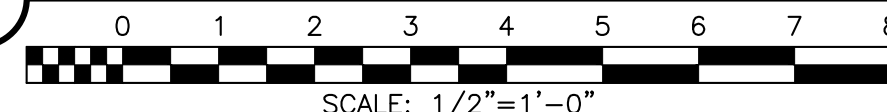
- ① REMOVE DRAIN SERVING EXISTING CAGEWASHER COMPLETE TO RECESSED PIT DRAIN SINK.
- ② REMOVE 2" CONDENSATE SERVING EXISTING CAGEWASHER BACK TO EXTENT SHOWN.
- ③ REMOVE EXISTING STEAM TRAP, STEAM PIPING, AND CONDENSATE PIPING COMPLETE FOR 1" STEAM SERVING EXISTING CAGEWASHER BEING REMOVED.

**NOTES:**

1. NO DEMOLITION WORK SHALL START UNTIL INITIAL TEST AND BALANCE READINGS HAVE BEEN TAKEN BY THE TEST AND BALANCE CONTRACTOR.
2. CONTRACTOR SHALL FIELD VERIFY ALL PIPE AND DUCT SIZES AND LOCATIONS.
3. THINLY DASHED PIPING LINES ARE EXISTING UNDERSLAB PIPING. ALL UNDERSLAB PIPING SHALL REMAIN.



**2 CEILING MECHANICAL DEMOLITION PLAN**

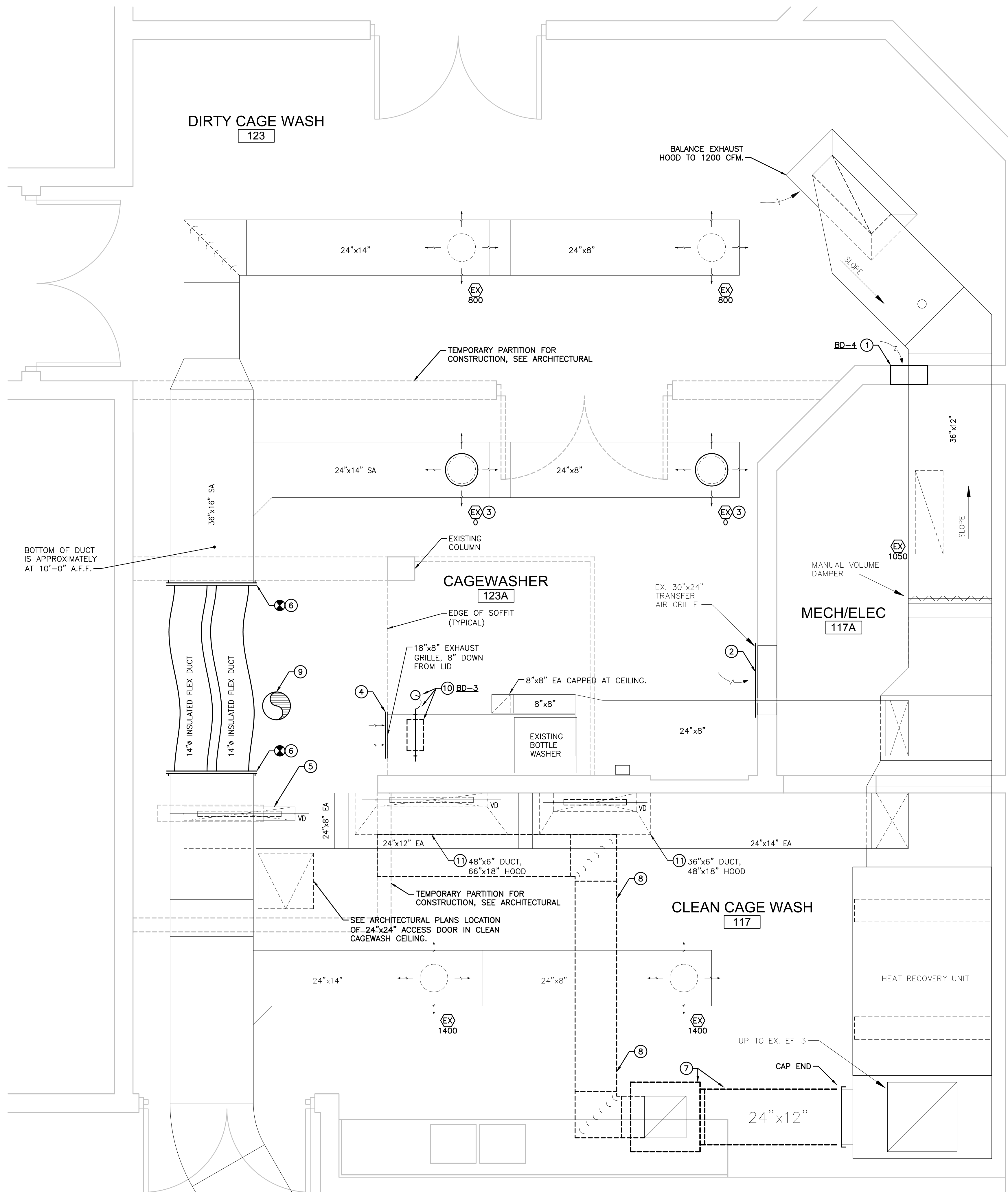


**MECHANICAL NOTES:**

- ① REMOVE 2 1/2" STEAM FROM EXISTING CAGEWASHER BACK TO ISOLATION VALVE.
- ② REMOVE 1" STEAM SERVING EXISTING CAGEWASHER BACK TO SOFFIT PENETRATION. TERMINATE PIPING AND ABANDON IN PLACE ABOVE THE CEILING.
- ③ REMOVE 1" DOMESTIC COLD WATER BACK TO ISOLATION VALVE.
- ④ REMOVE 1/4" DOMESTIC HOT WATER BACK TO ISOLATION VALVE.
- ⑤ REMOVE 1/2" COMPRESSED AIR SERVING EXISTING CAGEWASHER BACK TO BRANCH CONNECTION.
- ⑥ REMOVE EXISTING 8" CAGEWASHER EXHAUST COMPLETE.
- ⑦ REMOVE EXISTING STEAM PIPING SERVING CAGEWASHER BEING REMOVED ALONG WITH METAL ENCLOSURE AND SUPPORTS COMPLETE BACK TO ISOLATION VALVE AT STEAM GENERATOR HEADER.
- ⑧ ABANDON EXISTING 1" STEAM PIPING IN PLACE ABOVE CEILING. LABEL BOTH ENDS.
- ⑨ REMOVE SECTION OF 36"x16" SUPPLY AIR DUCT, AND PROTECT FOR REINSTALLATION. SEE SHEET M2.1 FOR CAPPING OF DUCT ENDS AND TEMPORARY SUPPLY AIR DUCT SERVING OPERATIONAL DIRTY CAGEWASH AREA.
- ⑩ RESTORE ALL SERVICES TO BOTTLE WASHER.

**NOTE:**

SEE SHEET M2.1 AND M3.1 FOR DUCTWORK DEMOLITION ASSOCIATED WITH EXISTING ABANDONED EF-4.

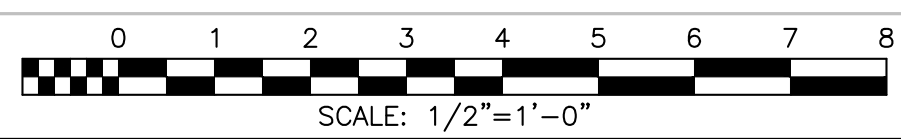


- MECHANICAL NOTES:**
- REMOVE 16" SQUARE SECTION OF CMU WALL. AT APPROXIMATELY 36" ABOVE FINISHED FLOOR. INSTALL OPPOSED BLADE DAMPER IN OPENING.
  - CAP EXISTING 30"x24" AIR TRANSFER OPENING AIR TIGHT.
  - CLOSE VOLUME DAMPER ON SUPPLY AIR DIFFUSER AND CAP DIFFUSER AIR TIGHT. SUPPLY AIR DIFFUSERS SHALL BE PROTECTED FROM CONSTRUCTION VAPORS, DUST AND DEBRIS. SUPPLY AIR DIFFUSERS PROTRUDE FROM THE CEILING IN A CYLINDRICAL FASHION.
  - CAP EXHAUST DUCT/GRILLE AIR AND WATER TIGHT TO PREVENT THE TRANSMISSION OF CONSTRUCTION DEBRIS, DUST OR VAPOR INTO LABORATORY EXHAUST SYSTEM.
  - CLOSE VOLUME DAMPER ON DUCT AND CAP DUCT TO BE AIR AND WATER TIGHT.
  - INSTALL FLANGED DUCTMATE CONNECTIONS ON OPEN ENDS OF EXISTING 36"x16" SUPPLY AIR DUCT. CAP OPEN DUCT ENDS. CONNECT FLEX DUCTS TO RECTANGULAR DUCT CAPS TO CONVEY SUPPLY AIR TO OPERATING SIDE OF DIRTY CAGEWASH. TEMPORARY SUPPLY AIR DUCTS SHALL BE AIR AND WATER TIGHT. THE INTENT OF INSTALLING FLEX DUCT IS TO ALLOW FOR CEILING REPLACEMENT.
  - REMOVE PORTION OF EXHAUST DUCT SERVING EXISTING EF-4 COMPLETE. SEE SHEET M4.1 FOR REMOVAL OF EXISTING EF-4.
  - POTENTIAL ROUTING OF VENTILATION DUCT FOR CONSTRUCTION PARTITION. IF MECHANICAL CONTRACTOR CHOOSES TO USE EXISTING EXHAUST DUCTWORK TO CONVEY SUPPLY AIR TO PARTITIONED CONSTRUCTION AREA, DUCTWORK SHALL BE CLEANED AND DISINFECTED BEFOREHAND. ROUTE DUCT TIGHT TO HARDLID CEILING TO SERVE CONSTRUCTION PARTITION.
  - EXISTING 8" EXHAUST DUCT ROOF PENETRATION CAN BE ENLARGED TO 12"Ø AND USED FOR VENTILATION DURING DEMOLITION AND CONSTRUCTION.
  - WHILE CAGEWASHER AREA SOFFIT IS REMOVED, INSTALL VOLUME DAMPER WITH REMOTE ACTUATOR IN 18"x8" EXHAUST AIR DUCT. INSTALL VOLUME DAMPER AS FAR DOWNSTREAM FROM EXISTING EXHAUST AIR GRILLE AS POSSIBLE. SEE MISCELLANEOUS EQUIPMENT SCHEDULE.
  - BALANCE EXISTING HOOD TO 425 CFM.

**NOTES:**

- THIS PLAN DEPICTS TEMPORARY CONSTRUCTION DURING DEMOLITION AND NEW WORK.
- CONSTRUCTION SHALL BE LIMITED TO THE GREATEST EXTENT POSSIBLE UNTIL TEST AND BALANCE CONTRACTOR HAS ACHIEVED AN AIR PRESSURE CASCADE AS DEPICTED ON SHEET M6.2 OR AS DIRECTED BY THE OWNER. THE INTENT IS TO MINIMIZE CONSTRUCTION DUST OR VAPORS FROM DISPERSING THROUGH THE FACILITY HVAC SYSTEM.

**TEMPORARY MECHANICAL HVAC PLAN**



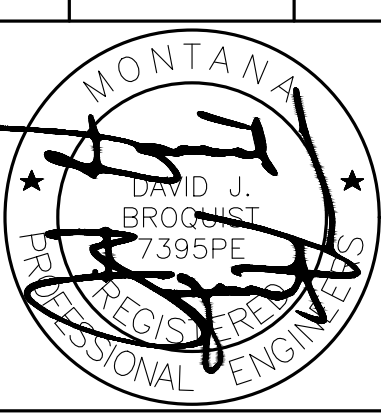
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**TIETZ HALL**  
 CAGE WASHER REPLACEMENT



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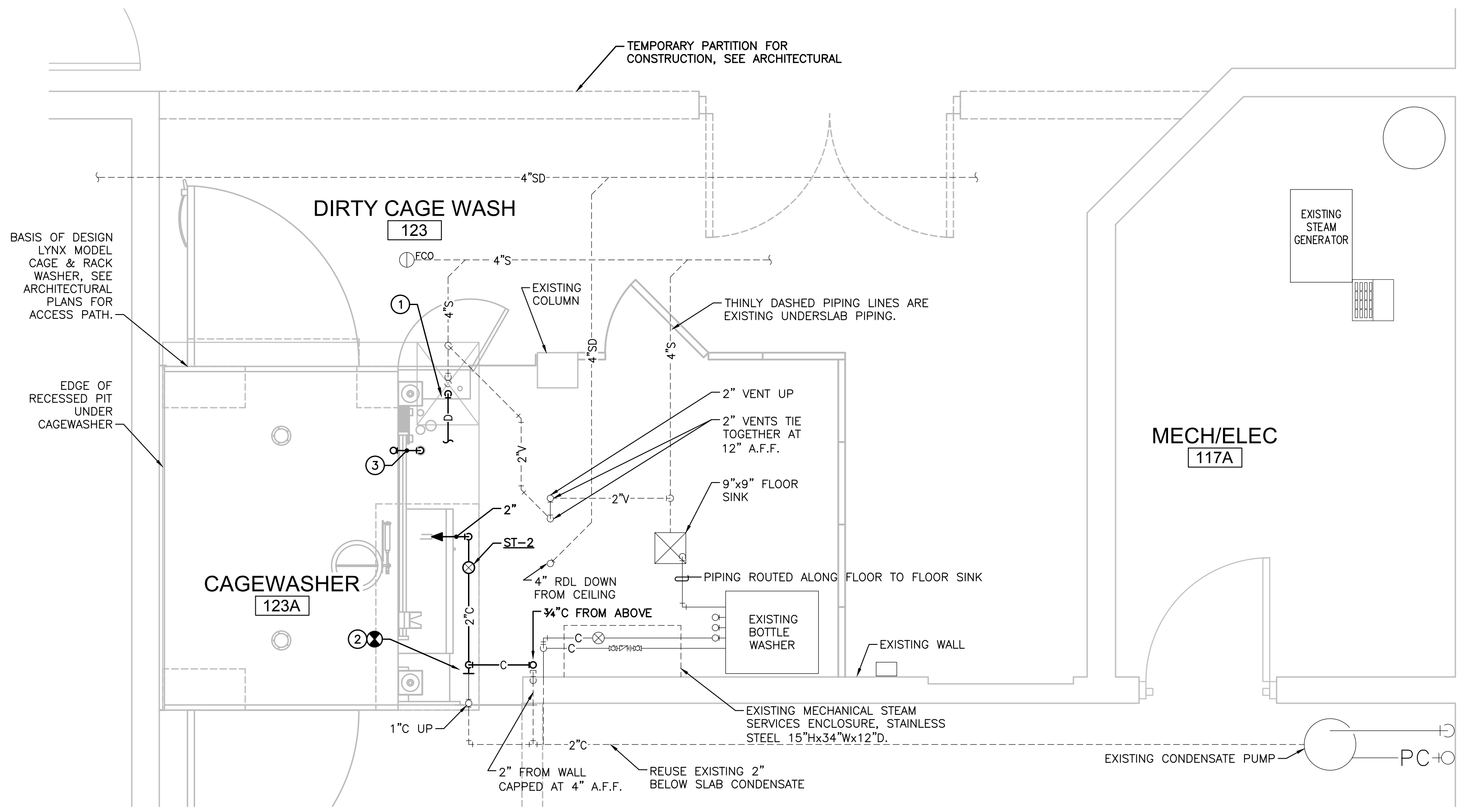
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**PPA#22-0541**  
**A/E# -**  
**GPD# 222506**

**SHEET TITLE**  
**CONSTRUCTION**  
**HVAC PLANS**  
**SHEET**  
**M2.1**

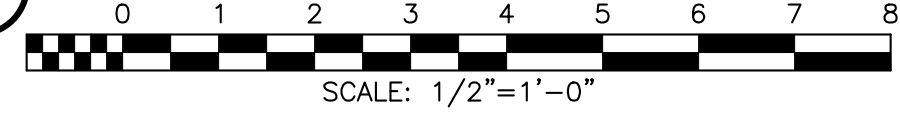
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**07-31-23**



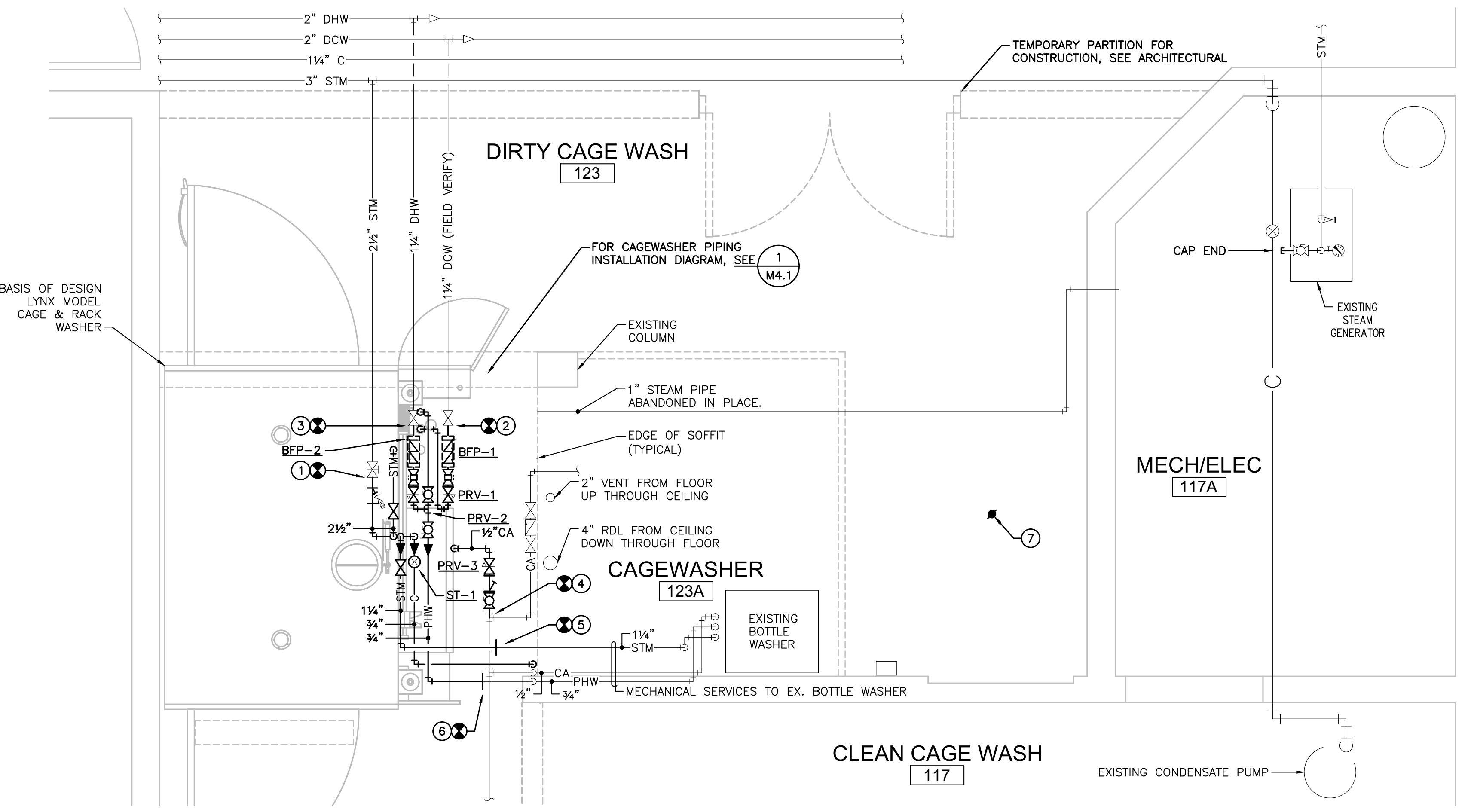
**MECHANICAL NOTES:**

- ① INSTALL CAGEWASHER DRAIN FROM EQUIPMENT CONNECTION AND SLOPE CONTINUOUSLY TO AIRGAP AT RECESSED PIT DRAIN.
- ② CONNECT TO EXISTING 2" CONDENSATE ROUTED IN RECESSED PIT AREA.
- ③ 2½" STEAM DOWN FROM ABOVE TO CONNECTION ON NEW CAGEWASHER. FOR MORE INFORMATION, SEE CAGEWASHER PIPING DIAGRAM 1/M5.1.

**1 FOUNDATION & FLOOR LEVEL MECHANICAL PIPING PLAN**



**CLEAN CAGE WASH 117**

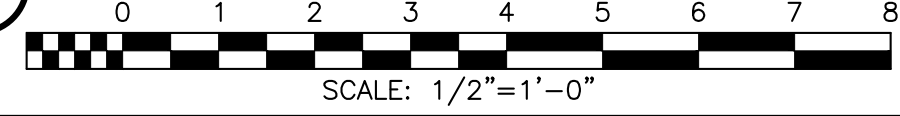


**MECHANICAL NOTES:**

- ① CONNECT NEW 2½" STEAM AT EXISTING ISOLATION VALVE.
- ② CONNECT NEW 1" DOMESTIC COLD WATER AT EXISTING ISOLATION VALVE.
- ③ CONNECT NEW 1¼" DOMESTIC HOT WATER AT EXISTING ISOLATION VALVE.
- ④ CONNECT NEW ½" COMPRESSED AIR. INSTALL ISOLATION VALVE AT POINT OF CONNECTION.
- ⑤ CONNECT TO EXISTING ¾" PROCESS HOT WATER SERVING EXISTING BOTTLE WASHER.
- ⑥ CONNECT EXISTING 1¼" STEAM SERVING EXISTING BOTTLE WASHER.
- ⑦ NEW FIRE SPRINKLER HEAD TO BE INSTALLED AS PART OF ALTERNATE BID ITEM #1. CENTER FIRE SPRINKLER IN JUT OUT ARE CREATED BY NEW PANEL SYSTEM. NEW FIRE SPRINKLER HEADS SHALL MATCH EXISTING WHERE POSSIBLE.

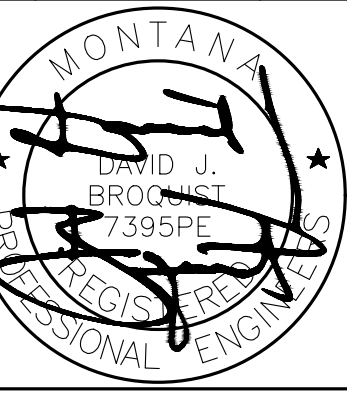
**ADD ALTERNATE BID ITEM #1:**  
 IN ROOMS 'DIRTY CAGE WASH 123' AND 'CAGEWASHER 123A', FIRE SPRINKLER SYSTEM WORK MUST BE ACCOMPLISHED IN ACCORDANCE WITH NFPA STANDARDS AND COMPLYING WITH THE REQUIREMENTS OF THE OWNERS INSURANCE CARRIER, STATE/LOCAL BUILDING CODES, AND THE FIRE DEPARTMENT.

**2 CEILING MECHANICAL PIPING PLAN**



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PPA#22-0541

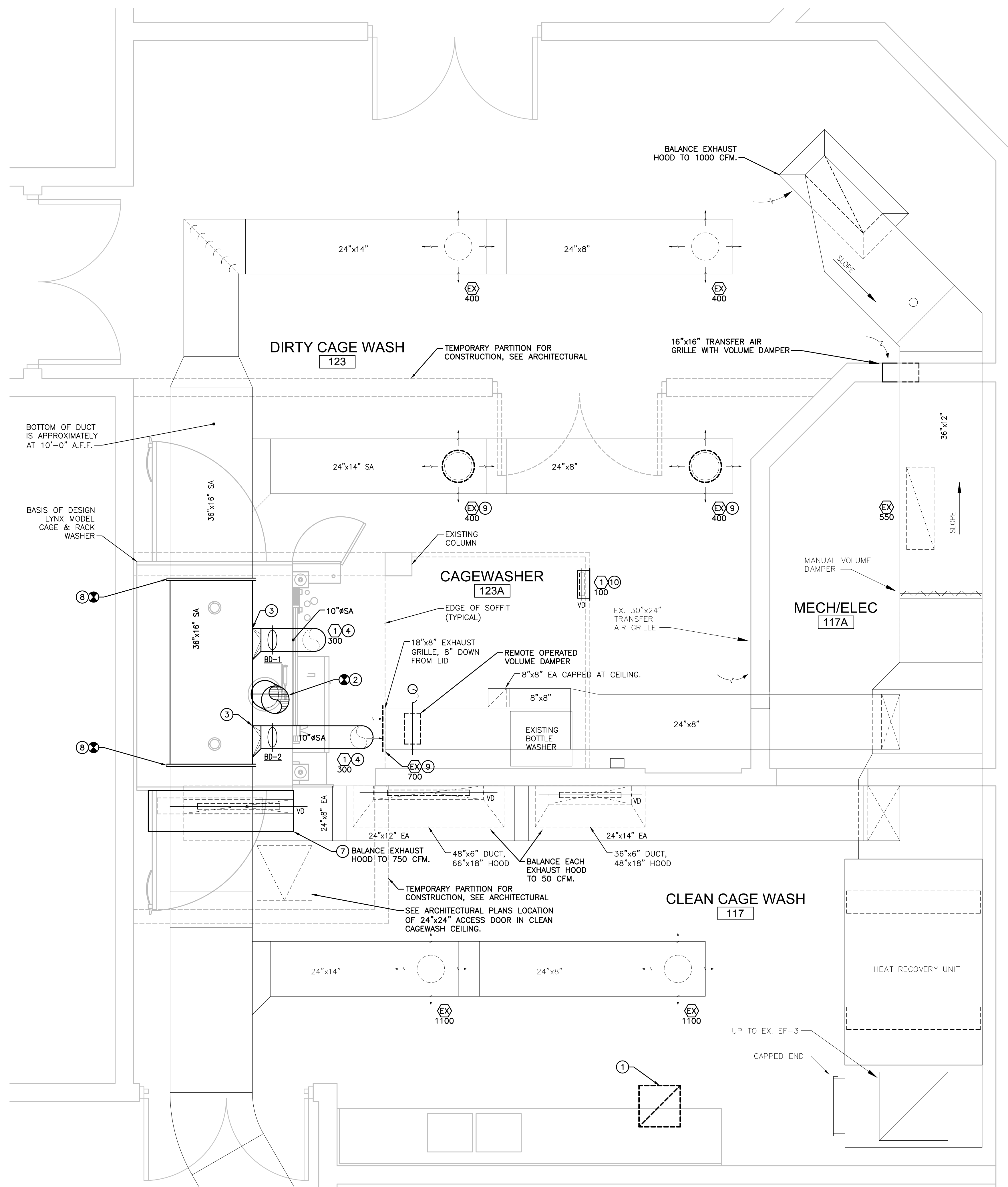
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GPD# 222506

SHEET TITLE  
 MECHANICAL  
 PIPING PLANS

SHEET  
**M3.1**

DATE  
 07-31-23



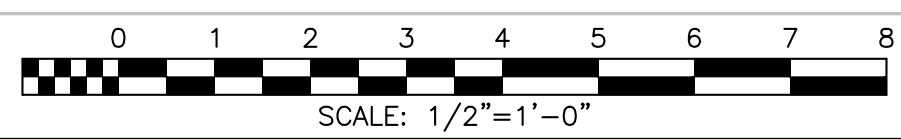
**MECHANICAL NOTES:**

- ① REMOVE ANY DUCTING ASSOCIATED WITH PROVIDING VENTILATION TO TEMPORARY CONSTRUCTION PARTITION. EXISTING DUCT TO REMAIN FROM CEILING TO TOP OF ROOF CURB. FILL DUCT WITH INSULATION AND CAP AIRTIGHT. CAP ROOF CURB AIR AND WATER TIGHT.
- ② INSTALL NEW 16 GAUGE 304 STAINLESS STEEL 12"Ø CAGEWASHER EXHAUST DUCT UP TO CAGEWASHER EXHAUST FAN ON ROOF. INSULATE EXHAUST DUCT.
- ③ CONNECT TO DUCT WITH LOW LOSS TAP CONNECTION. INSTALL VOLUME DAMPER NEAR LOCATION OF TAP. SEE MISCELLANEOUS EQUIPMENT SCHEDULE.
- ④ DIRECT DIFFUSER NOZZLE TO PROVIDE COOLING FOR CAGEWASHER CONTROL PANEL.
- ⑤ WHILE CAGEWASHER AREA SOFFIT IS REMOVED, INSTALL VOLUME DAMPER IN 18"x8" EXHAUST AIR DUCT. INSTALL VOLUME DAMPER AS FAR DOWNSTREAM FROM EXISTING EXHAUST AIR GRILLE.
- ⑥ INSTALL YOUNG REGULATOR REMOTE DAMPER OPERATOR MODEL 270-315BC CEILING TERMINATION OR APPROVED EQUAL. REMOTE DAMPER SHALL OPERATE NEW VOLUME DAMPER INSTALLED IN 18"x8" EXHAUST AIR DUCT.
- ⑦ CONNECT NEW CAGEWASHER HOOD TO EXISTING 48"x6" DUCT TAP WITH DAMPER. SEE DETAIL 4/M.4.1 FOR EXHAUST HOOD INSTALLATION.
- ⑧ REMOVE TEMPORARY SUPPLY AIR DUCTING AND REINSTALL SECTION OF 36"x16" SUPPLY AIR DUCT USING FLANGED DUCTMATE CONNECTIONS.
- ⑨ REMOVE TEMPORARY COVERS FROM DIFFUSER REGISTER OR GRILLE AND BALANCE TO INDICATED VALUES.
- ⑩ AS PART OF ADD ALTERNATE BID ITEM #1, INSTALL TRANSFER AIR GRILLE AT 24" ABOVE FINISHED FLOOR.

**NOTES:**

1. PLAN REPRESENTS THE FINAL CONDITIONS FOLLOWING REMOVAL OF THE TEMPORARY CONSTRUCTION ENCLOSURE.
2. AIRFLOWS LISTED ARE BASED ON PREVIOUS BALANCE REPORTS AND SHALL BE ADJUSTED BASED ON THE INITIAL READINGS TAKEN BEFORE WORK BEGAN AND AS NECESSARY TO ACHIEVE THE FINAL AIRFLOW ORIENTATIONS INDICATED ON SHEET M6.3.

**1** CEILING MECHANICAL HVAC PLAN



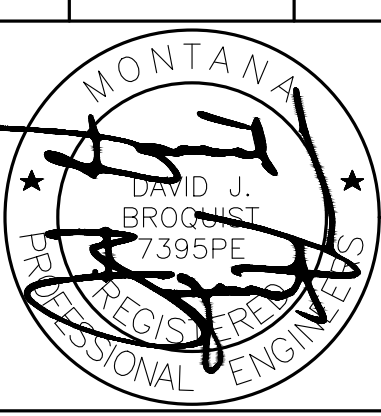
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 CAGE WASHER REPLACEMENT



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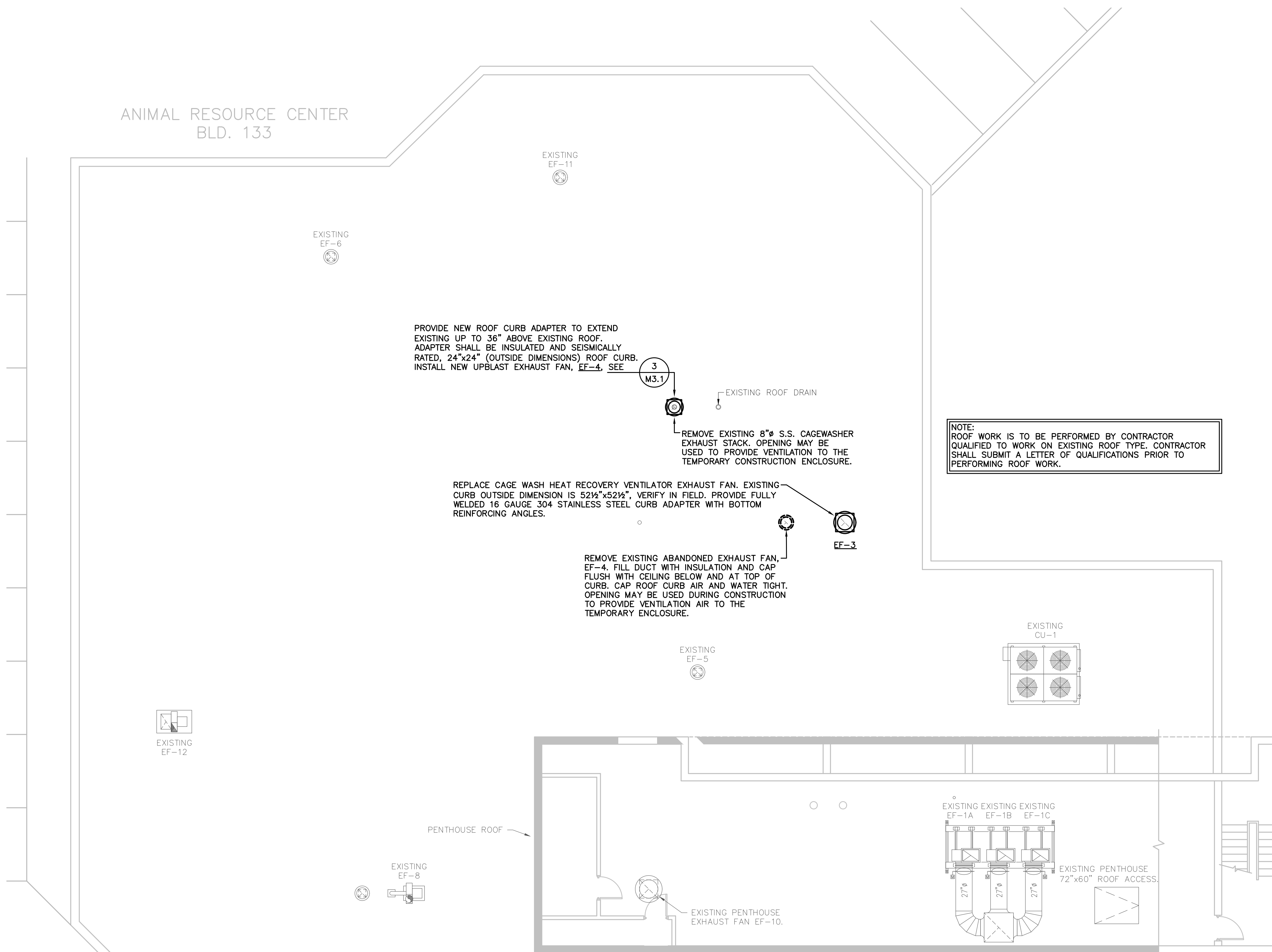
**PPA#22-0541**  
**A/E# -**  
**GPD# 222506**

**SHEET TITLE**  
**MECHANICAL**  
**HVAC PLANS**  
**SHEET**  
**M3.2**

**DATE**  
**07-31-23**



ANIMAL RESOURCE CENTER  
BLD. 133



NOTE:  
ROOF WORK IS TO BE PERFORMED BY CONTRACTOR  
QUALIFIED TO WORK ON EXISTING ROOF TYPE. CONTRACTOR  
SHALL SUBMIT A LETTER OF QUALIFICATIONS PRIOR TO  
PERFORMING ROOF WORK.

**N 1** ROOF MECHANICAL PLAN  
0 2 4 6 8 10 12 14 16 20 24 28 32  
SCALE: 1/8"=1'-0"



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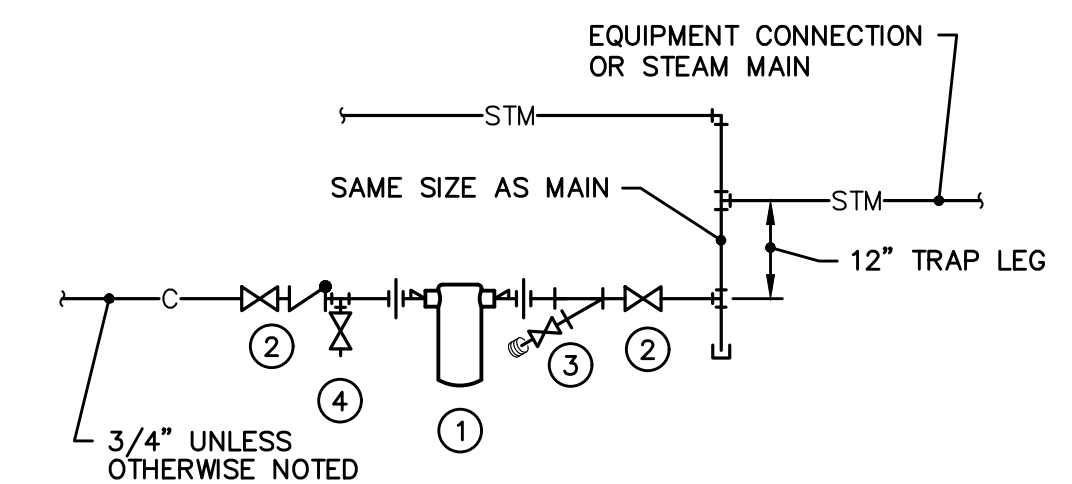
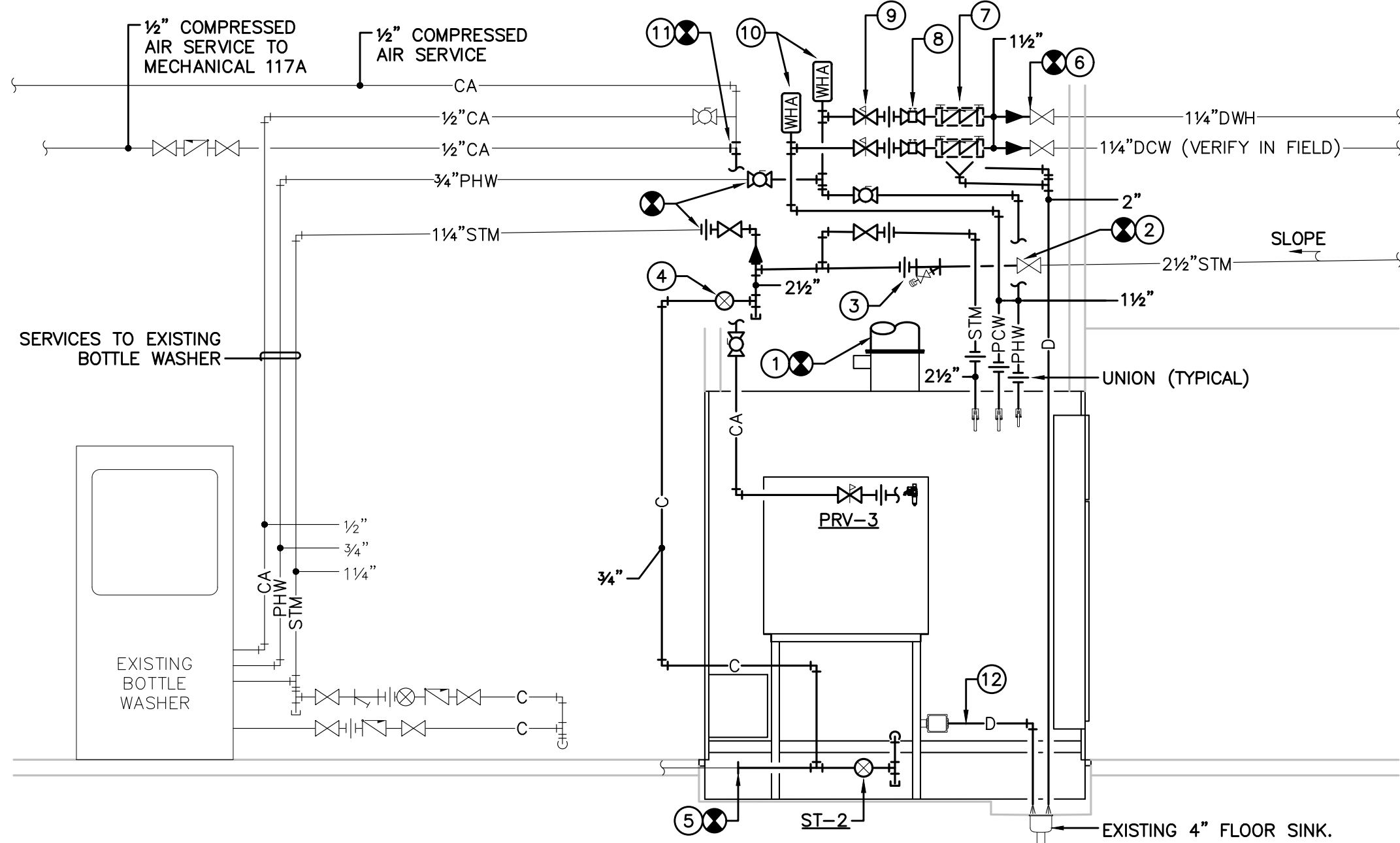
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**NOTES:**

- ① FLANGED 12"Ø EXHAUST DUCT CONNECTION AT CAGEWASHER EXHAUST DAMPER.
- ② CONNECT TO EXISTING 2½" STEAM ISOLATION VALVE.
- ③ INSTALL UNION AND STRAINER WITH BLOWDOWN LAID ON ITS SIDE.
- ④ STEAM TRAP, ST-1, FOR TYPICAL STEAM TRAP INSTALLATION, SEE DETAIL 2 ON THIS SHEET.
- ⑤ CONNECT TO EXISTING 2" CONDENSATE IN CAGEWASHER PIT AREA. FIELD DETERMINE LOCATION.
- ⑥ CONNECT TO EXISTING 1¼"DCW AND 1¼"DHW AT EXISTING ISOLATION VALVES, FIELD VERIFY SIZES.
- ⑦ REDUCED PRESSURE ZONE BACKFLOW PREVENTERS, BEP-1 (DOMESTIC COLD WATER) AND BEP-2 (DOMESTIC HOT WATER). SEE BACKFLOW PREVENTER SCHEDULE. PIPE DRAIN CUPS TO FIT.
- ⑧ FLOW BALANCE DEVICES, SEE FLOW BALANCE DEVICE SCHEDULE. PROVIDE REDUCERS AS REQUIRED.
- ⑨ PRESSURE REDUCING VALVES, PRV-1 (PROCESS COLD WATER, SET DOWNSTREAM PRESSURE TO 40PSIG) AND PRV-2 (PROCESS HOT WATER, SET DOWNSTREAM PRESSURE TO 40PSIG). SEE MISCELLANEOUS EQUIPMENT SCHEDULES.
- ⑩ 1½" WATER HAMMER ARRESTOR PLUMBING AND DRAINAGE INSTITUTE SIZE 'C'.
- ⑪ CONNECT TO EXISTING ½" COMPRESSED AIR PIPING.
- ⑫ PIPE CAGEWASHER DRAIN TO RECESSED PIT SUMP.

VERIFY AND ADJUST CONNECTION SIZES AND LOCATIONS AS REQUIRED TO MATCH ACTUAL EQUIPMENT SUPPLIED. PROVIDE UNIONS OR FLANGES AT ALL EQUIPMENT CONNECTIONS (INCLUDING DRAIN AND WASTE PIPING). PROVIDE 1" AIR GAP AT THE DISCHARGE OF ALL DRAINS. DIRECT WASTE STREAMS DOWN INTO FLOOR DRAIN BODY.



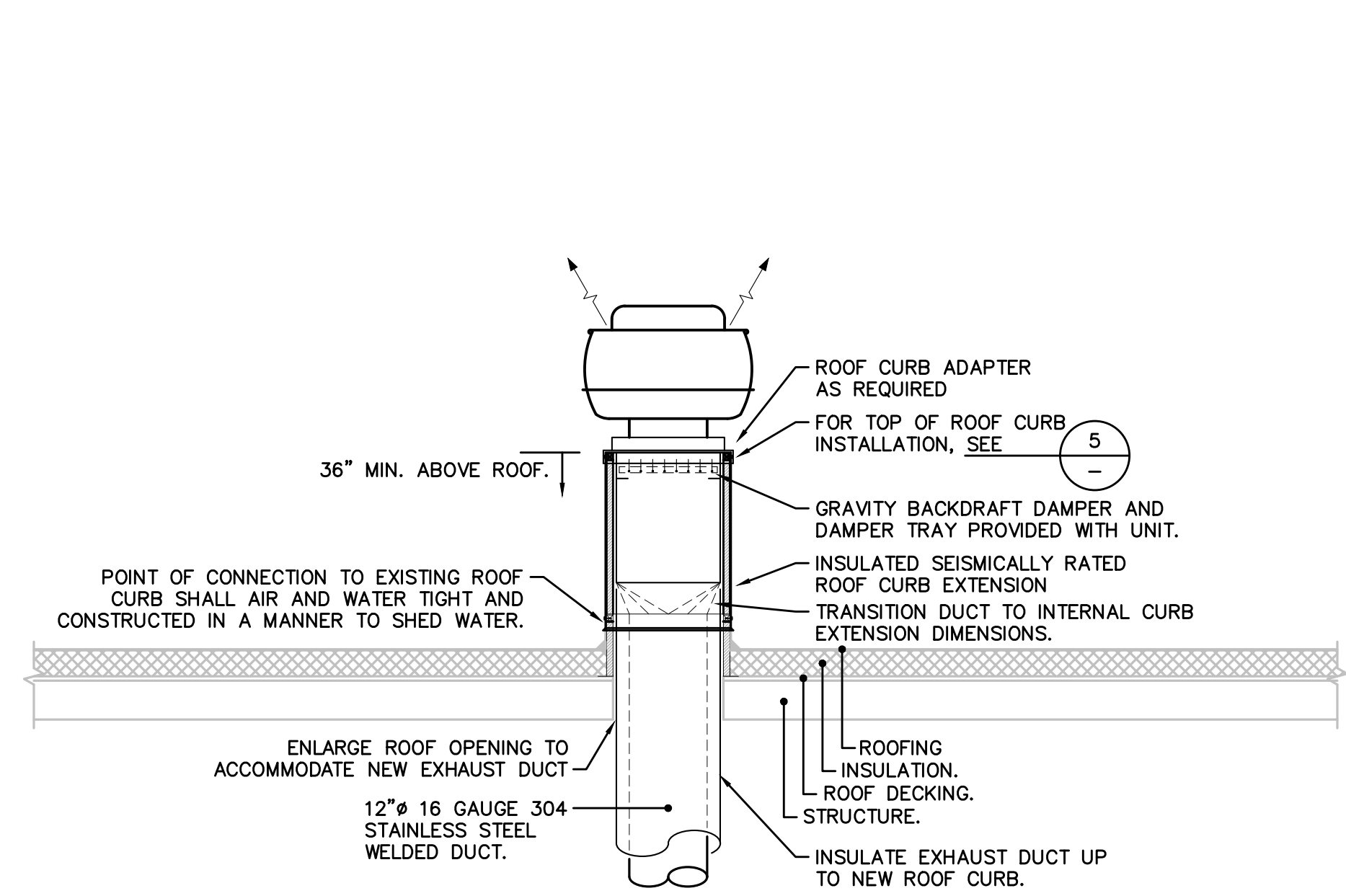
- ① STEAM TRAP. SEE SCHEDULE FOR TYPE, SIZE AND CAPACITY.
- ② ISOLATION VALVE.
- ③ Y STRAINER W/ 20/20 S.S. SCREEN, BLOWDOWN VALVE & HOSE THREAD.
- ④ TRAP TEST COCK - TRERICE MODEL 865-1 OR APPROVED EQUAL.
- ⑤ CHECK VALVE WHEN STEAM PRESSURE MUST LIFT CONDENSATE.

**① CAGE WASHER PIPING DIAGRAM**

SCALE: NO SCALE

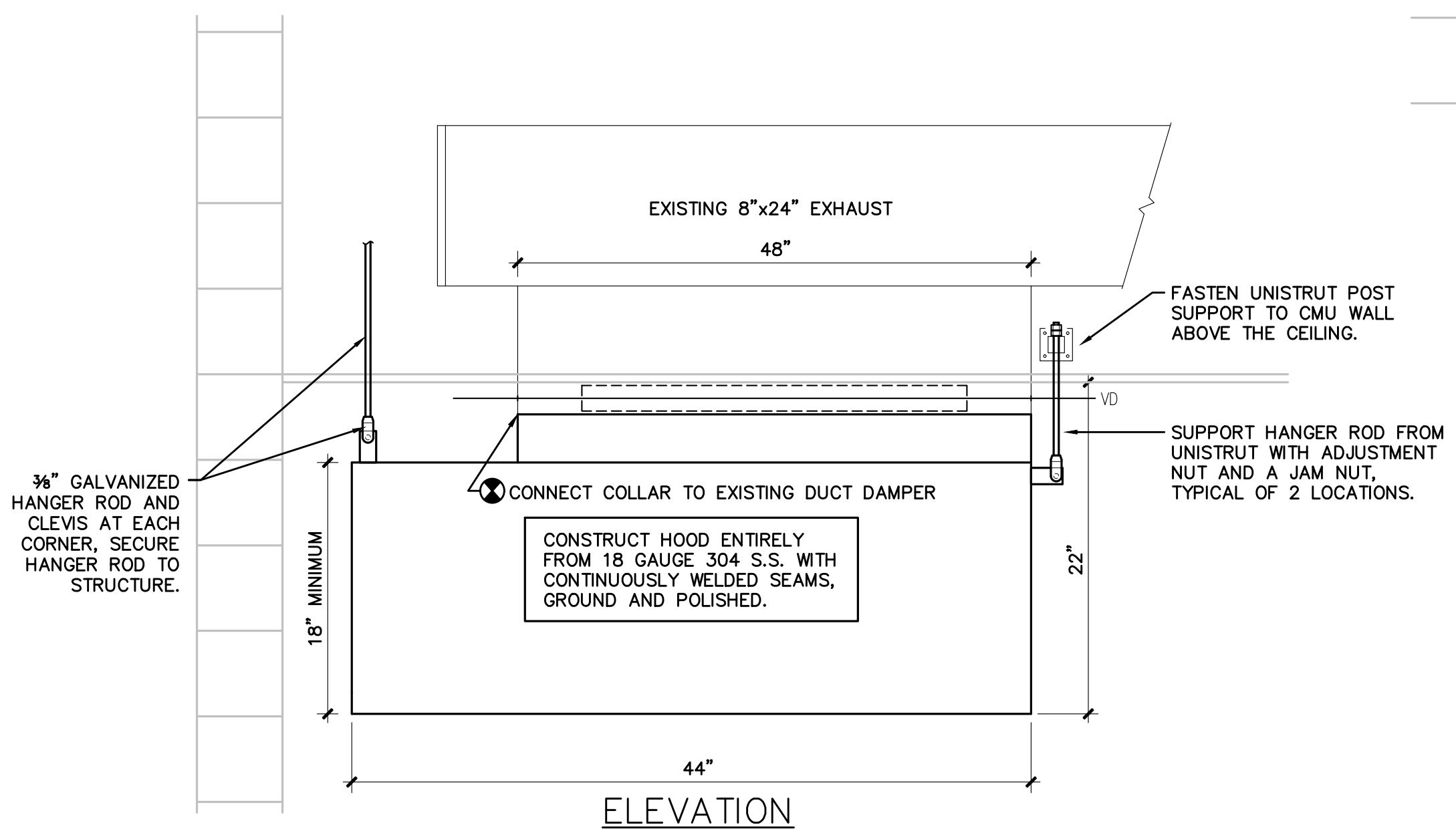
**② STEAM TRAP ASSEMBLY PIPING**

SCALE: NO SCALE



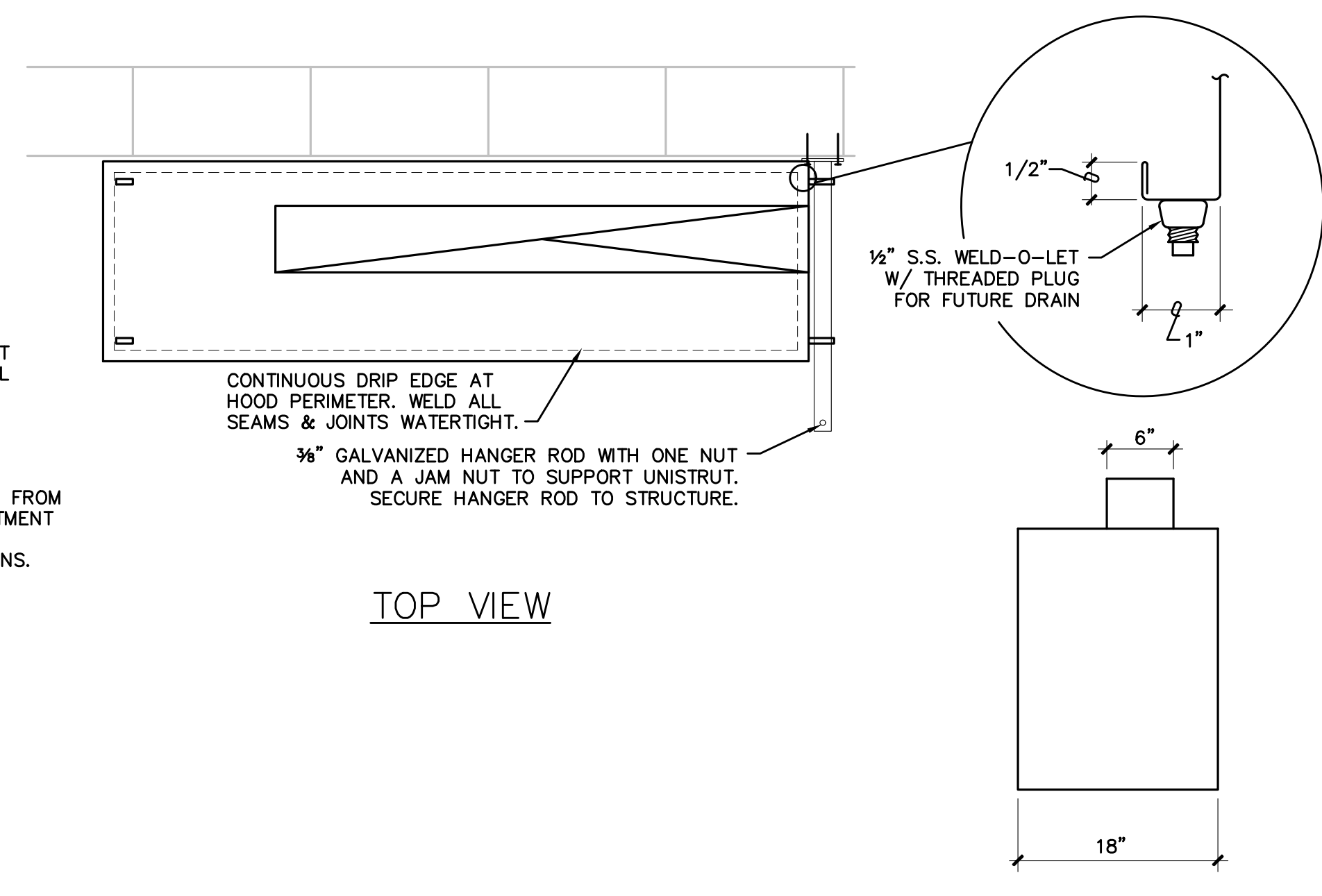
**③ CAGEWASH EXHAUST FAN INSTALLATION**

SCALE: NO SCALE

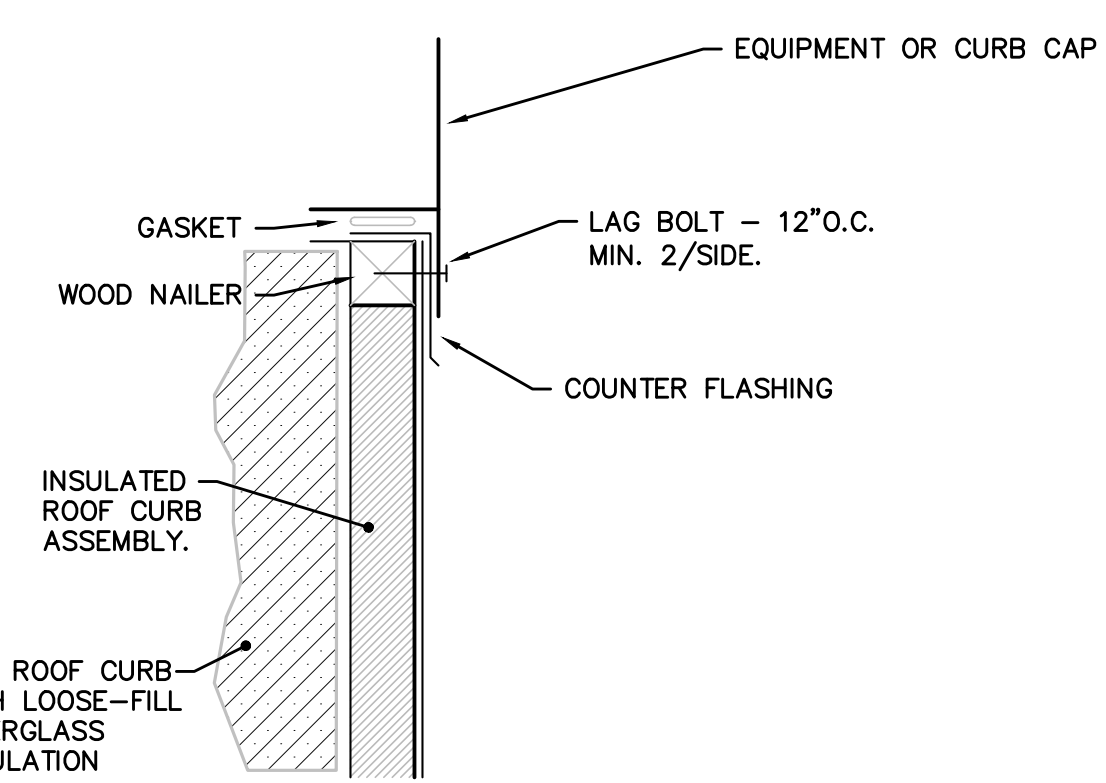


**④ CAGEWASH EXHAUST HOOD**

SCALE: NO SCALE



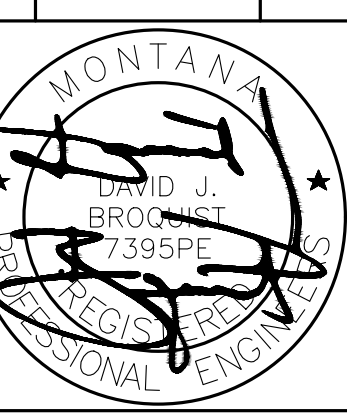
TOP VIEW



**⑤ TYPICAL ROOF CURB INSTALLATION**

SCALE: NO SCALE

DRAWN BY:		
REVIEWED BY:		
REV.	DESCRIPTION	DATE



PPA#22-0541

A/E# -

GPD# 222506

**SHEET TITLE**  
MECHANICAL  
DETAILS

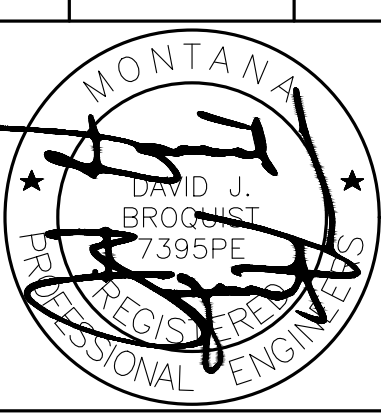
**SHEET**  
**M5.1**

**DATE**  
**07-31-23**



DRAWN BY:  
REVIEWED BY:

REV.	DESCRIPTION	DATE



PPA#22-0541

A/E# -

GPD# 222506

**SHEET TITLE**  
CONSTRUCTION PRESSURE  
CASCADE

**SHEET**  
**M6.2**

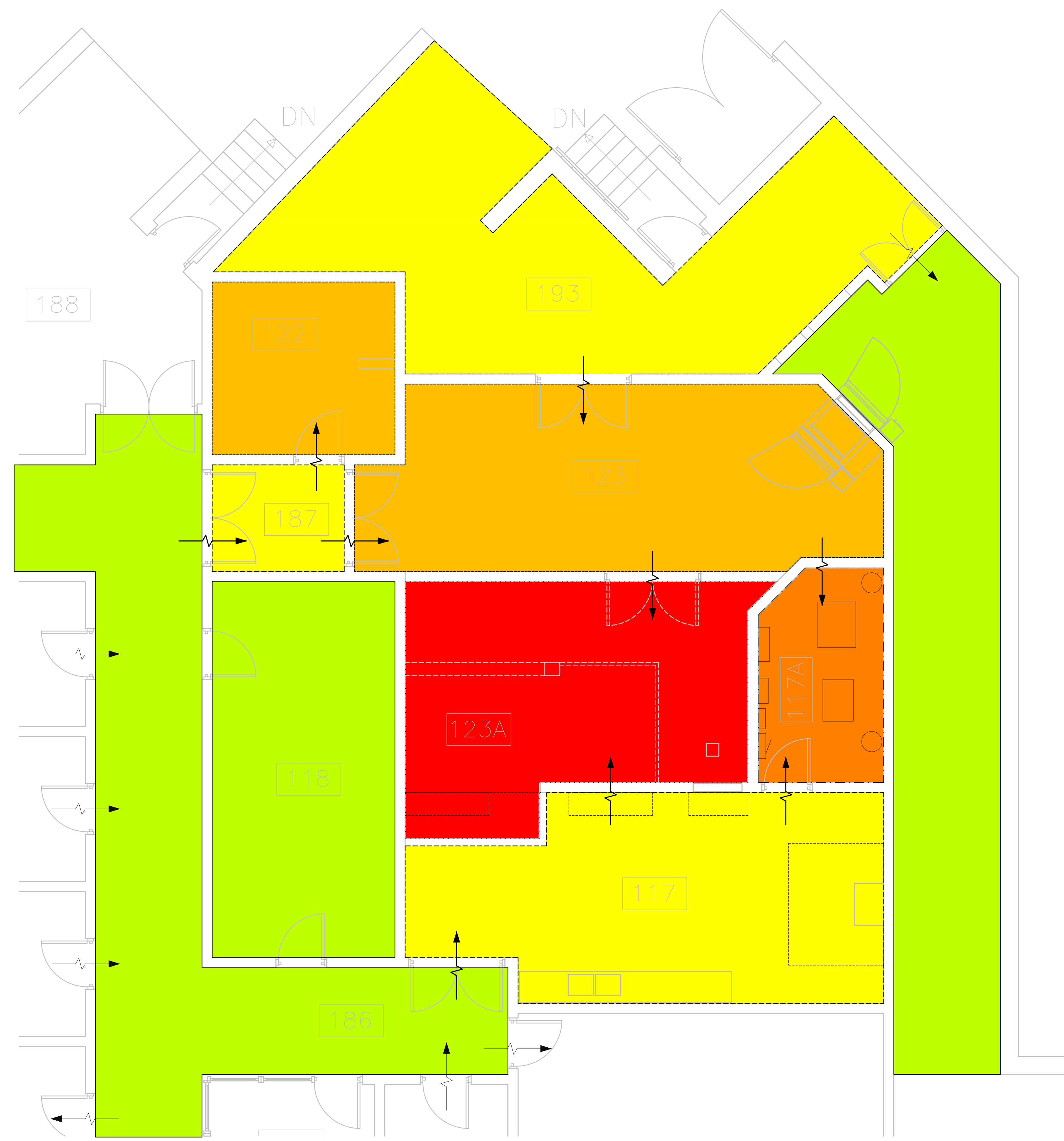
**DATE**  
**07-31-23**

**DESCRIPTION**

TEST AND BALANCE CONTRACTOR SHALL MAKE AIRFLOW ADJUSTMENT TO ACHIEVE AIR PRESSURE CASCADES AS SHOWN IN ALL MODES OF OPERATION. ENSURE THAT AIRFLOW ORIENTATION IS FROM THE CLEAN SIDE OF CAGEWASH TO THE DIRTY SIDE AND THE CONSTRUCTION PARTITION IN ALL OPERATING SCENARIOS TO PREVENT THE TRANSFER OF CONSTRUCTION DEBRIS, DUST, OR FUMES.

**PRESSURE CASCADE LEGEND**

- CASCADE 0
- CASCADE -1
- CASCADE -2
- CASCADE -3
- CASCADE -4
- AIR FLOW DIRECTION



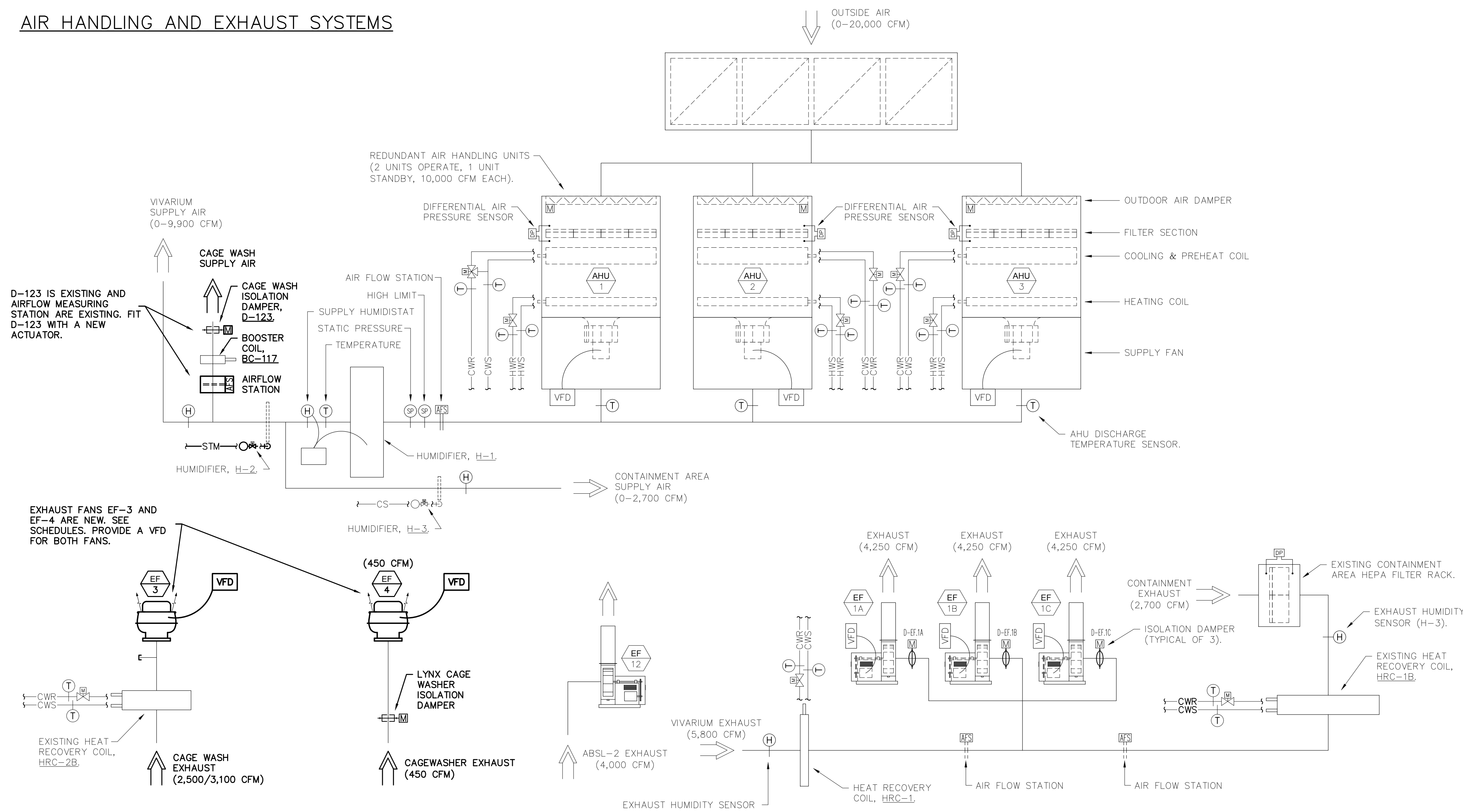
**CONSTRUCTION PRESSURE CASCADE**  
SCALE: 1/4"=1'-0"

P:\2022\PPA#22-0541\Drawings\A/E\TIETZ HALL\TIETZ HALL - CAGE WASHER REPLACEMENT - CONSTRUCTION PRESSURE CASCADE.dwg  
 07/31/23 11:58 AM  
 David J. Brockett  
 406.994.5413  
 406.994.5665



# TEMPERATURE CONTROLS

## AIR HANDLING AND EXHAUST SYSTEMS



**EQUIPMENT TO BE CONTROLLED:** EXISTING BOOSTER COIL (BC-117), NEW CAGEWASH MACHINE EXHAUST FAN EF-4 AND ASSOCIATED VFD, NEW CAGEWASH AREA EXHAUST FAN EF-3 AND ASSOCIATED VFD. THE AIR HANDLING UNIT SUPPLY FANS (AHU-1/2/3) AND OTHER EXHAUST FANS, DAMPERS AND EQUIPMENT DEPICTED HERE ARE EXISTING.

**DUTY:** TO EXHAUST THE CAGEWASH MACHINE, CLEAN AND DIRTY CAGEWASH AREAS AND PROVIDE CONDITIONED OUTDOOR AIR TO THESE SPACES WHILE MAINTAINING ROOM PRESSURIZATION CASCADES (PROPER AIRFLOW ORIENTATION) IN TIETZ HALL CAGEWASH ROOMS 117, 117A, 123, 123A.

**SCHEDULE:** THE MAIN BUILDING SYSTEMS OPERATE CONTINUOUSLY. NEW CAGEWASH MACHINE EXHAUST FAN WILL OPERATE INTERMITTENTLY WITH THE CAGEWASH MACHINE DURING VARIOUS CYCLES. CAGEWASH AREA EXHAUST FAN EF-3 WILL OPERATE CONTINUOUSLY AND WILL VARY SPEED ACCORDING TO OPERATION OF EF-4. AIRFLOW CONTROL DAMPER D-123 WILL MODULATE DEPENDING UPON THE OPERATIONAL CONDITIONS OF EF-3 AND EF-4.

**APPLIED CONTROL EQUIPMENT TO BE PROVIDED BY THE TEMPERATURE CONTROL (THIS) CONTRACTOR:** THE TEMPERATURE CONTROL CONTRACTOR WILL PROVIDE VFD'S FOR EF-3 AND EF-4, A NEW MODULATING ELECTRIC DAMPER ACTUATOR FOR D-123, FAN RELAYS AS REQUIRED AND A SPACE DIFFERENTIAL PRESSURE TRANSMITTER.

**SEQUENCE OF OPERATION:**

**CAGEWASH AREA:** THE CAGEWASH AREA SHALL OPERATE ACCORDING TO AN OCCUPIED/UNOCCUPIED SCHEDULE AS PROGRAMMED ON THE DDC. WHEN IN THE UNOCCUPIED MODE, EXHAUST FAN EF-4 SHALL BE DISABLED, DAMPER D-123 SHALL MODULATE TO REDUCE THE CAGEWASH SUPPLY AIR TO A LESSER FIELD-DETERMINED VOLUME AS MEASURED WITH THE AIRFLOW STATION AND CAGEWASH AREA EXHAUST FAN EF-3 SHALL REDUCE IN SPEED/VOLUME TO A FIELD-DETERMINED MINIMUM. WHEN OPERATING IN THE OCCUPIED MODE, AND THERE IS NO CALL FOR EF-4 TO OPERATE, EXHAUST FAN EF-3 SHALL RAMP IN SPEED/VOLUME AND DAMPER D-123 SHALL MODULATE OPEN TO PRODUCE AN INCREASED AIR EXCHANGE RATE IN THE CAGEWASH AREA. EXHAUST FAN EF-4 SHALL OPERATE ANYTIME THE CAGEWASH MACHINE CALLS FOR EXHAUST AT ITS CONTROL PANEL FAN CONTACTS AND SHALL RAMP TO A FIELD DETERMINED SPEED TO PRODUCE 450 CFM. WHEN EF-4 IS ACTIVATED, DAMPER D-123 SHALL MODULATE FURTHER OPEN TO PROVIDE MORE MAKEUP AIR TO THE CLEAN CAGEWASH (THE AIR EXHAUSTED FROM THE CAGEWASH BY EF-4 IS DRAWN FROM THE CLEAN CAGWASH ROOM). COORDINATE ALL SETTINGS AND RAMP SPEEDS IN CONJUNCTION WITH THE BALANCER IN ORDER TO MAINTAIN THE PROPER AIRFLOW ORIENTATIONS IN ALL CAGEWASH AREAS DURING ALL OPERATING MODES AND SEQUENCES.

AIRFLOW ORIENTATIONS IN THE CAGEWASH AREA ARE KEY TO MAINTAINING BIOLOGICAL SAFETY IN THE BUILDING. SHOULD THE AIR HANDLING UNITS ALL FAIL TO OPERATE, THE CAGEWASH AREA CONTROLS SHALL GO TO THE UNOCCUPIED MODE OF OPERATION.

**MONITORING AND ALARMS:**

MONITOR THE STATUS AND SPEED OF EXHAUST FANS EF-3 AND EF-4 AND ALARM FAN FAILURE THROUGH THEIR COMPANION VFD'S  
 ALARM FAILURE OF EF-3, EF-4 OR D-123 IF ANY FAIL TO GO TO THEIR COMMANDED CONDITION OR POSITION FOR LONGER THAN AN 10 SECONDS (ADJUSTABLE).  
 ALARM SPACE DIFFERENTIAL PRESSURIZATION REVERSAL GREATER THAN 0.01" W.C. (ADJUSTABLE) LASTING LONGER THAN 20 SECONDS (ADJUSTABLE).



MSU-CPDC

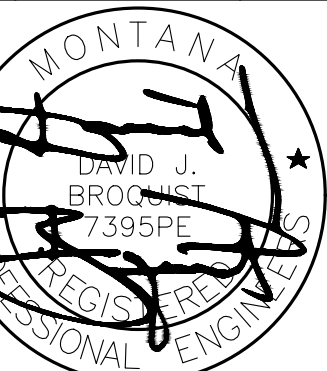
MONTANA STATE UNIVERSITY  
 BOZEMAN, MONTANA  
 PHONE: 406.994.5413  
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# TIETZ HALL CAGE WASHER REPLACEMENT



DRAWN BY:  
 REVIEWED BY:

REV.	DESCRIPTION	DATE



PPA#22-0541

A/E# -

GPD# 222506

SHEET TITLE  
 TEMPERATURE CONTROLS

SHEET  
**M7.1**

DATE  
 07-31-23

**ELECTRICAL LEGEND**

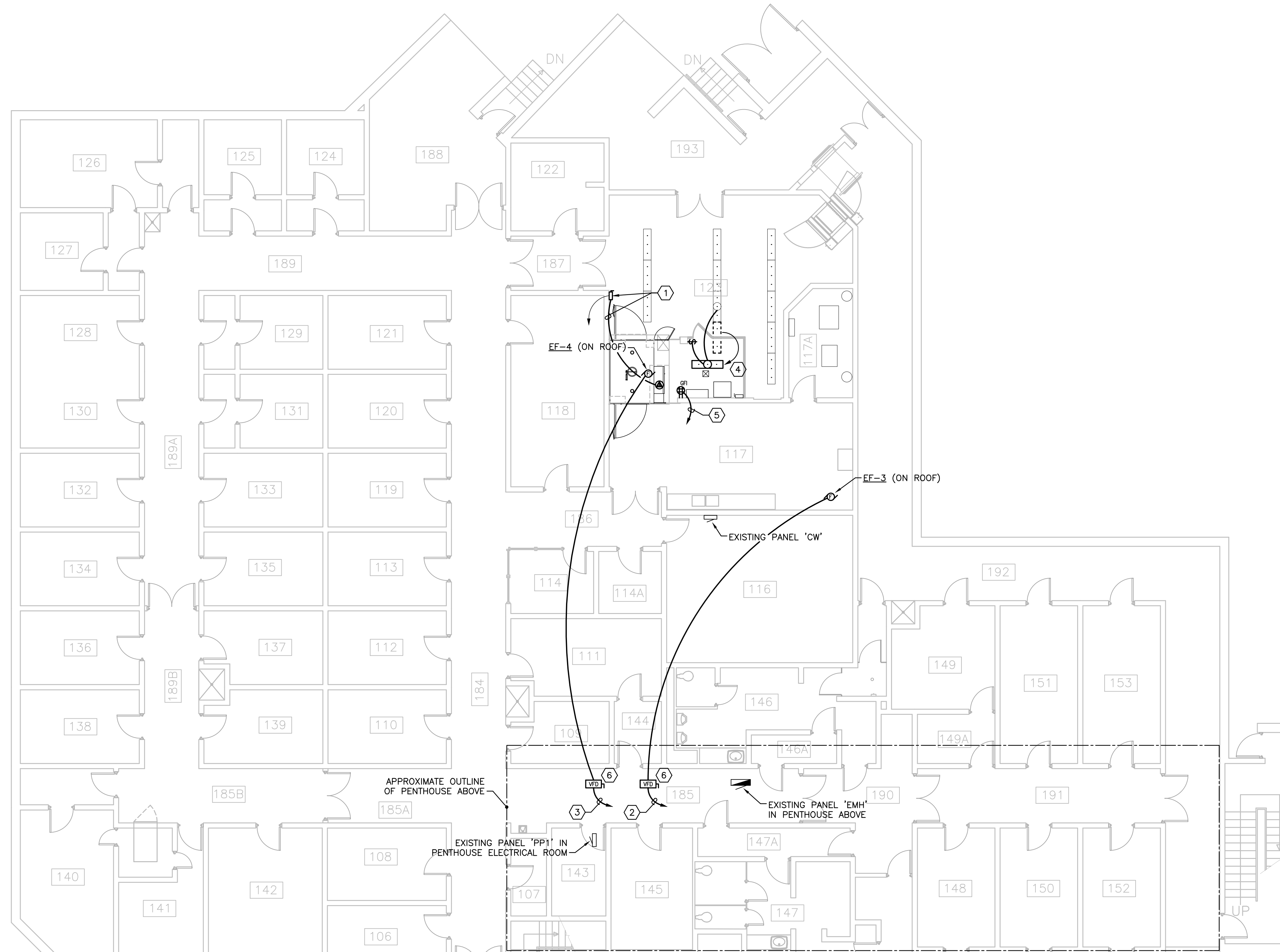
SYMBOL	DESCRIPTION
	POWER PANEL
	VARIABLE FREQUENCY DRIVE
	DISCONNECT SWITCH
	BRANCH CIRCUIT CONCEALED IN WALL OR CEILING
	BRANCH CIRCUIT CONCEALED IN OR UNDER FLOOR
	CONDUIT RUN - NUMBER OF ARROWHEADS INDICATES THE NUMBER OF CIRCUITS REQUIRED.
	CONDUIT STUB
	DUPLEX CONVENIENCE RECEPTACLE
	MOTOR (M - MOTOR, F - FAN, P - PUMP)
	SPECIAL EQUIPMENT CONNECTION OR OUTLET AS NOTED
ABBREVIATIONS	DESCRIPTION
AIC	AMPS INTERRUPTING CURRENT
ATS	AUTOMATIC TRANSFER SWITCH
C	CONDUIT
EX	EXISTING
G, GRD	GROUND
GFI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSEPOWER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
XFMR	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE
WP	WEATHERPROOF
W/	WITH
GUIDE TO LINE WEIGHTS FOR ELECTRICAL ITEMS	
	ITEMS SHOWN LIGHT ARE EXISTING AND TO REMAIN
	ITEMS SHOWN BOLD AND SOLID ARE NEW
	ITEMS SHOWN BOLD AND DASHED ARE TO BE REMOVED

**GENERAL SHEET NOTES:**

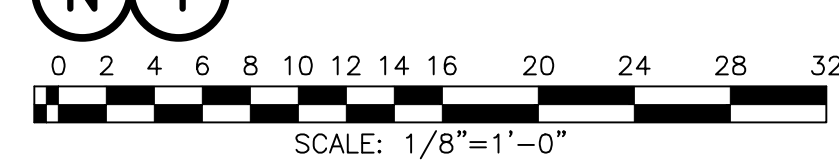
- THE ELECTRICAL CONTRACTOR SHALL BE COGNIZANT THAT THIS IS A REMODEL PROJECT AND AS SUCH, ELECTRICAL PANELS, DEVICES, CIRCUITS, ETC. SHOWN ARE DRAWN FROM EXISTING DRAWINGS AND FIELD OBSERVATIONS AND SHALL BE USED AS A REFERENCE ONLY. THERE MAY BE ADDITIONAL ELECTRICAL DEVICES THAT NEED TO BE REMOVED AND THEIR REMOVAL SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- ELECTRICAL DEVICES SHOWN LIGHT AND SOLID ARE EXISTING TO REMAIN. DEVICES SHOWN HEAVY AND DASHED ARE EXISTING TO BE REMOVED.
- ABANDONED CONDUIT, WIRE, J-BOXES AND SIGNALING WIRE IS TO BE REMOVED WHERE ACCESSIBLE.
- PATCH ALL HOLES FROM REMOVED CONDUIT AND CABLING WITH GROUT OR CAULK (FIRE RATED AS REQUIRED).
- ANY CIRCUITS (POWER, SYSTEMS, LIGHTING, FIRE ALARM, ETC.) THAT ARE IN THE WAY OF DEMOLITION SHALL BE EXTENDED/RE-ROUTED AS REQUIRED. ELECTRICIAN SHALL VISIT SITE PRIOR TO BID TO VERIFY THAT ALL REQUIRED DEMOLITION AND RE-ROUTING IS IN HIS BID.

**SPECIFIC SHEET NOTES:**

- DISCONNECT EXISTING CAGE WASH, MAINTAINING FUSED DISCONNECT AND CIRCUITING BACK TO PANEL 'CW'. PROVIDE CONNECTION TO NEW CAGE WASH VIA 3#6 AND #10G IN 1" CONDUIT AND PROVIDE NEW FUSES IN EXISTING DISCONNECT SWITCH, COORDINATING FUSE SIZE WITH MANUFACTURER NAMEPLATE.
- DISCONNECT EXISTING EXHAUST FAN AND REMOVE ALL CONDUIT AND WIRE BACK TO PANEL 'PP1'. PROVIDE CONNECTION TO NEW EXHAUST FAN AND ASSOCIATED VFD. CONNECT TO EXISTING PANEL 'EMH' VIA 3#12 AND #12G IN 3/4" CONDUIT. PROVIDE NEW 20A-3P CIRCUIT BREAKER IN PANEL.
- DISCONNECT EXISTING EXHAUST FAN AND REMOVE ALL CONDUIT AND WIRE BACK TO PANEL 'PP1'. PROVIDE CONNECTION TO NEW EXHAUST FAN AND ASSOCIATED VFD. CONNECT TO EXISTING PANEL 'EMH' VIA 3#12 AND #12G IN 3/4" CONDUIT. PROVIDE NEW 15A-3P CIRCUIT BREAKER IN PANEL.
- ALTERNATE BID ITEM #1: RELOCATE EXISTING 4'-0" LIGHT FIXTURE INTO NEW ROOM. ADD NEW LIGHT SWITCH TO CONTROL FIXTURE SEPARATE FROM ADJACENT ROOM. EXTEND EXISTING WIRING AS REQUIRED VIA 2#12 AND #12 GROUND IN 1/2" CONDUIT.
- PROVIDE NEW GFI RECEPTACLES AND CONNECT TO PANEL 'PP1' VIA 2#12 AND #12G IN 1/2" CONDUIT. PROVIDE NEW 20A-1P CIRCUIT BREAKER IN PANEL. VERIFY MOUNTING HEIGHT AND FINAL LOCATION WITH CHEMICAL SYSTEM EQUIPMENT SUPPLIER.
- LOCATE NEW VFD IN MECHANICAL PENTHOUSE, COORDINATING LOCATION WITH EXISTING GEAR.



**1 ELECTRICAL PLAN**



**MECHANICAL EQUIPMENT CONNECTION SCHEDULE**

UNIT	VOLTAGE	Ø	HP/LOAD	STARTER & CONTROLS					SAFETY DISCONNECT SWITCH					
				TYPE	MCP/FUSED	NEMA ENCL. SIZE	POLES	SWITCH	PILOT	SIZE	NEMA ENCL. SIZE	FUSED	NOTE	
EF-3	480	3	5 HP	VFD										(1) (2)
EF-4	480	3	3/4 HP	VFD										(1) (2)

**NOTES:**  
 (1) INSTALL VFD'S (FURNISHED BY OTHERS) AND PROVIDE CONNECTIONS BETWEEN VFD'S AND MOTORS.  
 (2) UNIT FURNISHED WITH DISCONNECT SWITCH.