LAKE HAVASU CITY, ARIZONA
ADMINISTRATIVE SERVICES DEPARTMENT
♦ PROCUREMENT ♦

INVITATION TO BID
NEW LABORATORY BUILDING REBID
PROJECT NO. B26-PW-107033-500739
ADDENDUM NO. 2
DECEMBER 5, 2025

Attention is called to the following changes, additions, clarifications and/or deletions to the original solicitation and they shall be considered in preparing submissions:

There is no change in the opening date. **Submissions are due no later than 3:00 p.m., Arizona Time, DECEMBER 17, 2025**, at the City Clerk's Office, 2330 McCulloch Blvd. N., Lake Havasu City, AZ 86403.

ITEM ONE (1): CLARIFICATION – STANDARDIZATION

The City is in the process of standardizing with TRANE equipment for its HVAC needs. Please see the attached plan set (Exhibit A) for details relating to this.

ITEM TWO (2): QUESTIONS AND ANSWERS

Question 1: With the City only allowing 150 Calendar Days to complete this project, will there be a separate NTP for procurement purposes issues ahead of time?

Answer 1: Yes. The City will issue a Materials Only NTP that will not start the 150 Day clock.

Question 2: Will subcontractors be able to bill for stored material if the City issues a Procurement NTP ahead of the actual start date?

Answer 2: Yes, the City would allow long lead time items to be billed ahead of the project starting. However, this would only be for materials with critical path issues and not stored materials.

Question 3: I am putting together a proposal for this project and would like verification of plan sheet C-3. Is there a projected curb, gutter and sidewalk that I need to address?

Answer 3: Please refer to sheet C-2 and the applicable details there as all information is referenced in the construction notes. There is a sidewalk that is flush with grade. There is no curb or gutter.

Andrew Klos, CPPB
Senior Procurement Specialist

GENERAL NOTES (APPLIES TO ALL SHEETS):

1. ALL WORK SHALL BE PROVIDED IN ACCORDANCE WITH 2018 INTERNATIONAL BUILDING CODES AND ALL APPLICABLE NATIONAL AND STATE CODES, AND SAFETY STANDARDS, INCLUDING ANY LOCAL AMENDMENTS ADOPTED BY THE STATE OF ARIZONA.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS PRIOR TO EXECUTION OF ANY WORK ON THE PROJECT.

3. ALL MECHANICAL EQUIPMENT SCHEDULED/SHOWN ON PLANS HAS BEEN SIZED IN ACCORDANCE WITH ASHRAE STANDARD 183, "PEAK COOLING AND HEATING LOAD CALCULATIONS IN BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS," USING INDUSTRY STANDARD SOFTWARE: I.E. ELITE SOFTWARE CHVAC, TRANE TRACE, ETC.

4. PROJECT/BUILDING(S) MINIMUM VENTILATION RATES HAVE BEEN CALCULATED IN ACCORDANCE WITH INTERNATIONAL MECHANICAL CODE (IMC) TABLE 403.3.1.1.

5. WORK INCLUDED: FURNISH MATERIAL, LABOR AND SERVICES NECESSARY FOR AND INCIDENTAL TO THE INSTALLATION OF THE FOLLOWING SYSTEMS WHERE SHOWN ON THE PLANS AND AS HEREINAFTER SPECIFIED. INCLUDE ALL NECESSARY WORK, MATERIALS, AND EQUIPMENT TO PERFORM WORK COMPLETELY.
   A. AIR HANDLING EQUIPMENT INCLUDING, BUT NOT LIMITED TO, PACKAGED DX ROOFTOP AIR HANDLING UNITS, DEDICATED OUTDOOR UNITS, HEAT PUMPS, FAN COILS, TERMINAL UNITS, AND EXHAUST FANS.
      a. ALL HVAC EQUIPMENT SHALL BE LABELED ON THE EXTERIOR AND INTERIOR OF BUILDING FOR EASE OF IDENTIFICATION. CONTRACTOR SHALL USE NAMING CONVENTION USED PROVIDED WITHIN THE THESE CONTRACTOR DOCUMENTS UNLESS DIRECTED OTHERWISE BY OWNER/TENANT/BUILDING MANAGEMENT.
         - EXTERIOR LABELS SHALL BE AN ENGRAVED PLATE MADE OF RUST AND UV FADE RESISTANT MATERIALS PERMANENTLY APPLIED TO EXTERIOR OF EQUIPMENT IN LOCATION EASILY SEEN, AN WHICH DOES NOT IMPACT PERFORMANCE OF EQUIPMENT. SIZE OF LETTERING/NUMBERING ON LABEL SHALL BE A MINIMUM OF 2" TALL, OR OTHERWISE APPROVED BY THE OWNER/TENANT/BUILDING MANAGEMENT.
         - INTERIOR LABELING IN OPEN TO CEILING AREAS SHALL BE PAINTED STENCIL, OR OTHERWISE APPROVED APPLICATION. PAINT SHALL BE A BRIGHT COLOR (I.E. WHITE, ETC.) DISSIMILAR TO COLOR OF DUCT/EQUIPMENT BEING APPLIED. SIZE OF LABEL SHALL BE VISIBLE/LEGIBLE FROM FLOOR. POSITION OF LABEL SHALL BE UNDERSIDE OF DUCT/DIFFUSER/EQUIPMENT. FINAL COORDINATION OF LABEL POSITION SHALL BE DONE IN THE FILED IN COORDINATION WITH OWNER/TENANT/BUILDING MANAGEMENT.
         - LABELING FOR EQUIPMENT LOCATED ABOVE CEILING SHALL BE APPLIED TO THE CEILING. LABELS SHALL BE PRINTED WITH CLEAN EDGES. SIZE AND POSITION OF LABEL SHALL BE DETERMINED IN THE FIELD. LABEL SHALL BE VISIBLE FROM FLOOR, BUT NOT DISTRACTING FROM CEILING AESTHETICS.
   B. SHEET METAL DUCTS, SHEET METAL PLENUMS, DUCT LININGS, FLEXIBLE DUCTWORK, DAMPERS AND ACCESSORIES.
   C. AIR DEVICES INCLUDING ADJUSTING THE PATTERN CONTROLLERS.
   D. LOUVERS, LOUVERED PENTHOUSES, INTAKE/RELIEF HOODS.
   E. INSTALLING ACCESSORIES SPECIFIED IN REFERENCED SECTIONS ABOVE.
   F. SMOKE STOPPING OF ALL PENETRATIONS OF DUCTWORK, AND FIRESTOPPING OF THE SAME THROUGH FIRE RATED PARTITIONS AS SHOWN ON THE ARCHITECTURAL DRAWINGS INCLUDING, BUT NOT LIMITED TO STAIRWAYS, SHAFTS, CORRIDORS, FLOORS, ROOFS, AND REQUIRED EXITS.
   G. INSTALLATION OF ALL REFRIGERANT SYSTEMS INCLUDING, BUT NOT LIMITED TO, PIPING, PIPING SPECIALTIES, AND REQUIRED REFRIGERANT CHARGE.
   H. CHARGING AND LEAK TESTING OF ALL FIELD PIPED REFRIGERANT SYSTEMS.
   I. CLEANING AND PRESSURE TESTING OF ALL EQUIPMENT, PIPING, AND ACCESSORIES IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS AS WELL AS INDUSTRY STANDARDS/PRACTICES.

6. MECHANICAL CONTRACTOR (MC) SHALL COORDINATE WITH THE PLUMBING CONTRACTOR (PC) REGARDING EQUIPMENT SUPPLIED BY MC TO BE INSTALLED BY THE PC. CONTRACTOR SHALL COORDINATE HIS WORK WITH THE WORK OF OTHER TRADES, AND WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.MECHANICAL CONTRACTOR (MC) SHALL BE RESPONSIBLE FOR PERFORMING A FIELD REVIEW OF ALL WORK IDENTIFIED WITHIN THE CONTRACT DOCUMENTS IN COORDINATION WITH ALL OTHER DISCIPLINES ON THE PROJECT PRIOR TO THE COMMENCEMENT OF ANY WORK. MC SHALL ALSO BE RESPONSIBLE FOR FINAL ROUTING OF ALL EQUIPMENT IN COORDINATION WITH ALL OTHER SYSTEMS PRESENT WITHIN SCOPE OF WORK.

7. ALL PENETRATIONS THROUGH FIRE/SMOKE RATED ASSEMBLIES SHALL BE SEALED AND PROTECTED IN ACCORDANCE WITH ALL NATIONAL, STATE, AND MUNICIPALLY ADOPTED CODES INCLUDING AMENDMENTS. CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS FOR ASSEMBLY LOCATIONS AND RATINGS. FIRE/SMOKE RATED ASSEMBLIES INCLUDE, BUT NOT LIMITED TO STAIRWAYS, SHAFTS, CORRIDORS, FLOORS, ROOFS, AND REQUIRED EXITS. CONTRACTOR SHALL INSTALL PER MANUFACTURER'S UL LISTED INSTALLATION INSTRUCTIONS.

8. A FULL TEST AND BALANCE OF THE COMPLETE MECHANICAL SYSTEMS (AIRSIDE, REFRIGERANT, ETC.) SHALL BE REQUIRED FOLLOWING THE COMPLETION OF ALL WORK OUTLINED WITHIN THE CONTRACT DOCUMENTS. THE TEST AND BALANCE CONTRACTOR SHALL BE A THIRD PARTY AND SHALL BE NEBB AND/OR TAB CERTIFIED. A COMPLETE TEST AND BALANCE REPORT SHALL BE SUBMITTED TO OWNER AND ENGINEER FOR REVIEW AND APPROVAL. ENGINEER SHALL PROVIDE FINAL APPROVAL OF THE TEST AND BALANCE WORK.

9. MC SHALL REFER TO THE SCHEDULES ON THE M5 SERIES SHEETS FOR ALL SPECIFIED HVAC PIPING, EQUIPMENT, AND ASSOCIATED COMPONENTS/MATERIALS.

10. MC SHALL PROVIDE SEISMIC RESTRAINT FOR ALL EQUIPMENT AS REQUIRED BY CODE. MC SHALL DESIGN ALL SUPPORTS TO WITHSTAND SEISMIC LOADS AS SPECIFIED IN THE IBC. PROVIDE REQUIRED SHOP DRAWINGS TO BUILDING AUTHORITY PRIOR TO INSTALLATION.

11. TEMPERATURE CONTROLS (TC) WORK REQUIRED SHALL FALL UNDER THE PURVIEW OF THE MECHANICAL CONTRACTOR PERFORMED BY A CONTROLS CONTRACTOR (CC). ADDITIONAL INFORMATION FOR THE MC AND CONTROLS CONTRACTOR (CC)
    a. PROVIDE WALL MOUNTED THERMOSTATS WITH DIGITAL DISPLAY. [THERMOSTAT SHALL BE COMPATIBLE WITH THE BUILDINGS EXISTING HVAC CONTROL SYSTEM.] THERMOSTATS SHALL BE 10,000-OHM THERMISTOR WITH AN ACCURACY OF ±0.36°F. ROOM TEMPERATURE SENSOR COVERS SHALL ALL MATCH ON THE PROJECT. THERMOSTATS SHALL BE PROVIDED WITH THE FOLLOWING: LOCAL TEMPERATURE ADJUSTMENT ONLY (TEMPERATURE BAND TO BE DEFINED BY OWNER IN COORDINATION WITH CONTROLS CONTRACTOR) WITH LOCAL DIGITAL TEMPERATURE DISPLAY CONFIGURED TO DISPLAY WHOLE NUMBERS ONLY -- NO DECIMAL POINTS OF PRECISION.
       - THERMOSTAT INSTALLATION HEIGHT SHALL BE IN ACCORDANCE WITH ADA GUIDELINES.
       - FINAL LOCATION OF THERMOSTATS SHALL DETERMINED IN THE FIELD IN COORDINATION WITH THE OWNER.
       - IF THERMOSTAT IS INSTALLED ON AN EXTERIOR WALL, THERMOSTAT SHALL BE PROVIDED WITH AN INSULATED BASE PLATE. ENGINEER DOES NOT ADVISE THAT THERMOSTATS BE PLACED ON EXTERIOR WALLS.
    b. PROVIDE 120V TO 24V TRANSFORMERS IN COORDINATION WITH ELECTRICAL CONTRACTOR.

12. ***IF REQUIRED*** CONTROLS CONTRACTOR (CC) SHALL PROVIDE ALL VFD'S, MC SHALL COORDINATE WITH C.C. ON INSTALLATION.

13. MC SHALL PROVIDE FIRE DAMPERS AS INDICATED ON THE DRAWINGS. ALL DAMPERS SHALL BE U.L. 555 LISTED UNDER NFPA STANDARD 90-A. DAMPERS FOR RECTANGULAR / SQUARE DUCTWORK SHALL BE STYLE 'B', ROUND OR OVAL DUCTWORK SHALL BE STYLE 'C'. ALL DAMPER CURTAINS SHALL BE LOCATED OUTSIDE OF THE AIRSTREAM REGARDLESS OF STYLE. FACTORY APPLIED WALL SLEEVES ARE NOT PERMITTED FOR BOTH HORIZONTAL AND VERTICAL INSTALLATIONS. SLEEVES SHALL BE FABRICATED AND INSTALLED IN THE FIELD. CONTRACTOR SHALL INSTALL PER MANUFACTURER'S UL LISTED INSTALLATION INSTRUCTIONS FOR FIRE DAMPERS AND SHALL MAINTAIN A COPY ON SITE.

14. SEE ARCHITECTURAL DRAWINGS FOR INFORMATION REGARDING ROOF TOP EQUIPMENT FLASHING, CURB, AND CRICKET DETAILS.

DUCTWORK AND AIR DISTRIBUTION (APPLIES TO ALL SHEETS):

1. WORK FOR THIS SECTION HAS BEEN DESIGNED, AND SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
   A. ASHRAE, "HANDBOOK 2017 FUNDAMENTALS", CHAPTER 21 - DUCT DESIGN.
      a. ALL DUCTWORK SIZING SHOWN ON THE PLANS HAS BEEN PERFORMED IN ACCORDANCE WITH ASHRAE'S 'EQUAL FRICTION METHOD.
      b. UNLESS OTHERWISE NOTED ON THE PLANS, ALL DUCTWORK IS DESIGNED IN ACCORDANCE WITH LOW STATIC PRESSURE REQUIREMENTS. STANDARD DUCTWORK DESIGN PRESSURE DROP CRITERIA IS AS FOLLOWS:
         - SUPPLY AIR DUCTWORK: 0.08 "W.C. PER 100'
         - RETURN AIR DUCTWORK: 0.06 "W.C. PER 100'
         - EXHAUST AIR DUCTWORK: 0.06 "W.C. PER 100'
   B. ASHRAE, "HANDBOOK 2020 HVAC SYSTEMS AND EQUIPMENT", CHAPTER 19 - DUCT CONSTRUCTION.
   C. ASHRAE, "HANDBOOK 2020 HVAC SYSTEMS AND EQUIPMENT", CHAPTER 20 - ROOM AIR DISTRIBUTION EQUIPMENT.
   D. SMACNA "HVAC DUCT CONSTRUCTION STANDARD - METAL AND FLEXIBLE" - LATEST EDITION
   E. UL 33, "HEAT RESPONSIVE LINKS FOR FIRE PROTECTION SERVICE."
   F. UL 555, "FIRE DAMPERS AND CEILING DAMPERS."
   G. UL 181, "FACTORY MADE AIR DUCTS AND CONNECTORS."

2. MATERIALS:
   A. ALL DUCTS UNLESS SPECIFIED OTHERWISE SHALL BE CONSTRUCTED FROM G-90 OR BETTER-GALVANIZED STEEL, LFQ, ETC. <u>FIBERGLASS DUCTBOARD IS PROHIBITED</u>.
      a. ALL ROUND AND/OR FLAT OVAL DUCTS SHALL HAVE SPIRAL SEAMS OR CONTINUOUSLY WELDED LONGITUDINAL SEAMS.
   B. EXHAUST DUCTS FOR SHALL BE CONSTRUCTED FROM 3003-H14 SERIES ALUMINUM.
   C. ALL SUPPLY DUCTWORK, UNLESS SPECIFIED OTHERWISE, SHALL BE CONSTRUCTED OF GAUGES AND REINFORCEMENT TO 2" W.C. STATIC PRESSURE IN SMACNA DUCT CONSTRUCTION STANDARD - LATEST EDITION.
   D. ALL RETURN, EXHAUST, OUTDOOR AIR, RELIEF, AND SUPPLY DUCTWORK DOWNSTREAM OF TERMINAL UNITS SHALL BE CONSTRUCTED OF GAUGES AND REINFORCEMENT TO 2" W.C. STATIC PRESSURE IN SMACNA DUCT CONSTRUCTION STANDARD - LATEST EDITION. PANELS IN ALL DUCTS 12" AND LARGER SHALL BE CROSS-BROKEN OR BEADED ON 12" CENTERS.
   E. WHERE LOCAL CODE REQUIRES GAUGES HEAVIER THAN REQUIRED BY SMACNA THEN THE LOCAL CODE SHALL GOVERN.

3. DUCT CONSTRUCTION AND INSTALLATION:
   A. ALL DUCTWORK SHALL BE NEATLY CONSTRUCTED, STIFFENED, ON THE OUTSIDE SURFACES WHERE NECESSARY TO PREVENT PERCEPTIBLE VIBRATION OR BUCKLING. ALL DUCTS, HOUSINGS, ETC., SHALL BE FABRICATED AS DETAILED ON THE DRAWINGS AND IN THE SMACNA DUCT CONSTRUCTION MANUAL -LATEST EDITION.
   B. DUCTS SHALL BE SECURELY SUPPORTED IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION MANUAL - LATEST EDITION AND IN NO CASE LESS THAN DOUBLE THICKNESS 1" X #24 GAUGE GALVANIZED METAL. <u>CABLE HANGERS ARE NOT ALLOWED</u>.
   C. DUCTS THAT ARE TO BE EXTERNALLY INSULATED SHALL NOT BE SUPPORTED ON UNISTRUT CHANNEL UNLESS IT REQUIRED BASED UPON LOADING. HANGER RODS FOR TRAPEZE BARS SHALL BE SPACED TO ALLOW FOR INSULATION INSTALLATION.
   D. SIZE OF DUCTWORK IDENTIFIED ON THE DRAWINGS SHALL BE THE FREE AREA DIMENSION OF THE DUCTWORK. [SHEET METAL DUCTWORK (I.E. PRESSURE SHELL) DIMENSIONS MAY VARY BASED UPON INSULATION REQUIREMENTS] OR [SHEETMETAL DIMENSIONS PROVIDED TAKE INTO ACCOUNT ANY INTERNAL ACOUSTICAL LINING THICKNESS SPECIFIED FOR THE DUCT SYSTEM OR SUB-SYSTEM.]
   E. MC SHALL PROVIDE TURNING VANES AT ALL SQUARE/RECTANGULAR SUPPLY AND RETURN AIR DUCTWORK ELBOWS.
   F. MC SHALL PROVIDE HIGH EFFICIENCY TAKEOFFS WITH INTEGRAL LOCKABLE QUADRANT VOLUME DAMPERS AT EVERY SUPPLY, RETURN, AND EXHAUST AIR DUCT BRANCH/TAP UNLESS NOTED OTHERWISE ON THE PLANS.
   G. UNLESS OTHERWISE NOTED (U.N.O.) WITHIN THE DRAWINGS, ALL MANUAL VOLUME DAMPERS SHALL BE LOCKABLE QUADRANT TYPE.
   H. FLEX-DUCT LENGTHS SHALL NOT EXCEED 8'-0" FOR DIFFUSERS, AND 3'-0" AT VAV BOX INLETS.
      a. SUPPORT FLEX-DUCT ON 4'-0" CENTERS MAXIMUM.
      b. FLEX-DUCT SHALL BE FLEXMASTER TYPE 8M, THERMAFLEX M-KE, OR EQUIVALENT.
   I. ALL EXPOSED DUCTWORK SHALL BE PAINTED. MC SHALL BE RESPONSIBLE FOR PROVIDING PAINTED DUCTWORK EITHER FROM THE MANUFACTURER, OR FIELD APPLIED. IF DUCTWORK IS FIELD PAINTED, MC SHALL PROVIDE PAINTGRIP TYPE DUCTWORK. MC SHALL COORDINATE WITH THE ARCHITECT FOR THE FINAL PAINT COLOR AND APPLICATION.
   J. ALL SUPPLY DUCTWORK UNLESS SPECIFIED OTHERWISE SHALL BE SMACNA'S SEAL CLASS A.

4. DUCT INSULATION:
   A. ALL DUCTWORK LOCATED ABOVE CEILINGS WITHIN AN UNCONDITIONED SPACE SHALL BE PROVIDED WITH A MINIMUM R-6 INSULATION.
      a. <u>EXCEPTION</u>: ALL DUCTWORK LOCATED IN ATTICS (ABOVE BUILDING INSULATION) WITHIN AN UNCONDITIONED SPACE SHALL BE PROVIDED A MINIMUM R-8 INSULATION.
      b. <u>EXCEPTION</u>: ALL DUCTWORK SERVING FRESH OUTSIDE AIR SHALL BE PROVIDED A MINIMUM R-8 INSULATION WITH VAPOR BARRIER.
      c. ALL SQUARE/RECTANGULAR DUCTWORK ABOVE CEILINGS SHALL BE PROVIDED WITH EITHER 1-1/2" THICK R-6 INTERNAL LINING OR MINIMUM 2" THICK R-6 EXTERNAL GLASS FIBER, FOIL BACKED INSULATION WITH A VAPOR BARRIER.
         - ALL DUCT LINERS USED SHALL BE TESTED IN ACCORDANCE WITH TEST METHOD ASTM C423.
      d. ALL ROUND DUCTWORK ABOVE CEILINGS SHALL BE WRAPPED WITH A MINIMUM 2" THICK R-6 GLASS FIBER, FOIL BACKED INSULATION WITH A VAPOR BARRIER.

5. AIR DEVICES:
   A. DEVICES DESCRIBED WITHIN THE DRAWINGS AND ASSOCIATED SCHEDULES ARE BASED ON TITUS. SIMILAR DESIGN CHARACTERISTICS AS MANUFACTURED BY PRICE, KRUEGER, CARNES, METAL AIRE, NAILOR, OR TUTTLE & BAILEY WILL ALSO BE ACCEPTABLE. SUCH SUBSTITUTE EQUIPMENT SHALL BE SIZED ON THE BASIS OF ADPI PERFORMANCE, AND SHALL BE SELECTED FOR A MAXIMUM OF 0.05 INCHES W.C. STATIC PRESSURE DROP AND A MAXIMUM NOISE CRITERION CURVE OF NOT GREATER THAN NC30. RETURN OR EXHAUST DEVICES SHALL NOT BE SMALLER THAN SIZES SHOWN.
   B. UNLESS NOTED OTHERWISE (U.N.O.) WITH FLOW ARROWS ON THE DRAWINGS, ALL DIFFUSERS SHOWN ON THE DRAWINGS ARE 4-WAY THROW PATTERNS. MC SHALL REFER TO DRAWINGS AND AIR DEVICE SCHEDULE TO DETERMINE WHICH DIFFUSERS REQUIRE A DIFFERENT THROW PATTERN. ALL DIFFUSERS NOT 4-WAY PATTERN ARE IDENTIFIED ON THE DRAWINGS WITH FLOW ARROWS ILLUSTRATING THE THROW NUMBER, AND DIRECTION OF FLOW.
   C. UNLESS NOTED OTHERWISE (U.N.O.) ON THE DRAWING, HET FITTING AND FLEX-DUCT SHALL BE THE SAME SIZE AS DIFFUSER CONNECTION.
   D. MC SHALL PROVIDE PLENUM RETURN SOUND BOOTS ON ALL RETURN AIR DEVICES. CONTRACTOR SHALL REFER TO THE 'AIR DEVICE' SCHEDULE FOR RETURN AIR DEVICE SPECIFIED TO COORDINATE REQUIRED SOUND BOOT TYPE. REFER TO DETAILS WITHIN M5 SERIES SHEETS (OR MP IF COMBINED DISCIPLINES).

HEAT PUMP NOTES (APPLIES TO ALL SHEETS):

1. IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR (MC) TO OBTAIN A MANUFACTURER PRODUCED, ENGINEER APPROVED HEAT PUMP PIPING SCHEMATIC WHICH SHALL INCLUDING ALL PIPING SIZES, LENGTHS, ETC., PRIOR TO MATERIAL ACQUISITION AND INSTALLATION. THE MECHANICAL CONTRACTOR SHALL BE HELD FULLY LIABLE FOR ANY COST, MATERIALS AND LABOR, ASSOCIATED TO HEAT PUMP SYSTEM ISSUES / PROBLEMS RESULTING FROM THE MECHANICAL CONTRACTORS FAILURE TO OBTAIN AN APPROVED PIPING SCHEMATIC.
   A. MC SHALL PROVIDE A DRAWING WITH THE LOCATION OF ALL VRF EQUIPMENT, INCLUDING DIMENSIONS, TO THE MANUFACTURERS REPRESENTATIVE TO COMPLETE AN ACCURATE PIPING SCHEMATIC PRIOR TO MATERIAL ACQUISITION AND INSTALLATION.

2. MC SHALL INSTALL ALL HEAT PUMP REFRIGERANT PIPING IN ACCORDANCE WITH THE MANUFACTURERS GUIDELINES/REQUIREMENTS/SPECIFICATIONS. PIPING SHALL BE INSTALLED PLUMB AND LEVEL, AND BRACED IN ACCORDANCE WITH MANUFACTURER GUIDELINES/REQUIREMENTS/SPECIFICATIONS.

3. MC SHALL VALVE ALL HEAT RECOVERY UNIT (HR) PORTS AND CAP ALL UNUSED PORTS.

4. MC SHALL PROVIDE SERVICE VALVES AT REFRIGERANT CONNECTIONS TO FAN COILS.

5. EXPOSED EXTERIOR REFRIGERANT PIPING SHALL BE COVERED IN A UV RESISTANT WRAP. WRAP SHALL BE 3M VENTURECLAD, OR APPROVED EQUAL.

6. AT MC OPTION, PRIOR ENGINEER APPROVED PRESS FITTINGS MAY BE USED IN LIEU OF BRAISING COPPER REFRIGERANT PIPING. PRESS FITTINGS SHALL BE ZOOMLOCK OR APPROVED EQUAL.

7. MC SHALL PROVIDE SERVICE VALVES ON REFRIGERANT PIPING (R2 OR R3) AT EACH PIECE OF EQUIPMENT TO PROVIDE EASE OF SERVICE. EQUIPMENT INCLUDES, BUT NOT LIMITED TO FAN COILS, CASSETTES, HEAT PUMPS, HYDRO UNITS, ETC.

8. ***IF REQUIRED*** MC SHALL PROVIDE REFRIGERANT LINE SET PIPE CHASE WEATHER HOOD. MC SHALL REFER TO THE DRAWINGS FOR THE LOCATION AND DETAIL M.07.01 ON M5 SERIES SHEETS FOR INSTALLATION GUIDELINES.

9. ***IF REQUIRED*** PRE-INSULATED REFRIGERANT PIPING SHALL BE PLENUM RATED.

10. ALL HEAT PUMPS INSTALLED ON GRADE OR THE ROOF SHALL BE MOUNTED ON EQUIPMENT STANDS. IF THE HEAT PUMP IS MOUNTED ON GRADE, THE EQUIPMENT STAND SHALL SIT ATOP A CONCRETE HOUSEKEEPING PAD - THE PAD SHALL BE A MINIMUM OF 3-1/2" THICK. IF THE HEAT PUMP IS MOUNTED TO A WALL, IT SHALL BE AFFIXED TO THE WALL VIA BRACKETS CONSTRUCTED IN SUPPORT AT MINIMUM 1.15 X THE WEIGHT OF THE HEAT PUMP. HEAT PUMP INSTALLATION, INCLUDING CLEARANCES SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS.

MECHANICAL ABBREVIATIONS INDEX

NOTE: ALL ABBREVIATIONS MAY NOT BE USED ON THIS PROJECT.

AD	ACCESS DOOR
A.F.F.	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
APRX	APPROXIMATE
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
D	DAMPER
DN	DOWN
EA	EXHAUST AIR
EF	EXHAUST FAN
FCU	FAN COIL UNIT
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING
MA	MAKE-UP AIR
OA	OUTSIDE AIR
RA	RETURN AIR
RTU	ROOF TOP UNIT
SA	SUPPLY AIR

MECHANICAL PIPE FITTING SYMBOLS

NOTE: ALL SYMBOLS AND ABBREVIATIONS MAY NOT BE USED.

SYMBOL	ABBREVIATION	EXPLANATION
	UP	PIPE, TURNED UP
	DN	PIPE, TURNED DOWN
	TDN	PIPE, TEE DOWN
	SV	SERVICE VALVE
	BV	BALANCE VALVE
		CAP

MECHANICAL CALLOUTS

NOTE: ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT.

SYMBOL	ABBREVIATION
XX / ##	EQUIPMENT DESIGNATION / NUMBER
X# / ###	AIR DEVICE DESIGNATION / CFM
# / X#.#	SECTION DESIGNATION / SHEET NUMBER
# / X#.#	CALLOUT DESIGNATION / SHEET NUMBER
	CONNECT TO EXISTING
	POINT OF DEMOLITION
#	KEYED NOTE DESIGNATION
#	REVISION DELTA
Ø	ROUND DUCT WORK
	OVAL DUCT WORK
T#' #" / B#' #"	DUCT ELEVATION TAG
T / X-#	THERMOSTAT WITH EQUIPMENT NUMBER

MECHANICAL PIPE SYMBOLS

NOTE: ALL SYMBOLS AND ABBREVIATIONS MAY NOT BE USED.

SYMBOL	EXPLANATION
CD	CONDENSATE DRAIN
R2	REFRIGERANT 2-PIPE

DESIGN CONTACTS

ENGINEER	JOEL WILLIAMS
DESIGNER	JAREN TICE

MECHANICAL SHEET LIST

M0.1	MECH NOTES SYMBOLS & ABBREVIATIONS
M2.1	LEVEL 1 MECHANICAL PLAN
M2.2	MECHANICAL & PLUMBING ROOF PLAN
M5.1	MECHANICAL SCHEDULES & DETAILS
M5.2	MECHANICAL DETAILS

MECHANICAL DUCT SYMBOLS

NOTE: ALL SYMBOLS AND ABBREVIATIONS MAY NOT BE USED.

SYMBOL	EXPLANATION
AP / AP X"xX"	ACCESS DOOR/PANEL
BDD	BACK DRAFT DAMPER
M, D, FSD, FRD	MANUAL BALANCE DAMPER MOTORIZED DAMPER FIRE RATED DAMPER FIRE SMOKE DAMPER
	DIRECTION OF FLOW
	DROP IN DIRECTION OF ARROW
D	DUCT 45° TAKE-OFF CONNECTION WITH DAMPER
XX" xXX"	INTERNALLY INSULATED DUCT WORK. (EXTERIOR DIMENSION.)
XX" xXX"	RECTANGULAR SHEET METAL DUCT. (EXTERIOR DIMENSION.)
XX" xXX"	K-27 DOUBLE WALL ROUND DUCT WORK. (EXTERIOR DIMENSION.)
	FLEXIBLE DUCT WORK
	TURNING VANES (RECTANGULAR)
	TURNING VANES (RECTANGULAR), SMOOTH RADIUS
	SUPPLY AIR DUCT, DOWN
	SUPPLY AIR DUCT, UP
	SUPPLY AIR DUCT ROUND, DOWN
	SUPPLY AIR DUCT ROUND, UP
	RETURN AIR DUCT, DOWN
	RETURN AIR DUCT, UP
	RETURN AIR DUCT ROUND, DOWN
	RETURN AIR DUCT ROUND, UP
	EXHAUST AIR DUCT, DOWN
	EXHAUST AIR DUCT, UP
	EXHAUST AIR DUCT ROUND, DOWN
	EXHAUST AIR DUCT ROUND, UP
	DEMO DUCTWORK
	EXISTING DUCTWORK
	SQUARE SUPPLY DIFFUSER ROUND CONNECTION
	SQUARE RETURN GRILLE ROUND CONNECTION
	SQUARE EXHAUST GRILLE ROUND CONNECTION
	PLENUM RETURN WITH SOUND BOOT
	PLENUM RETURN
	SQUARE SUPPLY DIFFUSER SQUARE CONNECTION
	SQUARE RETURN GRILLE SQUARE CONNECTION
	SQUARE EXHAUST GRILL SQUARE CONNECTION
	ROUND DIFFUSER
	LINEAR SLOT DIFFUSER
	LOUVER GRILLE
	DUCT MOUNTED DIFFUSER (SEE PLANS FOR DIFFUSER INSTALLATION ANGLE.)

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Registered Professional Engineer (Mechanical)
CERTIFICATE NO. 80884
JOEL WILLIAMS
Date Signed 07/15/2025
ARIZONA, U.S.A.

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

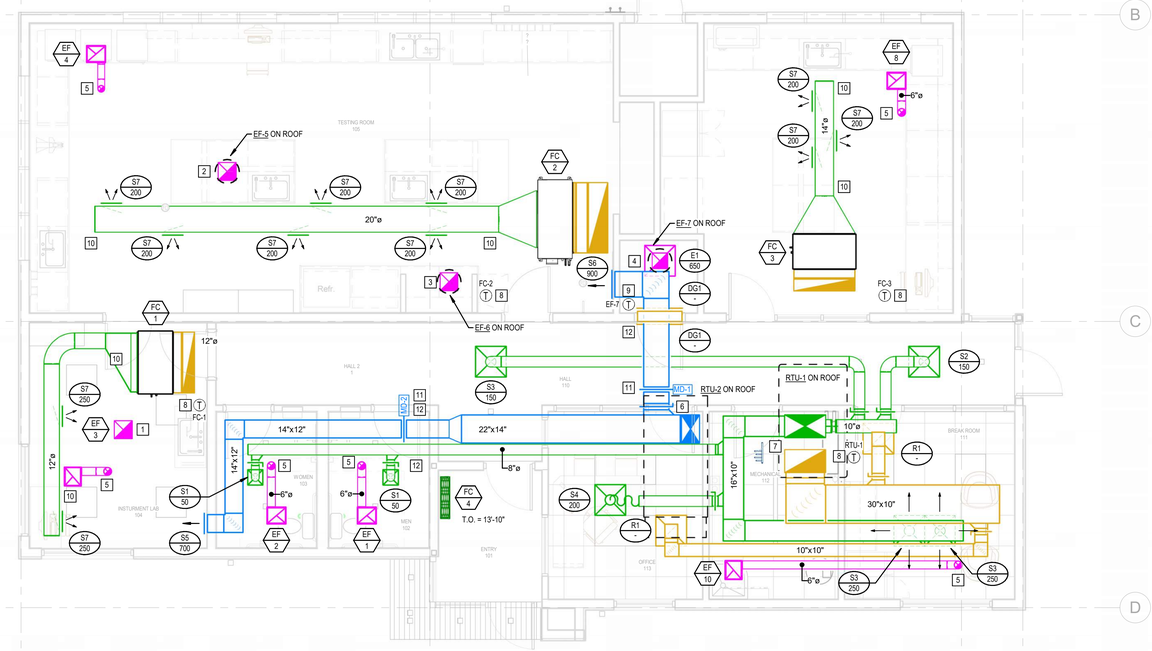
PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
MECH NOTES SYMBOLS & ABBREVIATIONS

SHEET NUMBER:
M0.1

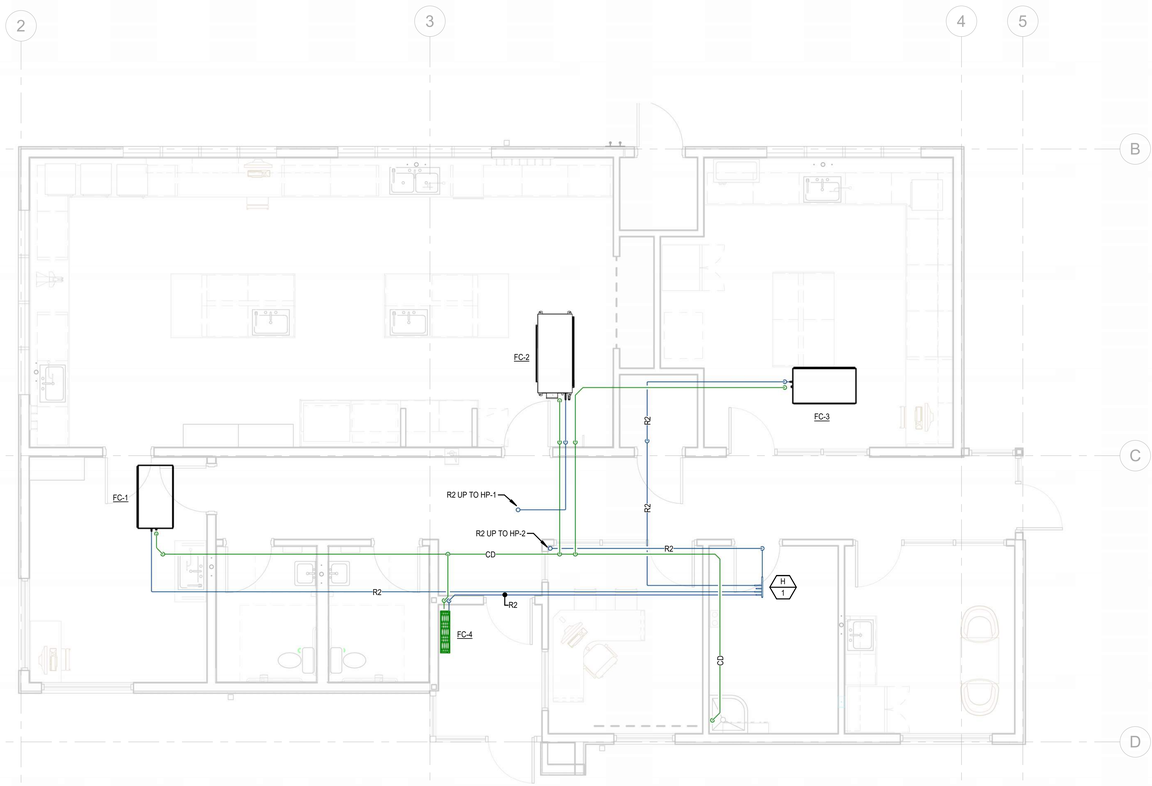
BID SET

Plot Date: 12/3/2025 11:13:51 AM



1 M2.1 MECHANICAL FLOOR PLAN
1/4" = 1'-0"

1/4" = 1'-0"
1' 2' 4' 8'



2 M2.1 MECHANICAL PIPING FLOOR PLAN
1/4" = 1'-0"

1/8" = 1'-0"
2' 4' 8' 16'

BUILDING NORTH

NOTE:
CONTRACTOR SHALL INSTALL DUCT TIGHT TO STRUCTURE. COORDINATE WITH ALL TRADES.

GENERAL NOTES

1. REFER TO ALL NOTES, SYMBOLS & ABBREVIATIONS ON SHEET M0.1. REFER TO ALL SCHEDULES & DETAILS WITHIN P5 SERIES SHEETS.

KEYED NOTES

1. 12"Ø FOR FUTURE HOOD. ROUTE UP TO ROOF. TRANSITION AND CONNECT TO CURB OPENING. FOR FUTURE EXHAUST FAN. STUB DUCT 12" BELOW CEILING AND CAP.
2. CONNECT 12"Ø DUCT TO HOOD. ROUTE UP TO ROOF, TRANSITION AND CONNECT TO CURB OPENING OF EF-6.
3. CONNECT 10"Ø DUCT TO HOOD. ROUTE UP TO ROOF, TRANSITION AND CONNECT TO CURB OPENING OF EF-5.
4. ROUTE 12"x12" EXHAUST DUCT UP TO ROOF, TRANSITION AND CONNECT TO CURB OPENING OF EF-7.
5. ROUTE 6"Ø EXHAUST DUCT UP THRU ROOF AND CAP.
6. ROUTE 22"x14" DUCT UP THRU ROOF, TRANSITION AND CONNECT TO RTU-2 OPENING.
7. ROUTE 32"x18" SUPPLY DUCT AND 32"x18" RETURN DUCT UP THRU ROOF. TRANSITION AND CONNECT TO RTU-1 OPENING.
8. CONTRACTOR SHALL PROVIDE COMPATIBLE 7-DAY PROGRAMMABLE THERMOSTAT. COORDINATE FINAL LOCATION WITH ARCHITECT/OWNER BEFORE FINAL INSTALLATION.
9. PROVIDE LINE VOLTAGE, CLOSE ON RISE THERMOSTAT. THERMOSTAT TO CLOSE AT 85 DEGREES F. AND OPEN AT 80 DEGREES F. (ADJUSTABLE)
10. CENTER OF DUCT TO BE MOUNTED 12'-0" A.F.F. COORDINATE WITH LIGHTS TO ENSURE DUCT IS INSTALLED ABOVE. CONTRACTOR SHALL CONFIRM FINAL HEIGHT WITH OWNER BEFORE INSTALLATION.
11. RTU-2 IS A TWO SPEED UNIT. ON INITIAL SETUP UNIT IS TO RUN ON LOW SPEED ONLY, WITH LOW VOLTAGE, NORMALLY CLOSED MOTORIZED DAMPER TO TESTING ROOM OPEN AND DAMPER TO SPECIAL INSTRUMENTS LAB CLOSED. IN THE FUTURE WHEN SPECIAL INSTRUMENTS LAB IS OPERATIONAL, UNIT SHALL OPERATE ON LOW SPEED WHEN HOOD IS ONLY OPERATIONAL IN ONE LAB AND ON HIGH SPEED WHEN HOODS IN BOTH LABS ARE OPERATING. WHEN ONE HOOD IS OPERATIONAL AUTOMATIC DAMPER TO THAT LAB SHALL OPEN AND DAMPER TO OTHER LAB SHALL CLOSE.
12. COORDINATE WITH MASONRY SUBCONTRACTOR FOR OPENING IN CMU WALL.

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80884
JOEL
WILLIAMS
07/15/2025
REGISTERED
ARIZONA U.S.A.

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

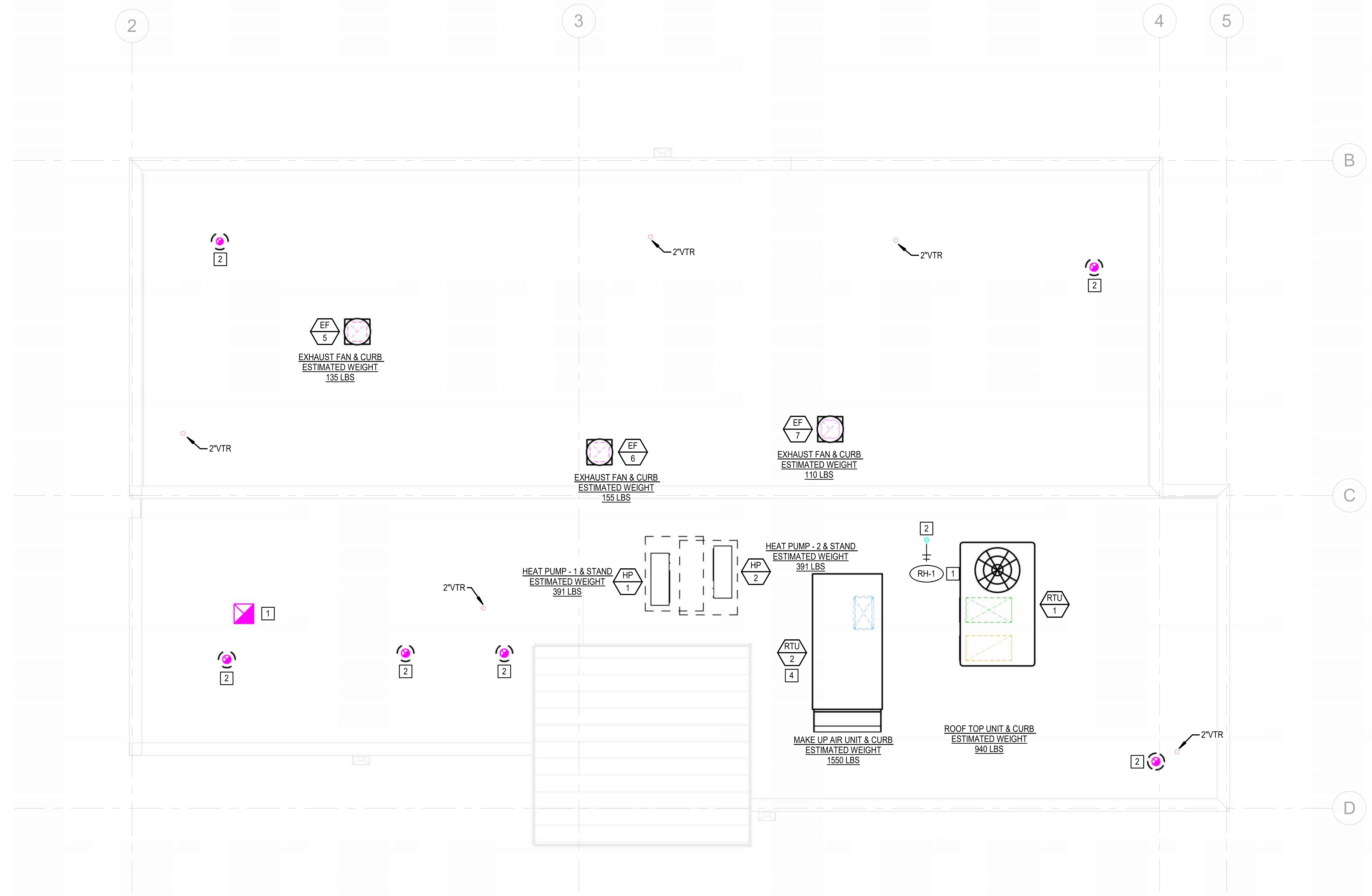
PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
LEVEL 1 MECHANICAL PLAN

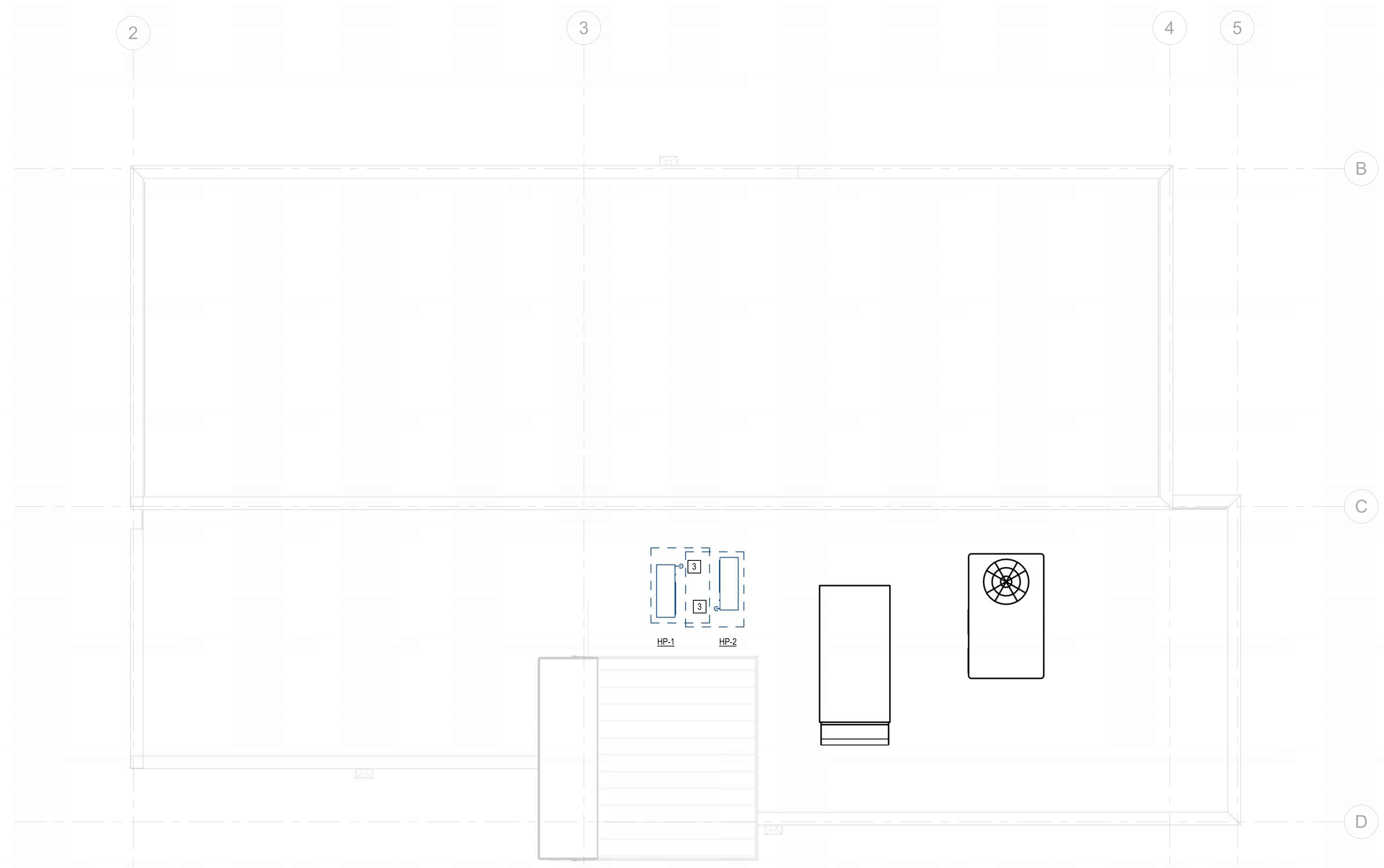
SHEET NUMBER:
M2.1

BID SET

Plot Date: 12/3/2025 11:14:05 AM



1 M2.2 MECHANICAL & PLUMBING ROOF PLAN
1/4" = 1'-0"



2 M2.2 MECHANICAL PIPING ROOF PLAN
1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ALL NOTES, SYMBOLS & ABBREVIATIONS ON SHEET M0.1. REFER TO ALL SCHEDULES & DETAILS WITHIN P5 SERIES SHEETS.
2. ALL EXHAUST PENETRATIONS TO BE LOCATED A MINIMUM OF 10'-0" FROM ALL AIR INTAKES.

KEYED NOTES

1. CONTRACTOR TO INSTALL MINIMUM 14" ROOF CURB. SECURE TO ROOF DECK. ROOFING CONTRACTOR TO FLASH AND SEAL ALL PENETRATIONS TO FIT FUTURE EXHAUST FAN MODEL: COOK 150RH15D.
2. 6" EXHAUST DUCT FROM BELOW. PROVIDE ROOF CAP.
3. R2 PIPING FROM BELOW. SEE SHEET M2.1 FOR CONTINUATION.
4. SEE ROOFTOP SCHEDULE ON SHEET M5.1 FOR NOTES.

RTU-2 SEQUENCE OF OPERATION:

RTU-2 WILL HAVE FACTORY PROVIDED CONTROL TO PROVIDE THE FOLLOWING. (SEE RTU-2 CONTROL DRAWINGS FOR DETAILS)
1. WHEN OPERATING, UNIT SHALL AUTOMATICALLY CHANGE FROM HEATING TO VENT TO COOLING AS NEEDED TO MAINTAIN A DISCHARGE AIR TEMPERATURE BETWEEN 67-72° F (FIELD ADJUSTABLE).
2. ON A SINGLE LOW VOLTAGE INPUT FROM EITHER LAB, THE UNIT WILL START AND RUN ON LOW SPEED TO DELIVER 900 CFM.
3. ON A SECOND LOW VOLTAGE INPUT FROM THE OTHER LAB, THE UNIT WILL INCREASE TO HIGH SPEED TO DELIVER 1800 CFM.
4. ON LOSS OF SECOND INPUT UNIT WILL REDUCE TO LOW SPEED.
5. ON LOSS OF SINGLE INPUT UNIT WILL SHUT DOWN.

CONTROL CONTRACTOR (CC) SHALL DESIGN AND PROVIDE CONTROL PACKAGE TO INTERFACE WITH RTU-2 CONTROLS TO PROVIDE THE FUNCTIONS DETAILED BELOW.
1. WHEN EITHER EXHAUST FAN EF-5 OR EF-6 OPERATES, A SINGLE LOW VOLTAGE SIGNAL WILL BE SENT TO RTU-2 TO START THE UNIT ON LOW SPEED.(OWNER STATES BOTH FANS WILL NOT OPERATE SIMULTANEOUSLY)
   A. WHEN EITHER EF-5 OR EF-6 IS RUNNING, MD-1 SHALL OPEN AND MD-2 SHALL REMAIN CLOSED.
2. WHEN ONLY EXHAUST FAN EF-3 OPERATES, A SEPARATE LOW VOLTAGE SIGNAL WILL BE SENT TO RTU-2 TO START THE UNIT ON LOW SPEED.
   A. WHEN ONLY EF-3 IS RUNNING, MD-1 SHALL REMAIN CLOSED AND MD-2 SHALL OPEN.
3. WHEN EITHER EF-5 OR EF-6 AND EF-3 ARE RUNNING THERE WILL BE 2 SEPARATE LOW VOLTAGE SIGNALS TO RTU-2, AND IT SHALL RUN ON HIGH SPEED.
   A. WHEN 2 EXHAUST FANS ARE RUNNING, BOTH MD-1 AND MD-2 SHALL OPEN.

EF-3 IS NOT BEING INSTALLED AT THIS TIME AND RTU-2 WILL ONLY OPERATE ON LOW SPEED, BUT CONTROLS SHALL BE PUT IN PLACE TO ALLOW OPERATION DESCRIBED ABOVE WHEN EF-3 IS INSTALLED. CONTROL DRAWINGS SHALL BE PROVIDED TO ALLOW CONNECTION OF INSTALLED CONTROLS AND WIRING TO EF-3 WHEN INSTALLED.

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Registered Professional Engineer (Mechanical) CERTIFICATE NO. 80884 JOEL WILLIAMS 07/15/2025 Date Signed

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
MECHANICAL & PLUMBING ROOF PLAN

SHEET NUMBER:
M2.2

BID SET

Plot Date: 12/3/2025 11:14:15 AM

AIR DEVICE SCHEDULE

UNIT DESIG.	SERVICE	MANUFACTURER & MODEL NO.	TYPE	THROW	NECK SIZE (IN.)	FACE SIZE (IN.)	FINISH	NOTES
S1	SUPPLY	TITUS TDC	GYP.	4-WAY	6"Ø	12"x12"	VERIFY WITH OWNER	2,8
S2	SUPPLY	TITUS TDC	LAY-IN	2-WAY	8"Ø	24"x24"	VERIFY WITH OWNER	1,8
S3	SUPPLY	TITUS TDC	LAY-IN	3-WAY	8"Ø	24"x24"	VERIFY WITH OWNER	1,8
S4	SUPPLY	TITUS TDC	LAY-IN	4-WAY	8"Ø	24"x24"	VERIFY WITH OWNER	1,8
S5	SUPPLY	TITUS 1700	WALL MOUNTED	2-WAY	14"x12"	16"x14"	VERIFY WITH OWNER	3,7,8
S6	SUPPLY	TITUS 1700	WALL MOUNTED	2-WAY	20"x10"	22"x12"	VERIFY WITH OWNER	3,7,8
S7	SUPPLY	TITUS S300FL ASD	DUCT MOUNTED	2-WAY	14"x6"	16"x8"	VERIFY WITH OWNER	5,6
R1	RETURN	TITUS PAR	LAY-IN	-	10"x10"	24"x24"	VERIFY WITH OWNER	1,4,8
E1	EXHAUST	TITUS PAR	LAY-IN	-	12"x12"	24"x24"	VERIFY WITH OWNER	1,8
DG1	TRANSFER	TITUS CT-700L	DOOR GRILLE	-	22"x22"	24"x24"	VERIFY WITH OWNER	3,7

NOTES:

1. PROVIDE BORDER FOR LAY-IN CEILING
2. PROVIDE BORDER FOR GYP. CEILING
3. PROVIDE BORDER FOR WALL MOUNTED DIFFUSER
4. PROVIDE WITH SOUND BOOT. SEE DETAIL M.02.05 ON M5 SERIES SHEETS.
5. ADJUST TO 30° BELOW HORIZONTAL CENTERLINE, OR AS DESCRIBED ON PLANS. PROVIDE WITH OPTIONAL AIR SCOOP DEVICE.
6. PROVIDE REAR BLADES WITH 22.5° DEFLECTION.
7. APPROVED MANUFACTURERS: TITUS, CARNES, NAILOR, PRICE, KRUEGER, METALAIRE, HART & COOLEY. (SUBJECT TO PROJECT DOCUMENT CONFORMANCE)
8. PROVIDE REAR BLADES WITH 0° DEFLECTION.
9. PROVIDE WITH ALUMINUM OPPOSED BLADE DAMPER.
10. GRILLE SHALL BE INSTALLED WITH BLADES FACING UP TO PREVENT LINE OF SIGHT.

EXHAUST FAN SCHEDULE

UNIT DESIG.	LOCATION	MANUFACTURER & MODEL NO.	FAN TYPE	AIRFLOW (CFM)	FSP (IN. W.C.)	SONES	MOTOR				CONTROL	SIZE		OPERATING WEIGHT (LBS.)	ACCESSORIES	NOTES
							HP	WATTS	RPM	VOLTS/PH		INLET L x W	FAN L x W x H			
EF-1	MEN - 102	COOK GC-146	CEILING	75	0.40	1.5	-	34	900	115/1	LIGHTS / OCC. SENSOR	6"Ø	14"x12"x8.5"	15	1	A,B,D
EF-2	WOMEN - 103	COOK GC-146	CEILING	75	0.40	1.5	-	34	900	115/1	LIGHTS / OCC. SENSOR	6"Ø	14"x12"x8.5"	15	1	A,B,D
EF-3	SPECIAL INSTRUMENTS - 104	COOK GC-622	CEILING	200	0.35	1.1	-	71	990	115/1	LIGHTS / OCC. SENSOR	6"Ø	17"x12"x12"	30	1,3	A,D
EF-4	CHEMICAL / TESTING - 105	COOK GC-622	CEILING	200	0.35	1.1	-	71	990	115/1	LIGHTS / OCC. SENSOR	6"Ø	17"x12"x12"	30	1,3	A,D
EF-5	ROOF	COOK 120R15D	UPBLAST	800	0.50	7.9	1/4	-	1550	115/1	SWITCH	16" x 16"	31"Ø	135	1,2,3	A,C,D
EF-6	ROOF	COOK 120R15D	UPBLAST	1000	0.75	11.8	1/3	-	1550	115/1	SWITCH	20" x 20"	35"Ø	155	1,2,3	A,C,D
EF-7	ROOF	COOK 120C15D	DOWNBLAST	650	0.50	5.9	1/4	-	1550	115/1	THERMOSTAT	16" x 16"	29"Ø	110	1,2,3	A,D
EF-8	MICROBIOLOGY - 108	COOK GC-622	CEILING	200	0.35	1.1	-	71	990	115/1	LIGHTS / OCC. SENSOR	6"Ø	17"x12"x12"	30	1,3	A,D
EF-9	BREAK - 109	COOK GC-542	CEILING	200	0.50	2.5	-	78	1315	115/1	SWITCH	6"Ø	17"x12"x12"	30	1,3	A,D
EF-10	JANITOR - 112	COOK GC-186	CEILING	200	0.50	5.0	-	86	1100	115/1	SWITCH	6"Ø	17"x12"x12"	30	1,3	A,D

ACCESSORIES:

1. GRAVITY BACKDRAFT DAMPER
2. CONTRACTOR TO SECURE MINIMUM 14" ROOF CURB TO ROOF DECK. FLASH AND SEAL ALL PENETRATIONS.
3. DIRECT DRIVE MOTOR WITH SPEED CONTROL. ADJUST TO LISTED CFM.

NOTES:

A. FAN SHALL BE AMCA RATED.
B. 5 MINUTE OFF DELAY AFTER OCCUPANCY.
C. INTERLOCK FAN WITH MAU-1.
D. APPROVED MANUFACTURERS: PENN-BARRY, COOK, GREENHECK, DOMEX, TWIN CITY. (SUBJECT TO PROJECT DOCUMENT CONFORMANCE)

MECHANICAL PIPING SCHEDULE

SERVICE DESIG.	SERVICE	MATERIAL	LOCATION	INSULATION	FITTINGS	NOTES
R2	REFRIGERANT PIPING 2 PIPE	COPPER TYPE "K" - SOFT - LINE SET	INTERIOR - ABOVE GRADE	REFRIGERANT PIPING PRE-INSULATED BY MANUFACTURER	BRAISED	1,2,3,4,5

NOTES:

1. ZOOMLOCK PRESS FITTINGS CAN BE USED AT CONTRACTOR OPTION WITH OWNER APPROVAL. ALTERNATE PRESS FITTINGS SHALL BE APPROVIDE BY ENGINEER PRIOR TO USE.
2. ALL INSULATION ON REFRIGERANT PIPING SHALL BE PLENUM RATED.
3. PROVIDE MINIMUM 1" INSULATION WITH VAPOR BARRIER. CONTRACTOR SHALL VERIFY FINAL REQUIRED INSULATION THICKNESS WITH MANUFACTURER PRIOR TO INSTALLATION.
4. EXPOSED EXTERIOR REFRIGERANT PIPING SHALL BE COVERED IN A UV RESISTANT WRAP. WRAP SHALL BE 3M VENTURECLAD, OR APPROVED EQUAL.
5. REFRIGERANT PIPING SHALL BE INSTALLED, AND SIZED AS PER MANUFACTURER REQUIREMENTS. PIPING SHALL BE INSTALLED PLUMB AND LEVEL, AND BRACED IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS/SPECIFICATIONS.

HVAC EQUIPMENT SCHEDULE

UNIT DESIG.	LOCATION	SERVES	MANUFACTURER & MODEL NO.	TYPE	CAPACITY	MCA/MOCP	VOLTS/PH	STARTER OR SWITCH BY	UNIT WEIGHT (LBS.)	REFRIG. TYPE	AIR FLOW (SPD = HIGH)	FAN STATIC (MIN / MAX)	ACCESSORIES/COMMENTS	NOTES
FC-1	SEE PLANS	SPECIAL INSTRUMENTS - 104	LG ZRNU183MAAA	HORIZONTAL	19,100 CLG / 21,500 HTG	2.3 / 15	230/1	E.C.	96	R32	675	0.16 / 0.71	SERVED BY HP-1	1,2,3,4,5,6
FC-2	SEE PLANS	TESTING ROOM - 105	LG ZRNU483M3AA	HORIZONTAL	48,100 CLG / 54,200 HTG	2.5 / 15	230/1	E.C.	106	R32	1,482	0.16 / 0.79	SERVED BY HP-2	1,2,3,4,5,6
FC-3	SEE PLANS	MICROBIOLOGY - 108	LG ZRNU243M2AAA	HORIZONTAL	24,200 CLG / 27,300 HTG	1.7 / 15	230/1	E.C.	75	R32	706	0.1 / 0.59	SERVED BY HP-1	1,2,3,4,5,6
FC-4	SEE PLANS	ENTRY - 101	LG ZRNU153SJSA	WALL	15,400 CLG / 17,100 HTG	.25 / 15	230/1	E.C.	22	R32	371	-	SERVED BY HP-1	1,2,3,4,5,6
HP-1	ROOF	-	LG ZRUM060GSS0	-	60,000 CLG / 67,000 HTG	32.9 / 40	230/1	E.C.	391	R32	4,238	-		5,7
HP-2	ROOF	-	LG ZRUM060GSS0	-	60,000 CLG / 67,000 HTG	32.9 / 40	230/1	E.C.	391	R32	4,238	-		5,7
H-1	JANITOR - 112	-	LG ARBL104	-	-	-	-	-	-	-	-	-	SERVED BY HP-1	-

NOTES:

1. FAN COIL SHALL BE INSTALLED WITH DISCONNECT SWITCH PROVIDED AND INSTALLED IN THE FIELD BY ELECTRICAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE WITH E.C.
2. FAN COIL SHALL BE PROVIDED WITH SERVICE VALVES ON REFRIGERANT PIPING FOR EASY ISOLATION.
3. PROVIDE LG THERMOSTAT/ZONE CONTROLLER APPROVED BY LG REPRESENTATIVE.
4. CONTROLS CONTRACTOR SHALL COORDINATE WITH LG REPRESENTATIVE ON CONTROLS SEQUENCE PRIOR TO INSTALLAION.
5. APPROVED MANUFACTURERS: LG.
6. PROVIDE WITH CONDENSATE PUMP MODEL: SILENT+ MINI ORANGE
7. HEAT PUMP DOES NOT NEED TO BE LG RED IF AVAILABLE.

ROOF TOP UNIT SCHEDULE (RTU)

UNIT DESIG.	LOCATION	SERVICE	MANUFACTURER & MODEL NO.	AIRFLOW (CFM)	MIN O.A. FLOW (CFM)	MINIMUM NOMINAL SIZE (TONS)	ESP (IN. W.C.)	VFD	COOLING						HEATING				ELECTRICAL			DIMENSIONS	MAX. OPERATING WEIGHT (LBS)	NOTES
									TOTAL (MBH)	SENSIBLE (MBH)	EAT DB/WB (°F)	LAT DB/WB (°F)	SEER2 / IEER	EER	REFRIG.	ELECTRIC HEAT CAPACITY (KW)	HEAT PUMP CAPACITY (MBH)	EAT DB (°F)	LAT DB (°F)	VOLTS/PH/HZ	UNIT MCA	UNIT MOCP	L"xW"xH"		
RTU-1	ROOF	102, 103, 109, 110, 111, 112, 113	TRANE WHK036A3S00**00B0A1A	1,150	240	3.0	1.0	N	32.7	25.71	80 / 67	60.0 / 58.3	16.2	13.5	R-454B	-	33	40.0	71.0	208-230/3/60	23	30	88"x54"x51"	940	1,2,3,4,5,6,7,8,9,12
RTU-2	ROOF	104 & 105	TRANE OABE108A3-D1B4G1KE	1,800	1,800	-	0.5	Y	98.9	98.9	115 / 71	57.9 / 51.2	-	8.5	R-454B	20	104.5	40.0	90.0	208/3/60	113	125	119"x52"x55"	1,550	10,11,12

NOTES:

1. SITE CONDITIONS ARE 110°F DB / 71°F WB SUMMER, 36°F DB WINTER AND ELEVATION OF 750 FEET ABOVE SEA LEVEL.
2. PROVIDE MINIMUM 14" ROOF CURB OR CURB ADAPTOR AS REQUIRED.
3. PROVIDE SMOKE DETECTOR IN SUPPLY AND RETURN AIR DUCT.
4. COORDINATE WITH OWNER FOR BACnet COMPATIBLE REQUIREMENTS BEFORE PURCHASING. PROVIDE TRANE PROGRAMMABLE THERMOSTAT.
5. ELECTRICAL CONTRACTOR SHALL VERIFY CONNECTION REQUIREMENTS (i.e. VOLTAGE, PHASE, MCA, MOCP, ETC.) WITH MECHANICAL EQUIPMENT SUBMITTALS BEFORE BEGINNING ROUGH IN.
6. FACTORY INSTALLED CONVENIENCE OUTLET. (NON POWERED) SEPARATE CIRCUIT SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.
7. ELECTRICAL CONTRACTOR SHALL PROVIDE DISCONNECT SWITCH.
8. PROVIDE WITH MERV 8 FILTER.
9. NO OTHER APPROVED MANUFACTURERS.
10. MAKE-UP AIR UNIT SHALL BE EQUIPPED WITH THE FOLLOWING OPTIONS: HEAT PUMP W/ ELECTRIC HEAT, MIN. TWO STAGE COOLING, BACNET CONTROLS, MIN. 20" CURB, VFD CONTROLLED SUPPLY FAN, INSULATED CABINET, HAIL GUARDS, ETC. FINAL ACCESSORIES LIST SHALL BE COORDINATED W/ OWNER PRIOR TO ORDERING.
11. MAKE-UP AIR UNIT APPROVED MANUFACTURERS: CAPTIVEAIRE, RENEWAIRE, OR OTHERWISE APPROVED EQUAL.
12. UNIT DATA TAKEN FROM VENDOR SELECTION IS FOR REFERENCE ONLY. MECHANICAL AND ELECTRICAL CONTRACTORS SHALL VERIFY INFORMATION FROM MECHANICAL EQUIPMENT SUBMITTALS BEFORE BEGINNING ROUGH IN WORK.

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Licensed Professional Engineer — CERTIFICATE HOLDER — 80884 JOEL WILLIAMS 07/15/2025 — Commonwealth of the Northern Mariana Islands

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

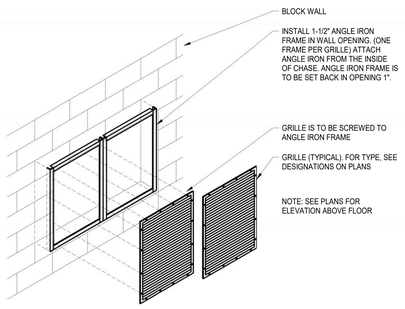
PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

BID SET

SHEET TITLE:
MECHANICAL
SCHEDULES & DETAILS

SHEET NUMBER:
M5.1

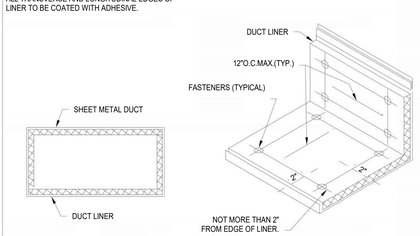
Plot Date: 12/3/2025 11:14:21 AM



FILE NAME: M.03.06
SCALE: NO SCALE

GRILLE INSTALLATION IN BLOCK WALL

NOTE:
ALL TRANSVERSE AND LONGITUDINAL EDGES OF LINER TO BE COATED WITH ADHESIVE.



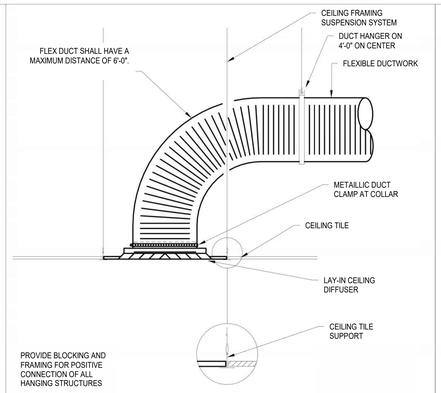
MINIMUM DUCT INSULATION R-VALUES FOR UNCONDITIONED SPACES PER 2015 IECC C403.2.9
SUPPLY = R6
RETURN = R6

MINIMUM DUCT INSULATION R-VALUES WHEN LOCATED OUTSIDE THE BUILDING PER 2015 IECC C403.2.9
SUPPLY = R8 (ZONE 1-4) R12 (ZONE 5-8)
RETURN = R8 (ZONE 1-4) R12 (ZONE 5-8)

THERMAL AND SOUND INSULATION AND COVERINGS, LININGS AND ADHESIVES (WHEN USED) INSTALLED IN CONCEALED AND EXPOSED SPACES SHALL MEET THE REQUIREMENTS OF ASTM E 84. FLAME SPREAD INDEX THAT IS NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84.

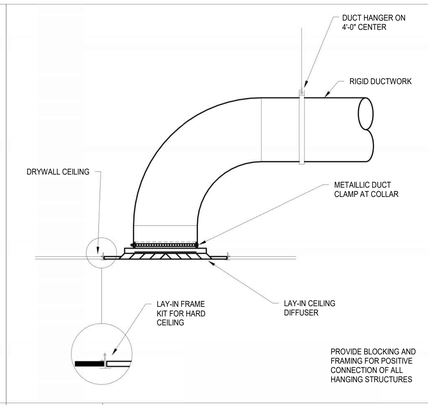
FILE NAME: M.04.13
SCALE: NONE

DUCT LINER



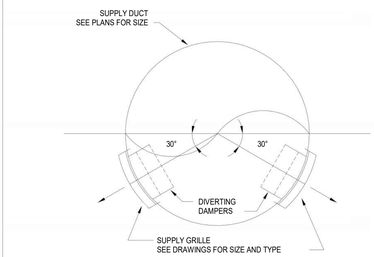
FILE NAME: M.03.03
SCALE: NONE

DIFFUSER/GRILLE LAY-IN CEILING INSTALLATION



FILE NAME: M.03.04
SCALE: NONE

DIFFUSER/GRILLE LAY-IN DRYWALL CEILING INSTALLATION



NOTES:
1. DUCT MOUNTED GRILLES SHALL BE PROVIDED WITH ADJUSTABLE DAMPERS TO ALLOW FOR AIRFLOW BALANCING. SEE THE DRAWINGS AND SCHEDULES FOR DIFFUSER, SIZES, AIRFLOW REQUIREMENTS, AND SPECIFICATIONS.

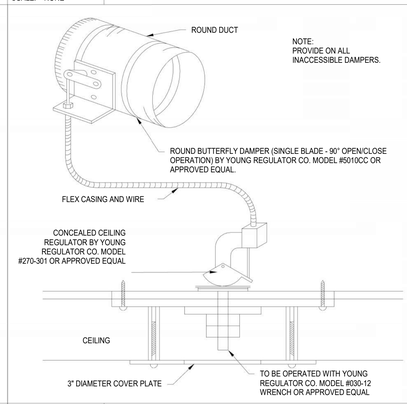
FILE NAME: M.03.12
SCALE: NONE

DUCT MOUNTED DIFFUSER 30° BELOW CENTER MOUNTING ANGLE

Dia.	Maximum Spacing	Wire Dia.	Rod	Strap
10 in. dn 250 mm dn	12 ft 3.7 m	One 12 ga One 2.75 mm	1/4 in. 6.4 mm	1 in. x 22 ga 25.4 x 0.85 mm
11-18 in. 460 mm	12 ft 3.7 m	Two 12 ga or One 8 ga One 4.27 mm	1/4 in. 6.4 mm	1 in. x 22 ga 25.4 x 0.85 mm
19-24 in. 610 mm	12 ft 3.7 m	Two 10 ga Two 3.51 mm	1/4 in. 6.4 mm	1 in. x 22 ga 25.4 x 0.85 mm
25-36 in. 900 mm	12 ft 3.7 m	Two 8 ga Two 2.7 mm	3/8 in. 9.5 mm	1 in. x 20 ga 25.4 x 1.00 mm
37-50 in. 1270 mm	12 ft 3.7 m	→	Two 3/8 in. Two 9.5 mm	Two 1 in. x 20 ga (2) 25.4 x 1.00 mm
51-60 in. 1520 mm	12 ft 3.7 m	→	Two 3/8 in. Two 9.5 mm	Two 1 in. x 18 ga (2) 25.4 x 1.31 mm
61-84 in. 2130 mm	12 ft 3.7 m	→	Two 3/8 in. Two 9.5 mm	Two 1 in. x 26 ga (2) 25.4 x 1.61 mm
85-96 in. 2400 mm	12 ft 3.7 m	→	Two 1/2 in. Two 12 mm	Two 1-1/2 in. x 16 ga (2) 25.4 x 1.61 mm

FILE NAME: M.04.26
SCALE: NONE

MINIMUM HANGER SIZES FOR ROUND DUCT



FILE NAME: M.04.15
SCALE: NONE

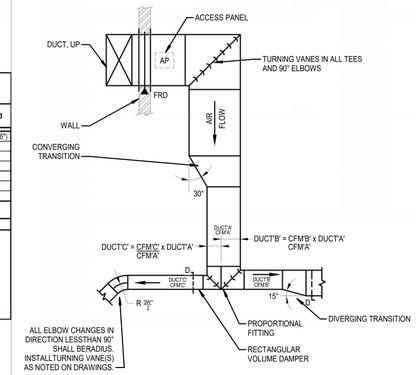
DAMPER AND REGULATOR

Maximum Half of Duct Perimeter	Pair at 10 ft Spacing		Pair at 8 ft Spacing		Pair at 5 ft Spacing		Pair at 14 ft Spacing	
	Strap	Wire/ Rod	Strap	Wire/ Rod	Strap	Wire/ Rod	Strap	Wire/ Rod
P/2 = 30"	1" x 22 ga	10 ga (0.135")	1" x 22 ga	10 ga (0.135")	1" x 22 ga	12 ga (0.106")	1" x 22 ga	12 ga (0.106")
P/2 = 72"	1" x 16 ga	3/8"	1" x 20 ga	1/4"	1" x 22 ga	1/4"	1" x 22 ga	1/4"
P/2 = 96"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	3/8"	1" x 22 ga	1/4"
P/2 = 120"	1-1/2" x 16 ga	1/2"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	1/4"
P/2 = 168"	1-1/2" x 16 ga	1/2"	1-1/2" x 16 ga	1/2"	1" x 16 ga	3/8"	1" x 18 ga	3/8"
P/2 = 192"	Not Given	1/2"	1-1/2" x 16 ga	1/2"	1" x 16 ga	3/8"	1" x 16 ga	3/8"
P/2 = 193" UP	Special Analysis Required							

When Straps are Lap Joined Use These Minimum Fasteners:	Single Hanger Maximum Allowable Load	
	Strap	Wire or Rod (Dia.)
1" x 18,20,22 ga - two #10 or one 1/4" bolt 1" x 16 ga - two 1/4" dia. 1-1/2" x 16 ga - two 3/8" dia. Place fasteners in series, not side by side.	1" x 22 ga - 260lbs. 1" x 20 ga - 320lbs. 1" x 18 ga - 420lbs. 1" x 16 ga - 700lbs. 1-1/2" x 16 ga - 1100lbs.	0.106" - 80lbs. 0.135" - 120lbs. 0.162" - 160lbs. 1/4" - 270lbs. 3/8" - 680lbs. 1/2" - 1250lbs. 5/8" - 2000lbs. 3/4" - 3000lbs.

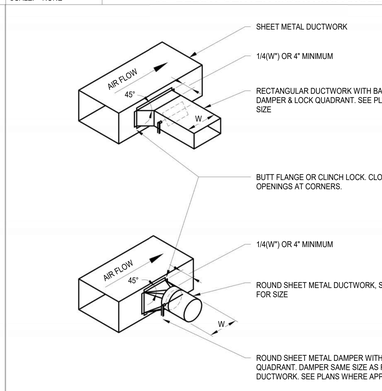
FILE NAME: M.04.25
SCALE: NONE

RECTANGULAR DUCT HANGERS MINIMUM SIZE



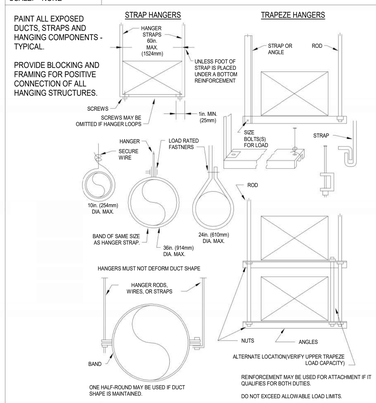
FILE NAME: M.04.01
SCALE: NONE

TYPICAL DUCTWORK



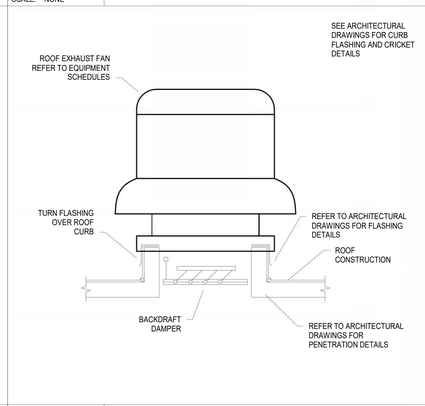
FILE NAME: M.04.02
SCALE: NONE

45 DEGREE TAKE-OFF



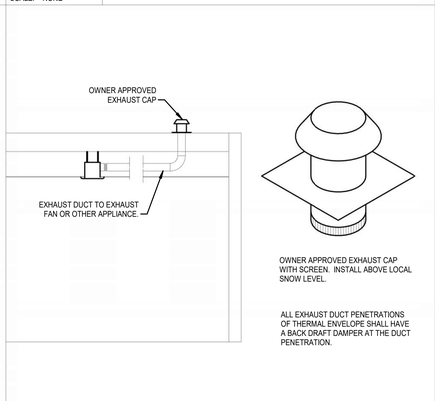
FILE NAME: M.04.27
SCALE: NONE

LOWER HANGER ATTACHMENTS SMACNA STANDARDS



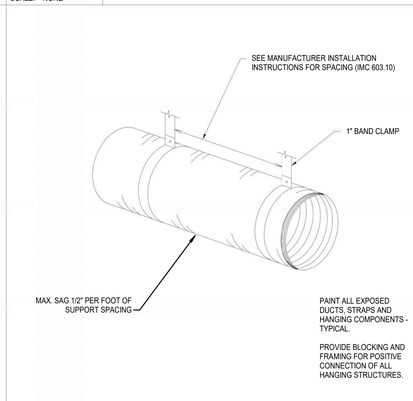
FILE NAME: M.05.06
SCALE: NONE

ROOF MOUNTED EXHAUST FAN



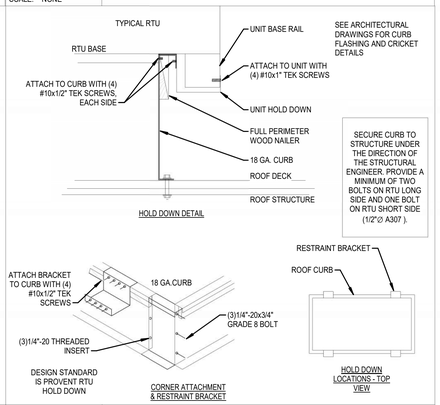
FILE NAME: M.08.08
SCALE: NONE

TYPICAL ROOF CAP FLAT ROOF



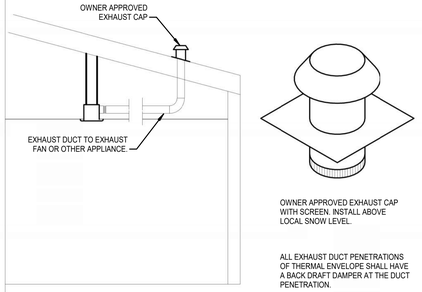
FILE NAME: M.04.06
SCALE: NONE

FLEXIBLE DUCT STRAP HANGER



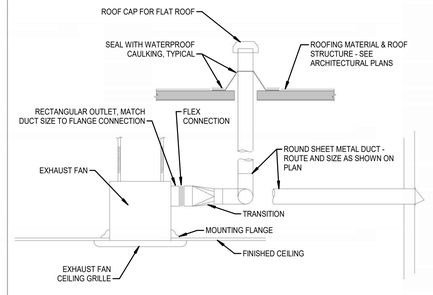
FILE NAME: M.06.03
SCALE: NONE

TYPICAL ROOF CURB



FILE NAME: M.08.09
SCALE: NONE

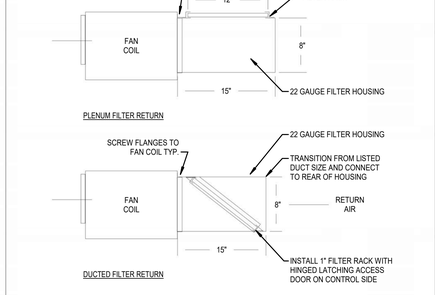
TYPICAL ROOF CAP PITCHED ROOF



NOTE:
ALL EXHAUST DUCT PENETRATIONS OF THERMAL ENVELOPE SHALL HAVE A BACK DRAFT DAMPER AT THE DUCT PENETRATION.

FILE NAME: M.09.03
SCALE: NONE

CEILING MOUNTED EXHAUST FAN



NOTES:
1. FILTER MEDIA SIZE USED SHALL BE CONSISTENT FOR BOTH THE PLENUM FILTER RETURN AND DUCTED FILTER RETURN APPLICATIONS.
2. FILTER MEDIA USED SHALL BE MERV 8 FOR BOTH THE PLENUM FILTER RETURN AND DUCTED FILTER RETURN APPLICATIONS.

FILE NAME: M.10.04
SCALE: NONE

TYPICAL FAN COIL RETURN/FILTER PLENUM

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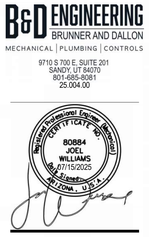

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
MECHANICAL DETAILS

SHEET NUMBER:
M5.2

BID SET

Plot Date: 12/3/2025 11:14:28 AM

GENERAL NOTES (APPLIES TO ALL SHEETS):

1. ALL WORK SHALL BE PROVIDED IN ACCORDANCE WITH 2018 INTERNATIONAL BUILDING CODES AND ALL APPLICABLE NATIONAL AND STATE CODES, AND SAFETY STANDARDS, INCLUDING ANY LOCAL AMENDMENTS ADOPTED BY THE STATE OF ARIZONA.

2. PLUMBING CONTRACTOR (PC) SHALL BE RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS PRIOR TO EXECUTION OF ANY WORK ON THE PROJECT.

3. ALL PLUMBING SYSTEMS WITHIN THESE CONTRACT DOCUMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE 2021 INTERNATIONAL PLUMBING CODE. ANY FIELD ADJUSTMENT MADE BY THE PC IN THE FIELD SHALL COMPLY WITH THE 2021 INTERNATIONAL PLUMBING CODE REQUIREMENTS.

4. WORK INCLUDED: FURNISH MATERIAL, LABOR AND SERVICES NECESSARY FOR AND INCIDENTAL TO PROVIDING THE FOLLOWING PLUMBING WORK WHERE SHOWN ON THE PLANS AND AS HEREINAFTER SPECIFIED. INCLUDE ALL NECESSARY WORK, MATERIALS, AND EQUIPMENT TO PERFORM WORK COMPLETELY.
   - A. SANITARY WASTE SYSTEM, INCLUDING BUT NOT LIMITED TO, SANITARY PIPING, VENT PIPING, PLUMBING FIXTURES, FLOOR DRAINS, AND CLEANOUTS.
   - B. STORM WATER DRAINAGE SYSTEM, INCLUDING BUT NOT LIMITED TO, STORM WATER PIPING, ROOF DRAINS, OVERFLOW DRAINS, AND CLEANOUTS.
   - C. POTABLE DOMESTIC WATER SYSTEM, INCLUDING BUT NOT LIMITED TO, BACKFLOW PREVENTERS, PRESSURE REGULATORS, WATER METER, COLD WATER PIPING, HOT WATER PIPING, HOT WATER RETURN PIPING, AND CONNECTION TO ALL PLUMBING FIXTURES, EQUIPMENT OR SPECIALTIES.
   - D. DOMESTIC HOT WATER SYSTEM, INCLUDING BUT NOT LIMITED TO, GAS ELECTRIC TANKED WATER HEATER, CIRCULATOR PUMP, THERMOSTATIC MIXING VALVES, AND EXPANSION TANK.
   - E. TEPID WATER SYSTEM, INCLUDING BUT NOT LIMITED TO, EMERGENCY EYEWASH/SHOWER, EMERGENCY EYEWASH, SERVICE VALVES, THERMOSTATIC MIXING VALVES, ETC.
   - F. WATER SOFTENER SYSTEM INCLUDING, BUT NOT LIMITED TO MINERAL TANK, BRINE TANK, AUTOMATIC CONTROLS, UNSOFTENED AND SOFTENED WATER PIPING.
   - G. CONDENSATE DRAIN PIPING FROM HVAC EQUIPMENT.
   - H. CONTRACTOR SHALL COORDINATE HIS WORK WITH THE WORK OF OTHER TRADES, AND WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
   - I. DRAINING, FILLING, AND VENTING OF ALL MODIFIED SYSTEMS AS REQUIRED FOR THE ABOVE WORK. THIS INCLUDES SCHEDULING SHUTDOWNS WITH THE OWNER.
   - J. PLUMBING CONTRACTOR (PC) SHALL COORDINATE WITH THE MECHANICAL CONTRACTOR (MC) REGARDING EQUIPMENT SUPPLIED BY MC TO BE INSTALLED BY THE PC.
   - K. PROVIDE SUFFICIENT LABOR AND RESOURCES REQUIRED FOR THE TESTING AND BALANCING OF THE DOMESTIC WATER, EMERGENCY SHOWER AND EYEWASH STATIONS, ETC.
   - L. CLEANING AND PRESSURE TESTING EQUIPMENT, PIPING, AND ACCESSORIES INSTALLED IN ACCORDANCE WITH CODE AND INDUSTRY BEST PRACTICES.
   - M. ALL SEISMIC RESTRAINTS FOR THE ABOVE WORK.
   - N. INSTALLING ACCESSORIES SPECIFIED UNDER OTHER SECTIONS CONTAINED WITHIN THE CONTRACT DOCUMENTS.
   - O. ***VACUUM TESTING SYSTEM*** SHALL BE PROVIDED BY CONTRACTOR AND VENDOR IN ACCORDANCE WITH OWNERS SYSTEM REQUIRES. SYSTEM SHALL BE DESIGNED BY A CERTIFIED VENDOR AND INSTALLED BY A CERTIFIED CONTRACTOR. THIS SYSTEM FALLS OUTSIDE THE ENGINEER OF RECORD SCOPE OF WORK. OUTLET LOCATIONS HAVE BEEN SHOWN ON THE PLANS FOR REFERENCE ONLY. FINAL INSTALLATION OF ALL EQUIPMENT, OUTLETS, AND ASSOCIATED MATERIALS SHALL BE THE RESPONSIBILITY OF THE EQUIPMENT VENDOR AND INSTALLING CONTRACTOR.
   - P. ***DI WATER SYSTEM*** SHALL BE PROVIDED BY CONTRACTOR AND VENDOR IN ACCORDANCE WITH OWNERS SYSTEM REQUIRES. SYSTEM SHALL BE DESIGNED BY A CERTIFIED VENDOR AND INSTALLED BY A CERTIFIED CONTRACTOR. THIS SYSTEM FALLS OUTSIDE THE ENGINEER OF RECORD SCOPE OF WORK. OUTLET LOCATIONS HAVE BEEN SHOWN ON THE PLANS FOR REFERENCE ONLY. FINAL INSTALLATION OF ALL EQUIPMENT, OUTLETS, AND ASSOCIATED MATERIALS SHALL BE THE RESPONSIBILITY OF THE EQUIPMENT VENDOR AND INSTALLING CONTRACTOR.

5. PC RESPONSIBILITY FOR PLUMBING PIPING INSTALLATION, SANITARY, STORM, DOMESTIC, ETC., SHALL END AT 5'-0" OUTSIDE THE BUILDING. PC SHALL BE RESPONSIBLE FOR CAPPING AND TESTING PIPING AT 5'-0" OUTSIDE THE BUILDING IN ACCORDANCE WITH CODE.
   - A. IT SHALL BE THE RESPONSIBILITY OF THE CIVIL CONTRACTOR TO MAKE THE FINAL CONNECTION OF ALL PLUMBING PIPING FROM 5'-0" OUTSIDE THE BUILDING TO SITE UTILITIES. THIS INCLUDES ALL REQUIRED FITTINGS AND ACCESSORIES.
   - B. IT SHALL BE THE RESPONSIBILITY OF BOTH THE PC AND THE CIVIL CONTRACTOR TO COORDINATE THE REQUIRED INVERT ELEVATIONS (I.E.) OF THE PLUMBING PIPING PRIOR TO INSTALLATION.

6. ALL PENETRATIONS THROUGH FIRE/SMOKE RATED ASSEMBLIES SHALL BE SEALED AND PROTECTED IN ACCORDANCE WITH ALL NATIONAL, STATE, AND MUNICIPALLY ADOPTED CODES INCLUDING AMENDMENTS. CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS FOR ASSEMBLY LOCATIONS AND RATINGS. FIRE/SMOKE RATED ASSEMBLIES INCLUDE, BUT NOT LIMITED TO STAIRWAYS, SHAFTS, CORRIDORS, FLOORS, ROOFS, AND REQUIRED EXITS. CONTRACTOR SHALL INSTALL PER MANUFACTURER'S UL LISTED INSTALLATION INSTRUCTIONS.

7. PC SHALL COORDINATE WITH THE ELECTRICAL CONTRACTOR TO ENSURE ALL PLUMBING EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS IS PROVIDED SERVICE. PC AND E.C. SHALL REFER TO THE PLUMBING FIXTURE SCHEDULE FOR ALL EQUIPMENT REQUIRING ELECTRICAL SERVICE.

8. EACH PLUMBING FIXTURE, ACCESSORY, EQUIPMENT ITEM AND SPECIALTY SHALL BE INSTALLED IN ACCORDANCE WITH THE RESPECTIVE MANUFACTURER'S RECOMMENDATIONS.

9. PLUMBING FIXTURES, EQUIPMENT AND SPECIALTIES SHALL BE PROTECTED AGAINST DAMAGE IN THE PERIOD BETWEEN INSTALLATION AND ACCEPTANCE. ANY ITEM DAMAGED SHALL BE REMOVED, REPAIRED AND/OR REPLACED AT NO ADDITIONAL COMPENSATION.

10. ALL OPERABLE DEVICES AND FEATURES OF PLUMBING FIXTURES, ACCESSORIES, EQUIPMENT AND SPECIALTIES PROVIDED FOR IN THE SCOPE OF WORK OUTLINED IN THE FOLLOWING DOCUMENTS SHALL BE OPERATED AND PROVED TO FUNCTION SATISFACTORILY FOR A PERIOD OF EIGHT (8) HOURS. ADJUST, BALANCE, LUBRICATE AS REQUIRED. CONTRACTOR SHALL INSTRUCT THE OWNER IN THE PROPER OPERATION AND MAINTENANCE OF EACH DEVICE.

11. THE PLUMBING SYSTEM SHALL COMPLY WITH THE 2011 REDUCTION OF LEAD IN DRINKING WATER ACT. COMPONENTS SHALL BE 'LEAD FREE' EQUIVALENT OF MODEL NUMBER SPECIFIED REGARDLESS IF MANUFACTURER'S PREFIX AND SUFFIX HAVE BEEN INCLUDED.

PLUMBING PIPING SYSTEM (APPLIES TO ALL SHEETS):

1. FURNISH AND INSTALL THE PIPING SYSTEMS SHOWN ON THE PLANS AND AS HEREINAFTER SPECIFIED IN THE RESPECTIVE SCHEDULES. INCLUDE ALL NECESSARY CONSIDERATIONS FOR THE RELATED SYSTEMS TO PROVIDE FOR COMPLETE SYSTEMS.

2. REFER TO P5 SERIES SHEETS FOR ALL SCHEDULES AND DETAILS.

3. ALL DRAINAGE PIPES SHALL BE FLUSHED CLEAN AT THE COMPLETION OF THE WORK. ROD OUT ANY OBSTRUCTIONS ENCOUNTERED.

4. ALL DOMESTIC WATER PIPES SHALL BE FLUSHED CLEAN AT THE COMPLETION OF THE WORK. REFER TO 'CLEANING OF PIPING SYSTEMS' NOTES ON SAME SHEET.

5. PRESSURE TEST EACH RESPECTIVE PIPING SYSTEM FOR TIGHTNESS TO THE TEST PRESSURE INDICATED WITHOUT LOSS. REPAIR ANY LEAKS AND RETEST, AS REQUIRED. IF TEST PRESSURE IS NOT INDICATED, HYDROSTATICALLY TEST TO 1.5 TIMES THE SYSTEM OPERATING PRESSURE. REFER TO 'PRESSURE TESTING' NOTES ON SAME SHEET.

6. THE PLANS INDICATE THE APPROXIMATE LOCATION AND ARRANGEMENT OF ROUGHING-IN FOR WASTE, VENT AND DOMESTIC WATER PIPING TO SERVE THE RESPECTIVE PLUMBING FIXTURE, EQUIPMENT AND SPECIALTIES. FINAL LOCATIONS AND ARRANGEMENTS SHALL BE DETERMINED FROM APPROVED SHOP DRAWINGS OF THE RESPECTIVE ITEM.

7. PROVIDE APPROVED BACKFLOW PREVENTERS IN ALL BRANCH PIPES IN THE DOMESTIC WATER SYSTEM FOR CONNECTIONS TO NON-DOMESTIC APPLICATIONS.

8. MAIN WASTE VENT THRU ROOF (VTR) PIPES SHALL EXTEND 12" MINIMUM ABOVE THE ROOF, AND MINIMUM VTR SHALL BE 2" SIZE.

9. INSTALL ALL PIPING WITH PITCH TO VENT OR DRAIN. PROVIDE DRAIN VALVES AT LOW POINTS AND AIR VENTS AT HIGH POINTS. DRAIN VALVES AND AIR VENTS SHALL BE 3/4" BRONZE, 2 PIECE BODY BALL VALVES WITH 3/4" HOSE END ADAPTER, CAP, AND CHAIN. IN 1/2" THROUGH 2" PIPE, CONTRACTOR MAY USE WEBSTONE MODEL T-DRAIN.

10. THE PLUMBING SYSTEM SHALL COMPLY WITH THE 2011 REDUCTION OF LEAD IN DRINKING WATER ACT.

11. WATER HAMMER ARRESTORS SHALL BE PROVIDED ON ALL DOMESTIC WATER QUICK OPENING/CLOSING DEVICES. FOR MULTI-FIXTURE APPLICATIONS, WATER HAMMER ARRESTORS SHALL BE EQUAL TO JAY R. SMITH 5005-5050. FOR SINGLE FIXTURE APPLICATIONS, WATER HAMMER ARRESTORS SHALL BE EQUAL TO JAY R. SMITH 5201-5250.

12. DRAINAGE PIPING REQUIREMENTS ARE AS FOLLOWS (2021 IPC):
   - A. CONDENSATE DRAIN:
     - a. 1/8" PER 1'-0" (1% SLOPE)
     - b. PROVIDE AN AIR GAP ON THE PRIMARY CONDENSATE PIPING AT THE APPROVED TERMINATION DRAIN. THE AIR GAP SHALL HAVE A MINIMUM SEPARATION DISTANCE FROM THE DRAIN OF 2 TIMES THE PIPE DIAMETER.
     - c. THE END OF THE PIPE AT THE TERMINATION POINT SHALL BE CUT AT A 30-45 DEGREE ANGLE TO ALLOW FOR FREE DISCHARGE OF THE LIQUID.
   - B. SANITARY DRAIN:
     - a. 2-1/2" OR LESS = 1/4" PER 1'-0" (2% SLOPE)
     - b. 3" TO 6" = 1/8" PER 1'-0" (1% SLOPE)
     - c. 8" OR LARGER = 1/16" PER 1'-0" (0.5% SLOPE)
     - d. NOTE 1: FOR INVERT ELEVATION (I.E.) CALCULATION PURPOSES, THE FINISHED FLOOR (F.F.) ELEVATION SHALL BE ASSUMED AS 100.00' - SEE PLANS FOR F.F. LOCATION. ACTUAL ELEVATIONS ARE CONTAINED WITH THE ARCHITECTURAL AND CIVIL PLANS IF REQUIRED.
   - C. STORM DRAIN: SEE TABLE 1106.2 WITHIN 2021 IPC.
     - a. NOTE 1: THE STORM DRAIN PIPING FOR THE PROJECT HAS BEEN DESIGNED USING 1/8" PER 1'-0" (1% SLOPE) TO MINIMIZE TOTAL PIPING FALL. PC SHALL BE RESPONSIBLE FOR PROVIDING CODE COMPLIANT CALCULATIONS IF STORM DRAINAGE SYSTEM IS MODIFIED FROM CONTRACT DOCUMENTS - I.E. CHANGE IN PIPE SIZES, CHANGE IN PIPE SLOPE, ETC.
     - b. NOTE 2: FOR INVERT ELEVATION (I.E.) CALCULATION PURPOSES, THE FINISHED FLOOR (F.F.) ELEVATION SHALL BE ASSUMED AS 100.00' - SEE PLANS FOR F.F. LOCATION. ACTUAL ELEVATIONS ARE CONTAINED WITH THE ARCHITECTURAL AND CIVIL PLANS IF REQUIRED.

CLEANING AND PRESSURE TESTING OF PIPING SYSTEMS (APPLIES TO ALL SHEETS):

1. CLEANING OF PIPING SYSTEMS
   - A. THE CONTRACTOR SHALL CLEAN THE RESPECTIVE PIPING SYSTEM(S) THAT ARE INCLUDED IN THEIR SCOPE OF WORK. ALL SYSTEMS SHALL BE FLUSHED WITH WATER OR AIR (DEPENDING ON ULTIMATE USE) TO RELIEVE ANY CONGESTION AND INTERNALLY CLEANSE THE RESPECTIVE PIPING SYSTEM. THE CONTRACTOR SHALL PROVIDE ALL FLUSHING MEDIA IN SUFFICIENT QUANTITY, INLET CONNECTIONS, DISCHARGE OR DRAINAGE OUTLETS AND ANY TEMPORARY PROVISIONS TO PROTECT COMPONENTS, OR REMOVE IT, TO FACILITATE THE FLUSHING. CLEAN AND REPLACE ALL STRAINER SCREENS AND FILTERS. FLUSH CLEAN AND DRAIN ALL LOW POINTS IN THE PIPING.
   - B. AN INDEPENDENT WITNESS AND/OR REPRESENTATIVE OF THE OWNER SHALL BE PRESENT ALL FOR FLUSHING, CLEANING, AND RINSING. WATER TREATMENT REPRESENTATIVE MUST CHECK WATER AFTER RINSING TO INSURE ALL CHEMICAL CLEANER HAS BEEN REMOVED AND THE ALKALINITY OF THE RINSE WATER IS EQUAL TO THAT OF THE MAKE-UP WATER.
   - C. NEW OR REPAIRED POTABLE WATER SYSTEMS SHALL BE PURGED OF DELETERIOUS MATTER AND DISINFECTED PRIOR TO UTILIZATION. THE METHOD FOLLOWED SHALL BE THAT PRESCRIBED BY THE HEALTH AUTHORITY HAVING JURISDICTION OR, IN THE ABSENCE OF A PRESCRIBED METHOD, THE PROCEDURE DESCRIBED IN EITHER AWWA C651 OR AWWA C652, OR AS DESCRIBED IN THIS SECTION. THIS REQUIREMENT SHALL APPLY TO "ON-SITE" OR "IN-PLANT" FABRICATION OF A SYSTEM OR TO A MODULAR PORTION OF A SYSTEM.
     - a. THE PIPE SYSTEM SHALL BE FLUSHED WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT THE POINTS OF OUTLET.
     - b. THE SYSTEM OR PART THEREOF SHALL BE FILLED WITH A WATER/CHLORINE SOLUTION CONTAINING AT LEAST 50 PARTS PER MILLION (50 MG/L) OF CHLORINE, AND THE SYSTEM OR PART THEREOF SHALL BE VALVED OFF AND ALLOWED TO STAND FOR 24 HOURS; OR THE SYSTEM OR PART THEREOF SHALL BE FILLED WITH A WATER/CHLORINE SOLUTION CONTAINING AT LEAST 200 PARTS PER MILLION (200 MG/L) OF CHLORINE AND ALLOWED TO STAND FOR 3 HOURS.
     - c. FOLLOWING THE REQUIRED STANDING TIME, THE SYSTEM SHALL BE FLUSHED WITH CLEAN POTABLE WATER UNTIL THE CHLORINE IS PURGED FROM THE SYSTEM.
     - d. THE PROCEDURE SHALL BE REPEATED WHERE SHOWN BY A BACTERIOLOGICAL EXAMINATION THAT CONTAMINATION REMAINS PRESENT IN THE SYSTEM.

2. PRESSURE TESTING
   - A. THE CONTRACTOR SHALL SUBMIT A SCHEDULE AT THE BEGINNING OF THE WORK OF THE PIPING SYSTEMS THAT ARE TO BE PRESSURE TESTED, AND INDICATE WHETHER TESTS WILL BE FOR AN ENTIRE OR PARTIAL SYSTEM. ENTIRE PIPING SYSTEMS SHALL BE PRESSURE TESTED AT ONE TIME UNLESS IT IS NOT POSSIBLE OR PRACTICAL.
   - B. ALL PIPING TO BE INSULATED OR CONCEALED SHALL BE PRESSURE TESTED PRIOR TO THE APPLICATION OF THE INSULATION OR CONCEALMENT.
   - C. AN INDEPENDENT WITNESS AND/OR REPRESENTATIVE OF THE OWNER SHALL WITNESS ALL PRESSURE TESTING. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER AT LEAST THREE (3) DAYS PRIOR TO THE TEST DATE.
   - D. EACH PIPING SYSTEM SHALL BE TESTED PER THE METHOD, TEST PRESSURE, AND TEST DURATION AS SPECIFIED IN THE PIPING MATERIAL SCHEDULES.
   - E. THE CONTRACTOR SHALL PROVIDE ALL TEST MEDIA, MEASURING DEVICES, INLET CONNECTIONS, TEST MEASUREMENT CONNECTIONS, AND DISPOSAL OF TEST MEDIA. THE CONTRACTOR SHALL PROTECT, ISOLATE AND/OR REMOVE PIPING SYSTEM COMPONENTS THAT CAN NOT BE SUBJECTED TO TEST PRESSURES.
   - F. HAMMER EACH JOINT IN WELDED OR SOLDERED PIPING WHILE UNDER TEST. LEAKS SHALL BE REPAIRED AND THE TEST(S) REPEATED UNTIL THE RESPECTIVE PIPING SYSTEM IS TIGHT.

PLUMBING ABBREVIATIONS INDEX

NOTE: ALL ABBREVIATIONS MAY NOT BE USED ON THIS PROJECT.

AD	AREA DRAIN
AP	ACCESS PANEL
AW	ACID WASTE
AV	ACID VENT
BV	BALANCE VALVE
CB	CATCH BASIN
CFS	CUBIC FEET PER SECOND
CO	CLEANOUT
CWV	COMBINATION WASTE & VENT
CGRWV	COMBINATION GREASE WASTE & VENT
CUSP	CUSPIDOR
CHV	CHECK VALVE
CW	COLD WATER
DD	DECK DRAIN
ODD	OVERFLOW DECK DRAIN
DF	DRINKING FOUNTAIN
DN	DOWN
DS	DOWNSPOUT
DV	DRAIN VALVE
DWH	DOMESTIC WATER HEATER
ET	EXPANSION TANK
EWC	ELECTRIC WATER COOLER
EX	EXISTING PIPING OR EQUIPMENT
F	FLANGE CONNECTION
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FS	FLOOR SINK
GA	GAUGE
GC	GAUGE COCK
GW	GREASE WASTE
HB	HOSE BIB
HW	HOT WATER
HWR	HOT WATER RECIRCULATION
ICW	ICE COLD WATER
IDW	INDIRECT WASTE
I.E.	INVERT ELEVATION
L	LAVATORY
LV	LOOP VENT
MH	MANHOLE
MS	MOP SINK
N.I.C.	NOT IN CONTRACT
NPC	NON-POTABLE COLD WATER
NPH	NON-POTABLE HOT WATER
OD	OVERFLOW DRAIN / OVERFLOW DRAIN PIPNG
PR	PRESSURE REGULATOR
RD	ROOF DRAIN / ROOF DRAIN PIPNG
RI	ROUGH-IN (ONLY)
RI&C	ROUGH-IN AND CONNECT
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
S	SANITARY WASTE
SBD	SHOWER BASINS AND DRAIN
SCW	SOFT COLD WATER
SH	SHOWER HEAD
SHW	SOFT HOT WATER
SS	SERVICE SINK
SSD	SUBSOIL DRAIN
STW	SOFT TEMPERED WATER
SV	SERVICE VALVE
TD	TRENCH DRAIN
TH	THERMOMETER
TT	TEST TEE
TWC	TEMPERED WATER CIRCULATING
U	UNION
UR	URINAL
V	VENT
VTR	VENT THROUGH ROOF
WC	WATER CLOSET
WCO	WALL CLEANOUT
WF	WASH FOUNTAIN
WH	WALL HYDRANT
WM	WATER MAIN
YCO	YARD CLEANOUT
YD	YARD DRAIN

PLUMBING ABBREVIATIONS INDEX

NOTE: ALL ABBREVIATIONS MAY NOT BE USED ON THIS PROJECT.

SYMBOL	ABBREVIATION
XX-#	FIXTURE DESIGNATION
# / X#.#	SECTION DESIGNATION / SHEET NUMBER
	CONNECT TO EXISTING
	POINT OF DEMOLITION
#	KEYNOTE DESIGNATION
#	REVISION DELTA
# / X#.#	ENLARGED PLAN CALL OUT
#	PLUMBING RISER DESIGNATION

DESIGN CONTACTS

ENGINEER JOEL WILLIAMS
DESIGNER JAREN TICE

PLUMBING SHEET LIST

PLUMBING PIPE FITTING SYMBOLS

NOTE: ALL ABBREVIATIONS MAY NOT BE USED ON THIS PROJECT.

SYMBOL	ABBREVIATION	EXPLANATION
	UP	PIPE LINE, TURNED UP
	DN	PIPE LINE, TURNED DOWN
	TDN	PIPE LINE, TEE DOWN
	SV	SERVICE VALVE
	BV	BALANCE VALVE
	CV	2 WAY CONTROL VALVE
	3CV	3 WAY CONTROL VALVE
	CHV	CHECK VALVE
	DV	DRAIN VALVE
	AAV	AUTOMATIC AIR VALVE
	MAV	MANUAL AIR VALVE
	FCO	FLOOR CLEANOUT
	WCO	WALL CLEANOUT
	RD/OD	ROOF DRAIN
	OFN	OVERFLOW NOZZLE
	FS	FLOOR SINK
	FD	SQUARE FLOOR DRAIN
	FD	ROUND FLOOR DRAIN
	F	FLANGE CONNECTION
GA GC	GA GC	GAUGE GAUGE COCK
	MC	MECHANICAL COUPLING
	P	PETE'S PLUG
	RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
	PR PRV	PRESSURE REGULATOR PRESSURE REDUCING VALVE
		SOLENOID VALVE
	RV	RELIEF VALVE
	STR	STRAINER
	TH	THERMOMETER
	TW	THERMOMETER WELL
	U	UNION
		METER
		CAP
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER (BOTTOM & TOP LEVEL)
	PA	PIPE ANCHOR
	PG	PIPE GUIDE
	ARR	WATER HAMMER ARRESTOR

PLUMBING PIPE SYMBOLS

NOTE: ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT.

SYMBOL	EXPLANATION
CW	COLD WATER
HW	HOT WATER
HWR	HOT WATER RECIRCULATION
CD	CONDENSATE DRAIN
S	SANITARY WASTE (ABOVE GRADE)
S	SANITARY WASTE (BELOW GRADE)
V	VENT

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Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
80884
JOEL WILLIAMS
Date Signed 07/15/2025
ARIZONA, U.S.A.

LAKE HAVASU CITY WATER QUALITY LABORATORY

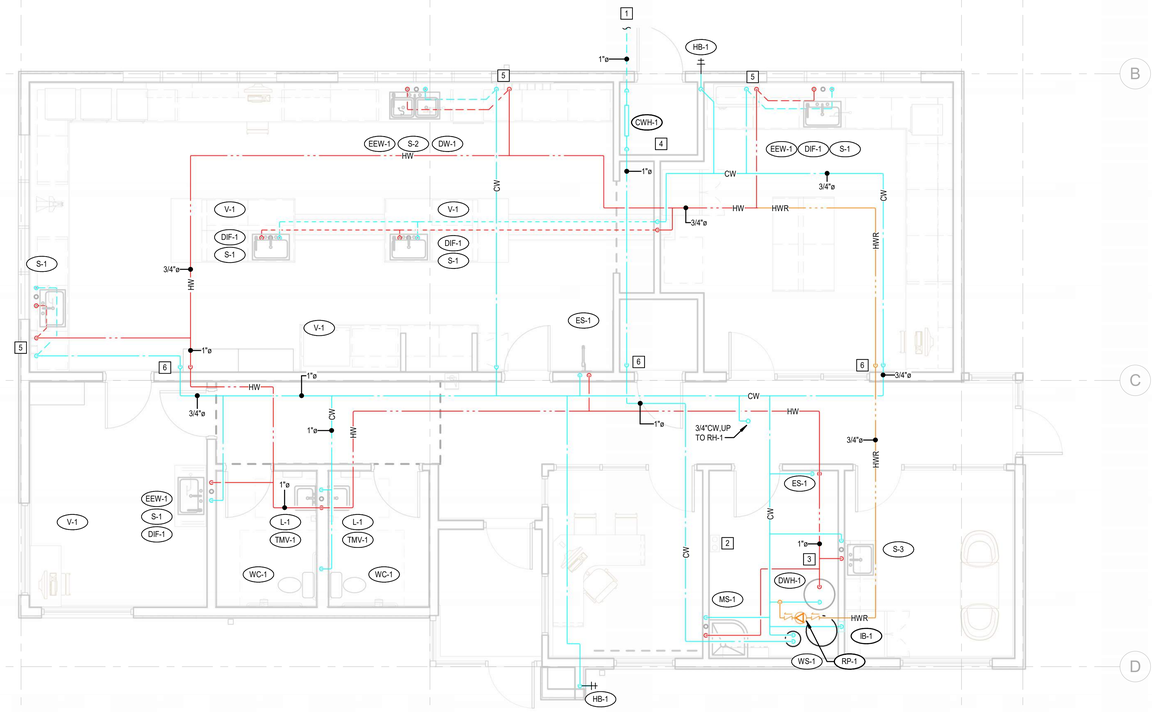
360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
PLUMBING NOTES SYMBOLS & ABBREVIATIONS
SHEET NUMBER:
P0.1

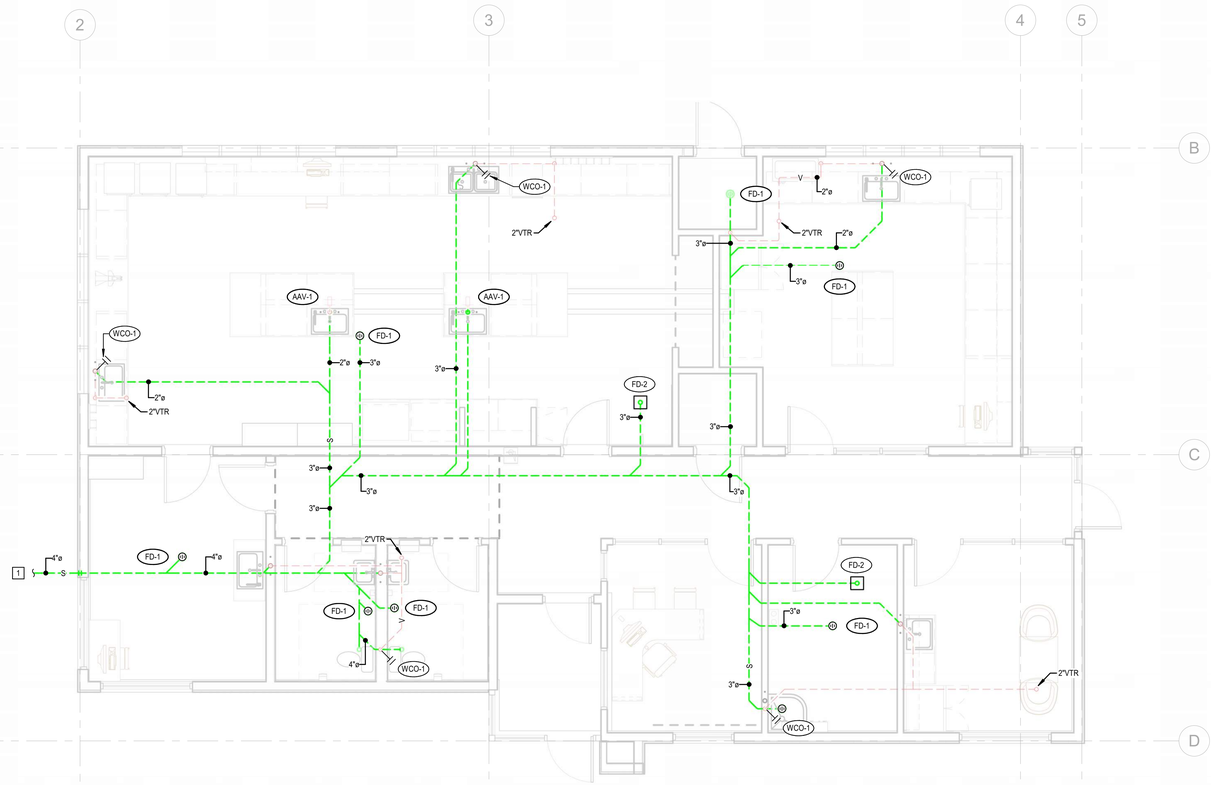
BID SET

Plot Date: 12/3/2025 11:14:32 AM



1 P2.1 LEVEL 1 SUPPLY PLAN
1/4" = 1'-0"

3/16" = 1'-0"
1' 2' 4' 8'



2 P2.1 LEVEL 1 WASTE & VENT PLAN
1/4" = 1'-0"

3/16" = 1'-0"
1' 2' 4' 8'

BUILDING NORTH

GENERAL NOTES

1. REFER TO ALL NOTES, SYMBOLS & ABBREVIATIONS ON SHEET P0.1. REFER TO ALL SCHEDULES & DETAILS WITHIN P5 SERIES SHEETS.
2. REFERENCE ARCHITECTURAL DRAWINGS FOR VACUUM VALVE AND VACUUM LINE LOCATIONS IN THE THREE LABORITORIES.

KEYED NOTES

1 SEE CIVIL FOR PIPE CONTINUATION.

2 VACUUM SYSTEM SHOWN FOR LOCATION ONLY. PROVIDED AND INSTALLED BY OTHERS. REFERENCE ARCHITECTURAL DRAWINGS.

3 DEIONIZED WATER SYSTEM SHOWN FOR LOCATION ONLY. PROVIDED AND INSTALLED BY OTHERS.

4 FIRE RISER LINE. SEE ARCHITECTURAL / FIRE PROTECTION DRAWINGS FOR DETAILS.

5 DOMESTIC HOT AND COLD WATER TO DROP IN WALL TO BELOW COUNTERTOP. ROUTE PIPING IN CABINET TO SINK.

6 DROP DOWN AND ROUTE IN CEILING OF LOWER STRUCTURE.

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CERTIFICATE NO.
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JOEL
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07/15/2025
REGISTERED
ARIZONA U.S.A.

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
PLUMBING FLOOR PLAN

SHEET NUMBER:
P2.1

BID SET

Plot Date: 12/3/2025 11:14:44 AM

PLUMBING FIXTURE SCHEDULE

SYMBOL	FIXTURE	SUPPLY PIPE SIZE						FIXTURE UNITS		ELECTRICAL CONNECTION	FIXTURE SPECS / REMARKS	FIXTURE SELECTION	TRIM				NOTES
		TRAP	WASTE	VENT	COLD	HOT	GAS	DFU	SFU				VALVE	DRAIN	STOP	MISCELLANEAOUS	
CWH-1	COLD WATER HEADER	-	-	-	1-1/2"	-	-	-	-	NO	COLD WATER HEADER SHALL BE INSTALLED IN THE FOLLOWING ARRANGEMENT: STRAINER, BACKFLOW PREVENTER, PRV. SET PRV 60 PSI. CHW IS DESIGNED BASED ON A 1" WATER METER W/ 1-1/2" DISTRIBUTION PIPE TO THE BUILDING.	1-1/2" WATTS 009M2QT-LF,1-1/2" WATTS U5B-Z3-GG,1-1/2" WATTS LF777S.	INCL.	-	BALL VALVE	PROVIDE BACKFLOW PREVENTER SHALL BE PROVIDED WITH AIR GAP. CONTRACTOR SHALL REFER TO PLANS FOR CLARIFICATION.	
DIF-1	DEIONIZED FAUCET	-	-	-	1/2"	-	-	-	-	NO	DEIONIZED WATER SYSTEM SHOWN FOR LOCATION ONLY. PROVIDED AND INSTALLED BY OTHERS						
DW-1	DISHWASHER CONNECTION	-	-	-	-	1/2"	-	-	-	NO	PROVIDE ONE OF THE FOLLOWING: A SEPARATE TAP WITH SERVICE VALVE OFF OF HOT WATER PIPE AT SINK, OR A THREE WAY VALVE WITH SERVICE VALVE ON HOT WATER PIPE AT SINK. HW PIPE TO DW SHALL MATCH DW MANUF. REQUIREMENTS.	CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING REQUIRED INSTALLATION METHOD IN THE FIELD - REFER TO REMARKS.	-	INCL	BALL VALVE		
DWH-1	DOMESTIC WATER HEATER ELECTRIC TANK	-	-	-	3/4"	3/4"	-	-	-	YES	50 GA CAPACITY. 240 V 4500 W ELEMENT.	A.O. SMITH PROLINE ELECTRIC PNT-50 & AMTROL ST-12 EXPANSION TANK OR APPROVED EQUAL.	-	-	BALL VALVE	INSTALL ST-12 ON COLD WATER INLET.	3
EEW-1	EMERGENCY EYEWASH	1-1/2"	1-1/2"	1-1/2"	1/2" TEPID	1/2" TEPID	-	-	-	NO	COUNTER MOUNTED, SWING ACTIVATED EYE WASH FIXTURE.	BRADLEY S19-270C OR APPROVED EQUAL.	INCL.	INCL.	YES CW & HW	PROVIDE TEMPERING VALVE BRADLEY S59-4007. INSTALL PER MANUFACTURERS REQUIREMENTS. COORDINATE WITH OWNER FOR FINAL LOCATION.	
ES-1	EMERGENCY SHOWER & EYEWASH	1-1/2"	1-1/2"	1-1/2"	1" TEPID	1" TEPID	-	-	-	NO	STAINLESS STEEL COMBINATION DRENCH SHOWER AND EYEWASH. PROVIDE FLOW SWITCH ALARM SYSTEM	SHOWER: ULINE H-6618 ALARM: BRADLEY S19-320B OR APPROVED EQUAL.	INCL.	INCL.	YES CW & HW	PROVIDE TEMPERING VALVE BRADLEY S59-2250 HIGH/LOW. INSTALL PER MANUFACTURERS REQUIREMENTS. COORDINATE WITH OWNER FOR FINAL LOCATION.	
FD-1	FLOOR DRAIN FINISHED FLOOR	3"	3"	2"	-	-	-	0	-	NO	CAST IRON BODY W/FLASHING FLANGE, INT. REVERSIBLE CLAMPING COLLAR, SEEPAGE OPENINGS, 6"x6" SQ. ADJ. SATIN NICKEL BRONZE STRAINER W/VR FASTENERS 3" OUTLET	J.R. SMITH 2005Y-B-U-NB, OR EQUAL BY WADE, ZURN, MIFAB	-	-	-	PROVIDE SURE SEAL TRAP GUARD.	
FD-2	EMERGENCY SHOWER DRAIN	3"	3"	2"	-	-	-	0	-	NO	10"x10" CAST IRON BODY WITH FLASHING COLLAR AND TRAP GUARD. NICKLE BRONZE TOP. 3" OUTLET	J.R. SMITH 2010-B, OR APPROVED EQUAL.	-	-	-	PROVIDE SURE SEAL TRAP GUARD.	
IB-1	ICE MAKER BOX	-	-	-	1/2"	-	-	-	-	NO	1/4 TURN VALVES (SWEAT), 20 GA POWDER COATED STEEL.	GUY GRAY MIB4 OR APPROVED EQUAL.	INCL.	-	INCL.	INSTALL PER MANUF. REQS. FINAL MOUNTING HEIGHT A.F.F SHALL BE COORD. IN FIELD W/OWNER/ARCH. CONTRACTOR SHALL BE RESPONISBLE FOR DETERMING PIPE CONNECTION METHOD.	
L-1	LAVATORY-ADA WALL HUNG	1-1/4"	1-1/2"	1-1/2"	1/2"	1/2"	-	1	2	NO	FRONT OVERFLOW W/FAUCET LEDGE, CONCEALED CARRIER ARMS, SELF-DRAINING DECK W/CONTOURED BACK AND SPLASH SHIELDS. MOUNT FIXTURE AT ADA HEIGHT. VITREOUS CHINA.	KOHLER "CHESAPEAKE" MODEL K-1728, 4" CENTERS, W/WALL HANGER.	CHICAGO 420 T45E2805 OR APPROVED EQUAL	GRID	YES	PROVIDE CARRIER. WATTS TC-411 OR APPROVED EQUAL. PROVIDE INSULATION KIT, TRUEBRO LAV GUARD 2 103 E-Z.	1
MS-1	MOP SINK BASIN	3"	3"	2"	1/2"	1/2"	-	2	3	NO	28"x28"x13" ENAMELED CAST IRON ONE PIECE BASIN, GROUTED AND SEALED. PROVIDE WITH REMOVABLE VINYL RIM GUARD.	AMERICAN STANDARD "FLORWELL" MODEL 7745.811	SEE MISCELLANEOUS	INCL.	INCL.	FAUCET: OVERHEAD SUPPLY. AMERICAN STANDARD MODEL 8344212.004	
RP-1	DOMESTIC HOT WATER RECIRCULATION PUMP	-	-	-	-	3/4"	-	-	-	YES	PUMP BODY SHALL BE LEAD FREE BRASS. CERAMIC SHAFT & BEARINGS, CERTIFIED NSF-61 AND NSF-372 STANDARDS. ELEC. REQ. 115V/208-230/60HZ.	GRUNDFOS ALPHA1 15-55SF UP 10-16 PM OR APPROVED EQUAL BY BELL AND GOSSETT, TACO, ARMSTRONG.	-	-	BALL VALVE	PUMP SHALL DELIVER 2 GPM @ 1.5 FT.HD. PUMP SHALL BE PROVIDED W/2 BALL VALVES, CHECK VALVE, STRAINER AND STRAP ON THERMOSTAT (SEE PLANS).	
RH-1	ROOF HYDRANT	-	-	-	3/4"	-	-	-	-	NO	NO DRAIN REQUIRED, DUAL CHECK BFP & DRAIN, AIR VENT BOOT COVERS WELL SEAL.	WOODFORD SRH-MS OR APPROVED EQUAL.	INCL.	-	BALL VALVE	INSTALL PER MANUFACTURERS REQUIREMENTS.	
S-1	SINK SINGLE COMPARTMENT	1-1/2"	2"	1-1/2"	1/2"	1/2"	-	2	1.4	NO	SINK SHALL BE PROVIDED BY COUNTER TOP SUPPLIER. SINK SHALL BE INTEGRATED INTO COUNTER TOP AND OF SAME MATERIAL.		KINGSTON MODEL CENTURION FB8498EFL	GRID	YES		
S-2	SINK DOUBLE COMPARTMENT	1-1/2"	2"	1-1/2"	1/2"	1/2"	-	2	1.4	NO	SINK SHALL BE PROVIDED BY COUNTER TOP SUPPLIER. SINK SHALL BE INTEGRATED INTO COUNTER TOP AND OF SAME MATERIAL.		KINGSTON MODEL CENTURION FB8498EFL	GRID	YES		
S-3	SINK-ADA SINGLE COMPARTMENT	1-1/2"	2"	1-1/2"	1/2"	1/2"	-	2	1.4	NO	18-GA, TYPE 304SS, SELF-RIM SINGLE BOWL. INSIDE BOWL DIM: 21"Lx15-3/4"Wx7-1/2"D. FAUCET DECK W/3 HOLES ON 4" CENTERS.	ELKAY LR-2522 OR JUST SLF-2225-A-GR	KINGSTON MODEL CENTURION FB8498EFL	GRID	YES		
TMV-1	THERMOSTATIC MIXING VALVE-INDIVIDUAL FIXTURE	-	-	-	1/2"	1/2"	-	-	-	NO	INTEGRAL CHECK VALVES, REMOVABLE CARTRIDGE STRAINERS, STAINLESS STEEL PISTONS. THERMAL BELLOWS, ROUGH BRONZE FINISH.	WATTS LFMMV-M1 OR APPROVED EQUAL.	INCL.	-	BALL VALVE ALL 3 SIDES	INSTALL PER MANUFACTURERS REQUIREMENTS.	1,2
V-1	VACUUM	-	-	-	-	-	-	-	-	NO	VACUUM SYSTEM SHOWN FOR LOCATION ONLY. PROVIDED AND INSTALLED BY OTHERS						
WC-1	WATER CLOSET - FLUSHTANK FLOOR MOUNT - ADA	INT	3"	2"	1"	-	-	4	5	NO	FLOOR MOUNTED TOP SPUD FLUSHOMETER BOWL. 1-1/2" TOP SPUD	KOHLER: 96057-0 HIGHCLIFF ULTRA	KOHLER: 10TH00N10-CP	-	INC. W/ VALVE	PROVIDE SEAT: KOHLER 4731-C-0	
WCO-1	WALL CLEANOUT FINISHED SPACES	-	-	-	-	-	-	-	-	NO	PROVIDE CLEANOUT FITTING W/SCREWED PLUG OPENING & COUNTERSUNK PLUG. PROVIDE 8"x8" SQ. ACCESS COVER, PLOISHED NICKEL BRONZE & S.S., VANDAL PROOF SCREWS.	WADE 8480ST-179, ZURN ZNAB-1462-8-VP, J.R. SMITH 4730-U-NB, MIFAB C1460-S-3-6, OR APPROVED EQUAL.	-	-	-		
WS-1	WATER SOFTENER	-	-	-	1"	-	-	-	-	YES	CONTRACTOR SHALL COORDINATE WITH OWNER TO PROVIDE AND INSTALL WATER SOFTENER SYSTEM TO MATCH EXISTING WATER SOFTENER SYSTEM IN OWNERS EXISTING BUILDING.		-	-	-		

NOTES:

1. PROVIDE WITH TMV-1. MIXING VALVE SHALL COMPLY WITH ASSE 1062 AND 1070. SET MIXING VALVE TO MAX. OF 105 F.
2. MIXING VALVE SHALL BE INSTALLED UNDER SINK IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS.
3. CONTRACTOR SHALL PROVIDE A MIN. OF TWO (2) SEISMIC RESTRAINTS/STRAPS AT THE TOP AND BOTTOM 1/3 POINTS OF DOMESTIC WATER HEATER.

2021 IPC TABLE 314.2.2
GRAVITY CONDENSATE DRAIN SIZING

EQUIPMENT CAPACITY	MINIMUM CONDENSATE PIPE DIAMETER (INCH)
Up to 20 tons of refrigeration	3/4 inch
Over 20 tons to 40 tons of refrigeration	1 inch
Over 40 tons to 90 tons of refrigeration	1 1/4 inch
Over 90 tons to 125 tons of refrigeration	1 1/2 inch
Over 125 tons to 250 tons of refrigeration	2 inch

MINIMUM CONDENSATE PIPE SIZE SHALL BE 3/4"

PLUMBING PIPING SCHEDULE

SERVICE DESIG.	SERVICE	MATERIAL	LOCATION	INSULATION	FITTINGS	NOTES
CD	CONDENSATE DRAIN	COPPER TYPE "L" - HARD	INTERIOR - ABOVE GRADE	NONE	WROUGHT COPPER - SOLDER ENDS	4,7,8
CW	DOMESTIC COLD WATER	COPPER TYPE "L" - HARD	INTERIOR - ABOVE GRADE	1-1/2" FIBERGLASS	WROUGHT COPPER - SOLDER ENDS	1,3,4
HW	DOMESTIC HOT WATER	COPPER TYPE "L" - HARD	INTERIOR - ABOVE GRADE	1-1/2" FIBERGLASS	WROUGHT COPPER - SOLDER ENDS	2,3,4
		COPPER TYPE "L" - HARD	INTERIOR - ABOVE & BELOW CEILING	SEE NOTES	WROUGHT COPPER - SOLDER ENDS	2,3,4
S	SANITARY SEWER	CAST IRON - DWV	INTERIOR - ABOVE & BELOW GRADE	NONE	CAST IRON - DWV	6
V	PLUMBING VENT	CAST IRON - DWV	INTERIOR - ABOVE & BELOW GRADE	NONE	CAST IRON - DWV	

NOTES:

1. INSULATION SIZING PER 2021 IECC TABLE C403.11.3 (40°F - 60°F) -- PIPE < 1" = 0.5" INSUL., PIPE 1" TO < 1.5" = 1" INSUL., PIPE 1.5" TO < 4" = 1.5" INSUL.
2. INSULATION SIZING PER 2021 IECC TABLE C403.11.3 (105°F - 140°F) -- PIPE < 1" = 1" INSUL., PIPE 1" TO < 1.5" = 1" INSUL., PIPE 1.5" TO < 4" = 1.5" INSUL.
3. ALL VALVES SHALL BE LEAD FREE
4. PRIOR ENGINEER APPROVED COPPER PRESS FITTINGS CAN BE USED AT CONTRACTORS OPTION.
5. NATURAL GAS PIPING SHALL BE INSTALLED PER THE CURRENT ADOPTED IFGC.
6. SANITARY DRAINAGE SLOPE: 2" AND SMALLER = 1/4" PER 1'-0" (2%), 3" AND LARGER 1/8" PER 1'-0" (1%).
7. MINIMUM CONDENSATE PIPE SIZE SHALL BE 3/4".
8. CONDENSATE PIPE SHALL SLOPE PIPE 1/8" PER 1' (1%) TOWARDS DRAIN.

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LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

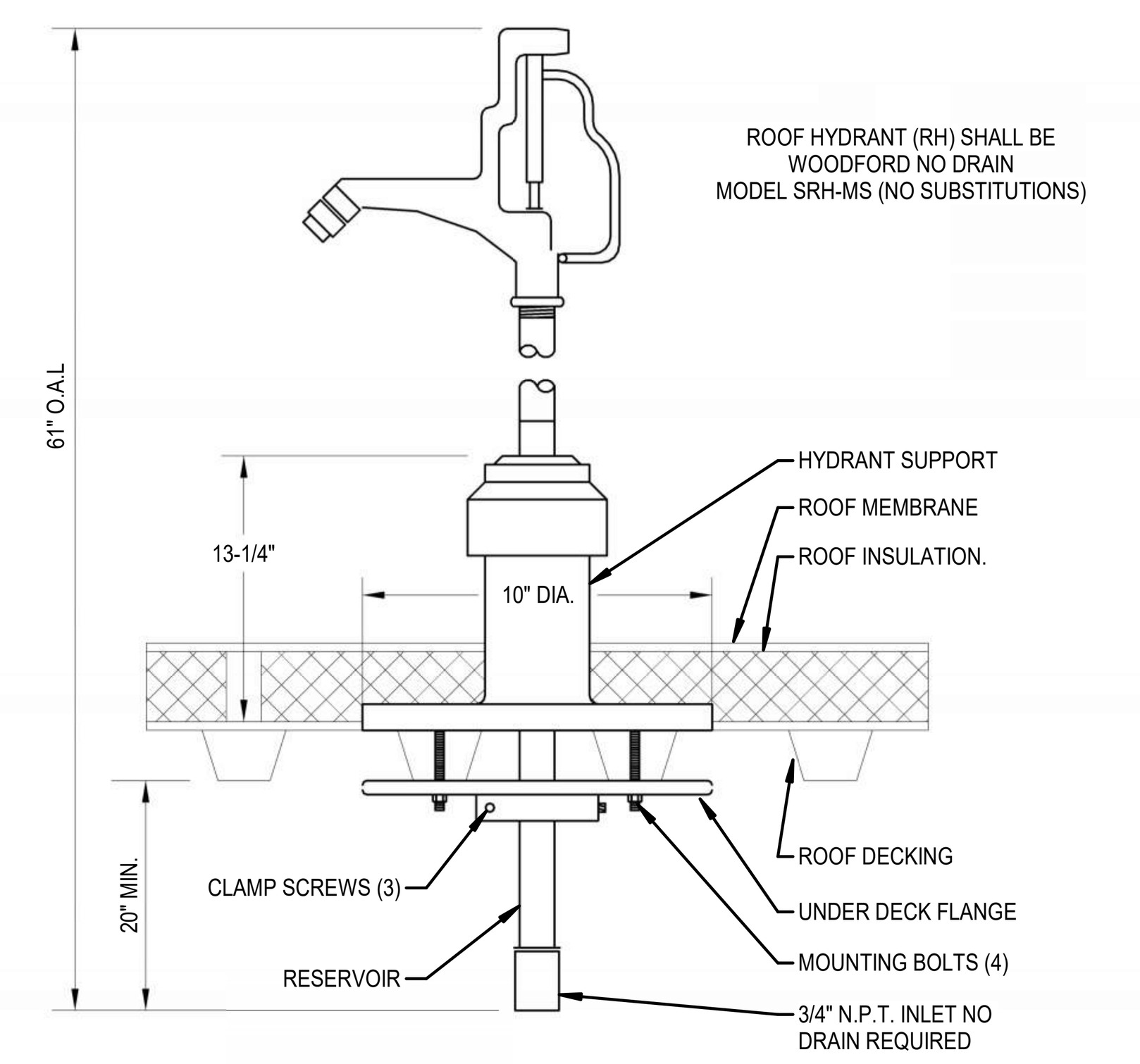
PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
PLUMBING SCHEDULES & DETAILS

SHEET NUMBER:
P5.1

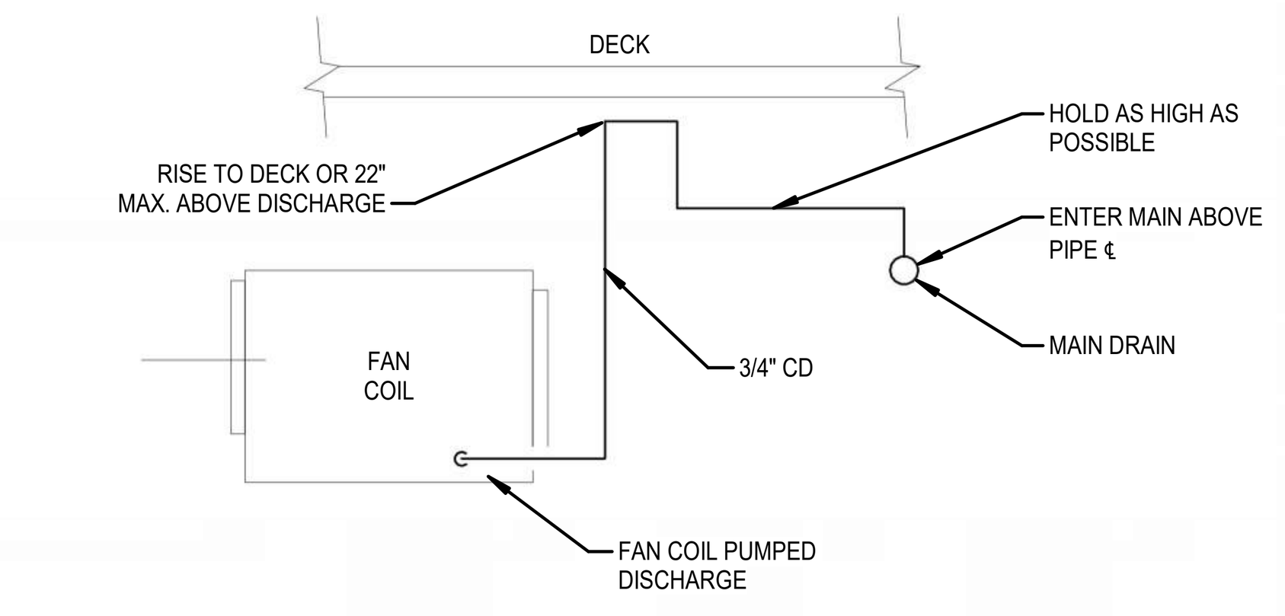
BID SET

Plot Date: 12/3/2025 11:14:50 AM



FILE NAME: P.03.01 SCALE: NONE

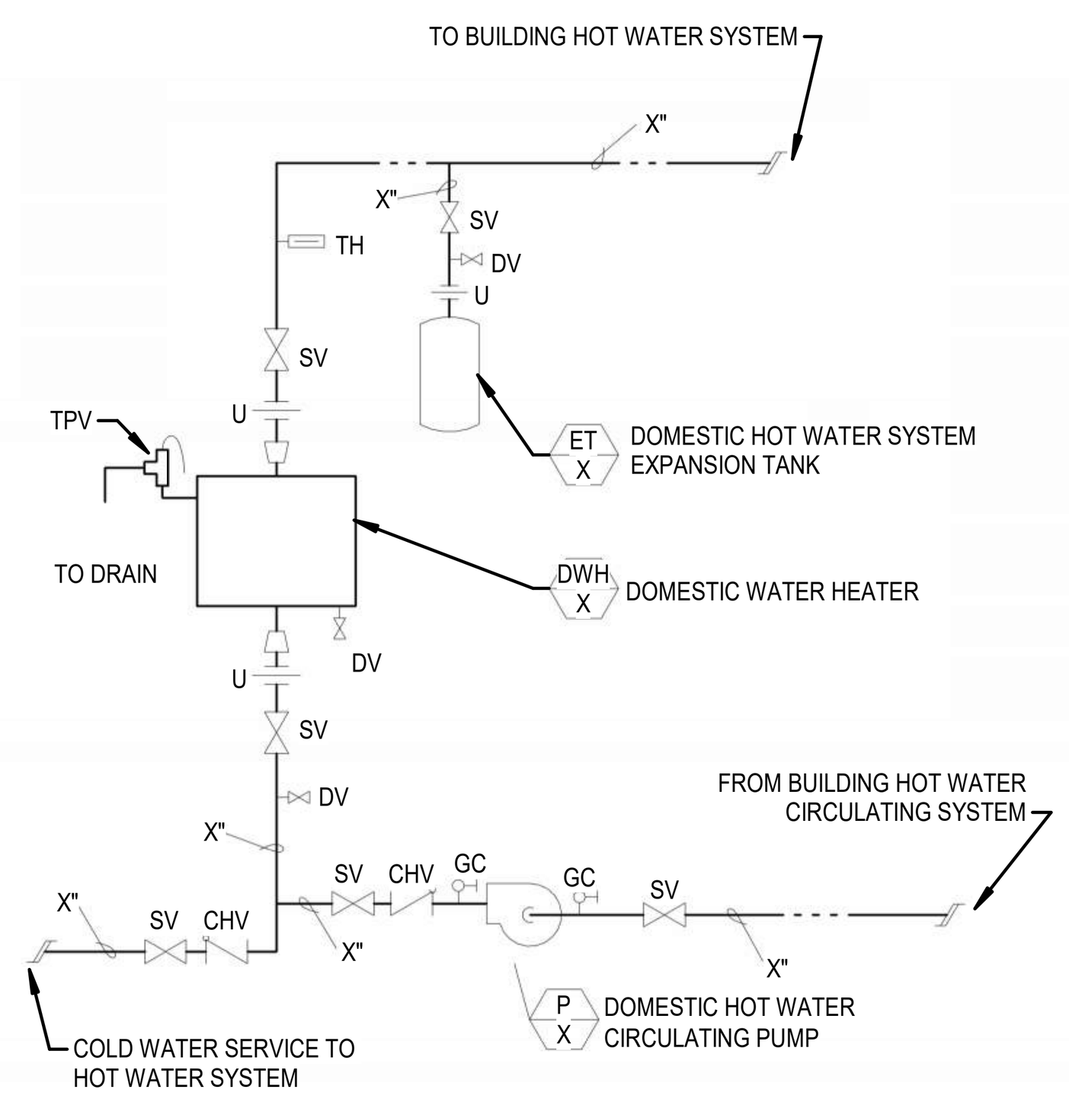
ROOF HYDRANT DETAIL NO DRAIN REQUIRED



NOTE:
1. MAIN DRAIN TO START AS HIGH AS POSSIBLE AND SLOPE UNIFORMLY TO DROP AT POINT OF DISCHARGE. PUMPED DRAIN HAS NO MINIMUM SLOPE REQUIREMENT.

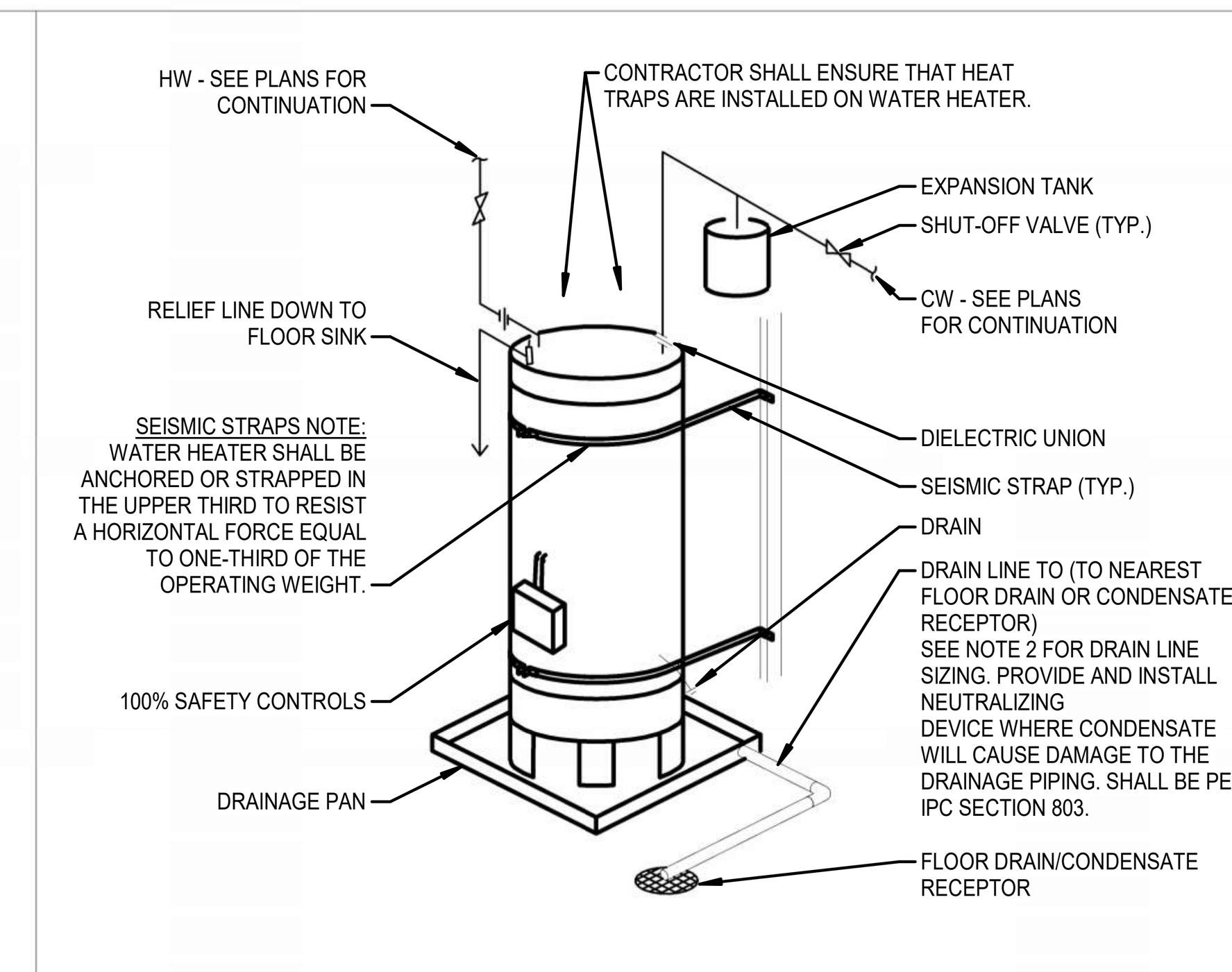
FILE NAME: MP.02.05 SCALE: NONE

TYPICAL FAN COIL PUMPED CONDENSATE



FILE NAME: P.01.01 SCALE: NONE

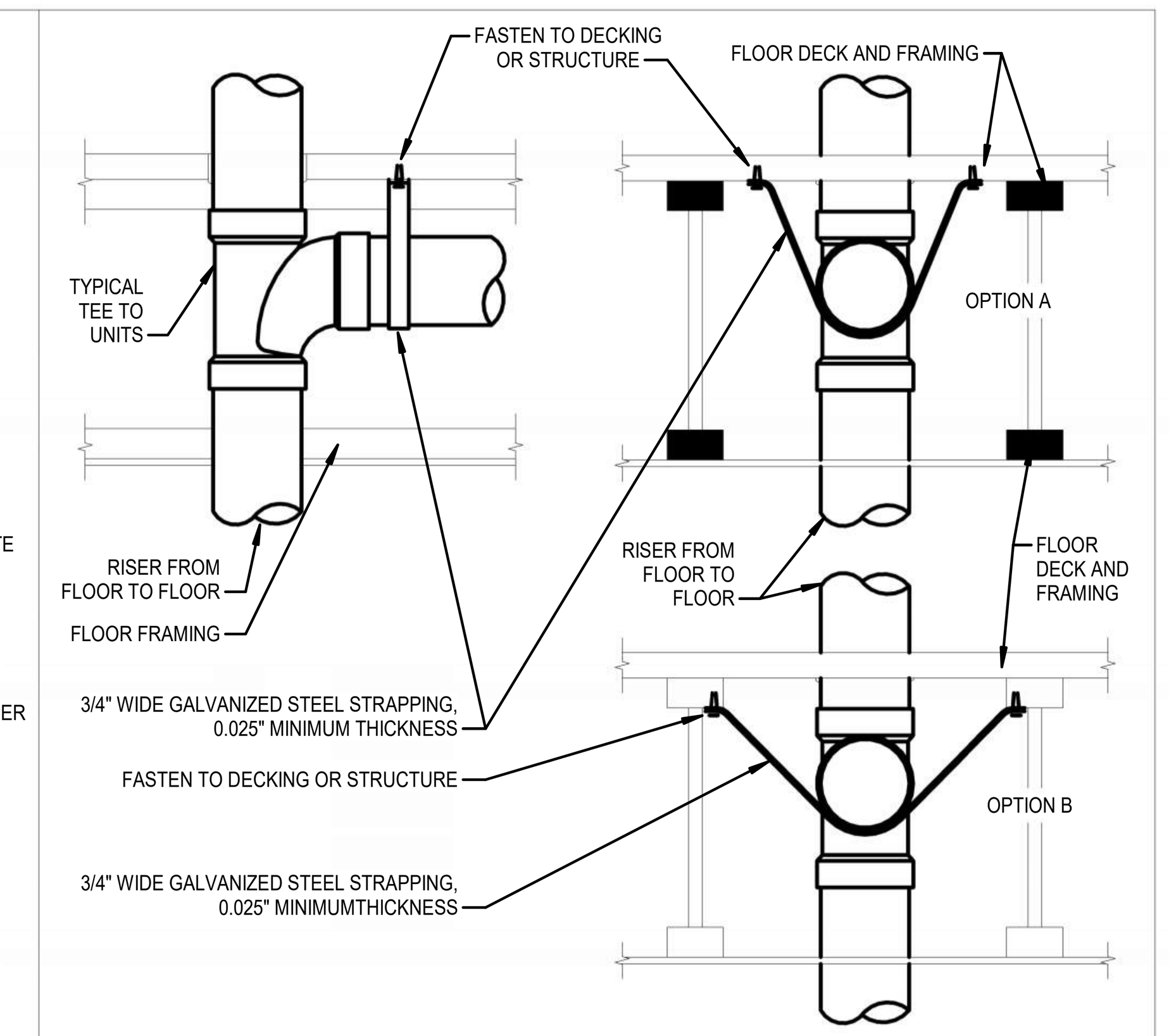
DOMESTIC HOT WATER PIPING DETAIL



NOTES:
1. PROVIDE AND INSTALL 2 SEISMIC STRAPS WITH TENSIONING BUCKLES ANCHORED TO STRUCTURE. INSTALL PER MANUFACTURERS REQUIREMENTS.
2. PROVIDE AND INSTALL PAN W/DRAIN WHERE REQUIRED, OR WHERE LEAK DAMAGE MAY OCCUR. DRAIN LINE SHALL BE 1 1/2" DIAMETER FOR PROJECTS LOCATED IN UTAH, 3/4" DIAMETER FOR OTHER PROJECT LOCATIONS.
3. PROVIDE HEAT TRAPS ON SUPPLY AND DISCHARGE PIPES.

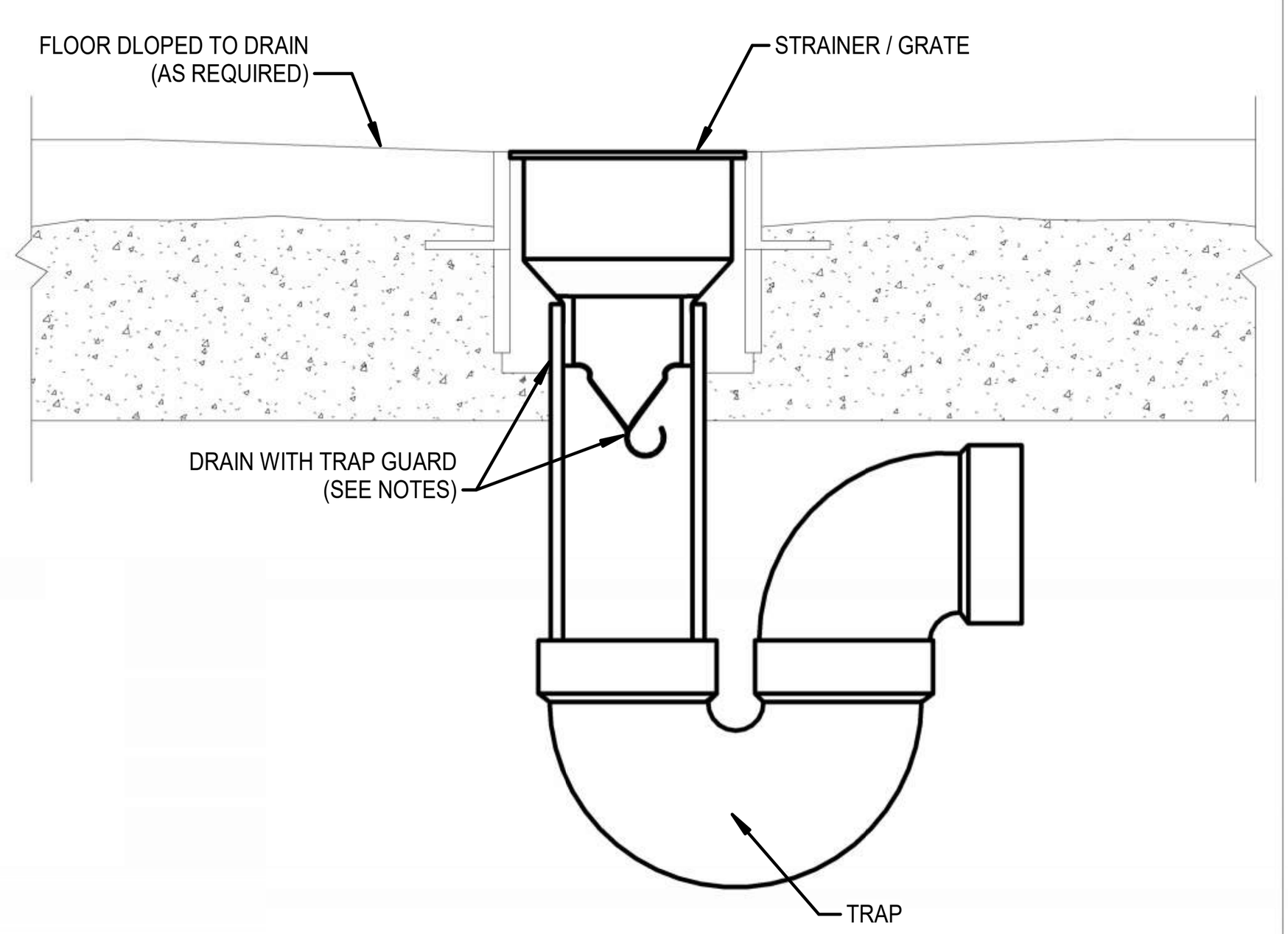
FILE NAME: P.01.07 SCALE: NONE

ELECTRIC WATER HEATER



FILE NAME: P.02.10 SCALE: NONE

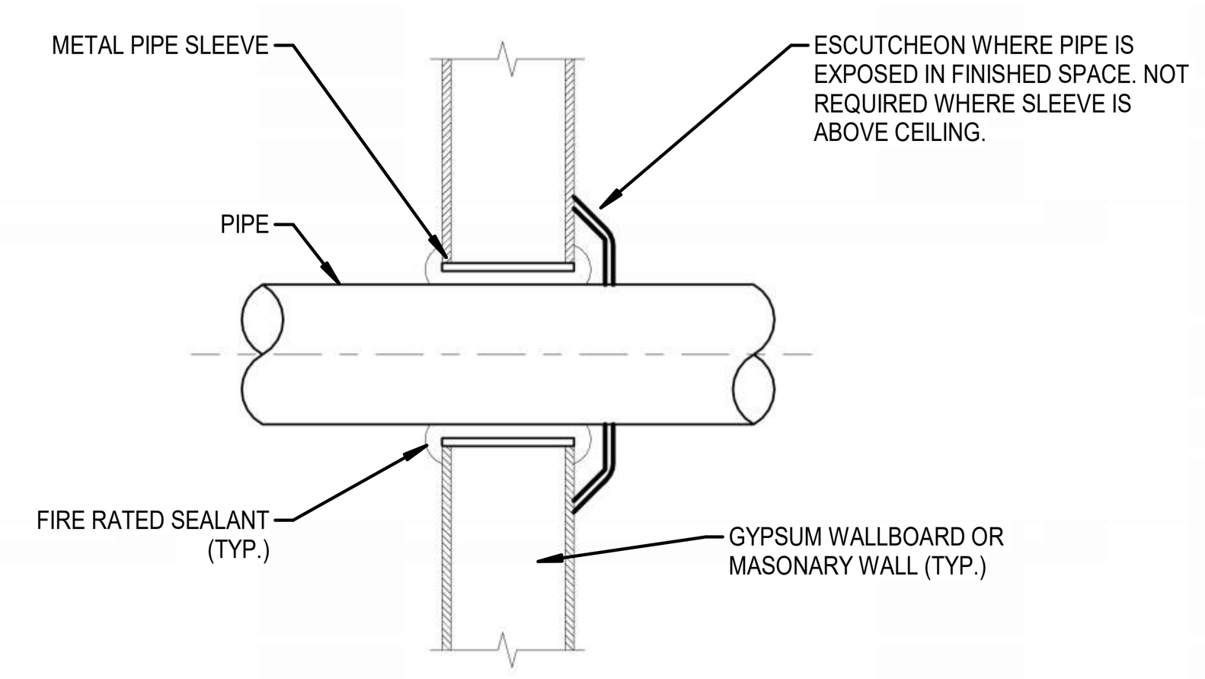
TYPICAL PLUMBING SUPPORT



NOTES:
1. DESIGN GUIDE: TRAP GUARD FLOOR DRAIN BY PROSET SYSTEMS INC.
2. FOLLOW ALL MANUFACTURER INSTALLATION AND OTHER INSTRUCTIONS.

FILE NAME: P.04.03 SCALE: NONE

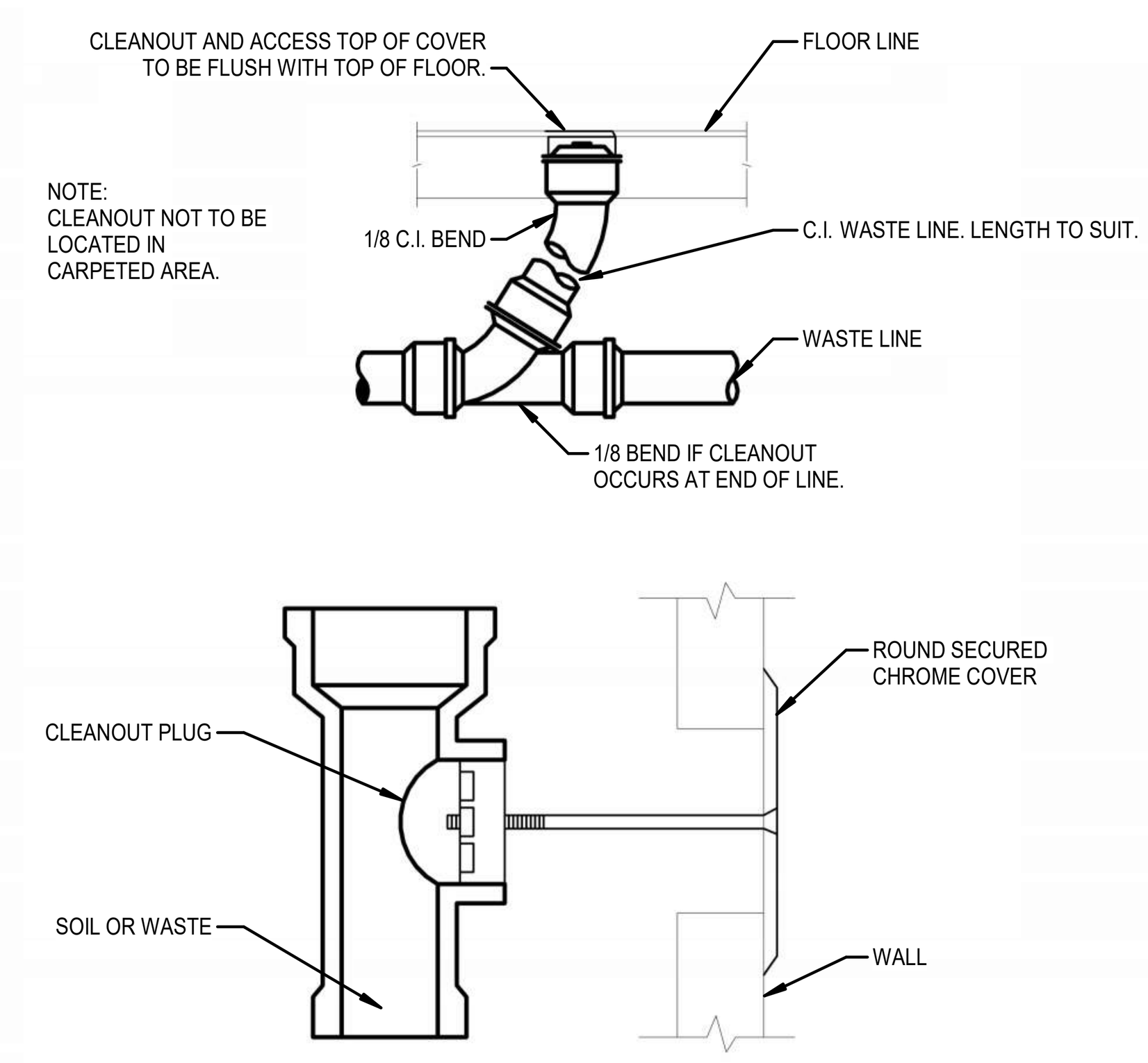
FLOOR DRAIN WITH TRAP GUARD IN CONCRETE FLOOR



NOTE:
PIPE SLEEVES ARE REQUIRED ON THIS PROJECT. CONTRACTOR SHALL BE REQUIRED TO REMOVE ANY PIPE INSTALLED WITHOUT A PIPE SLEEVE. INSTALL THE SLEEVE AND REINSTALL THE PIPE AT NO ADDITIONAL COST TO THE OWNER.

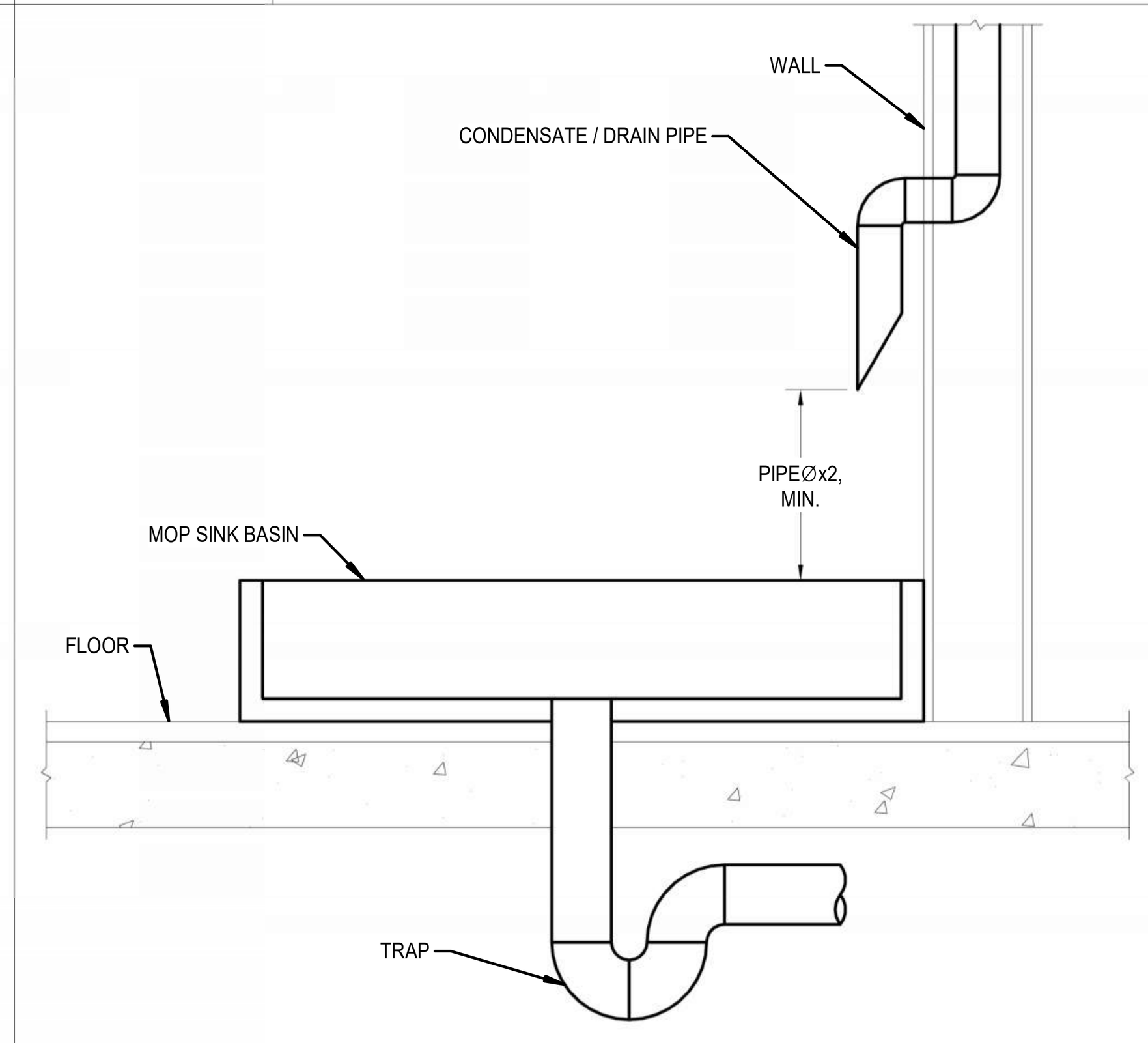
FILE NAME: P.05.03 SCALE: NONE

PIPING THROUGH GYPSUM WALL



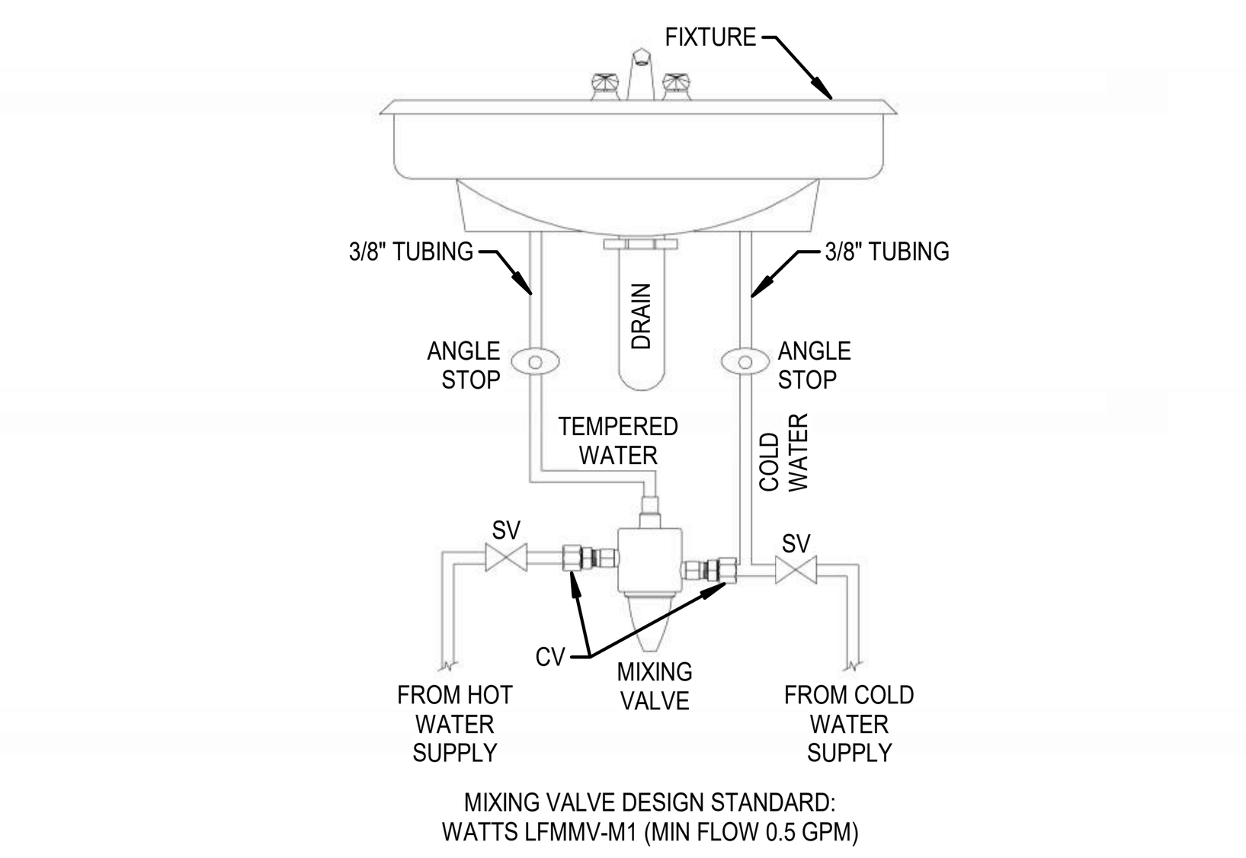
FILE NAME: P.03.03 SCALE: NONE

TYPICAL FLOOR AND WALL CLEANOUTS



FILE NAME: P.04.01 SCALE: NONE

INDIRECT CONDENSATE / DRAIN DISCHARGE TO MOP SINK



SINGLE LOCATION

NOTES:
1. PROVIDE WITH SEPARATE CHECKS AND WALL MOUNTING BRACKET.
2. SHALL CONFORM TO ASSE 1070 - LIMIT THE TEMPERED WATER TEMPERATURE TO A MAXIMUM OF 110 deg F. IPC 2015, 607.1.2.
3. SET MIXING VALVE TEMPERATURE WHEN INSTALLATION IS COMPLETE.
4. FOLLOW ALL MANUFACTURER INSTALLATION AND OTHER INSTRUCTIONS.
5. APPROVED MANUFACTURERS: SYMMONS, POWERS, LEONARD, BRADLEY, WATTS, LAWLER. INSTALL HANDY-SHIELD, AS MANUFACTURED BY PLUMBEREX SPECIALTY PRODUCTS, SAFETY COVERS ON ALL SUPPLY PIPING AND WASTE PIPING BENEATH HANDICAPPED LAVATORIES. SHIELDS SHALL MEET THE REQUIREMENTS OF UNIFORM FEDERAL ACCESSIBILITY STANDARDS 4.19.4 GSA AND ANSI DOCUMENT A117-1-1980.

FILE NAME: P.06.07 SCALE: NONE

WATER TEMPERING MANUAL FAUCET

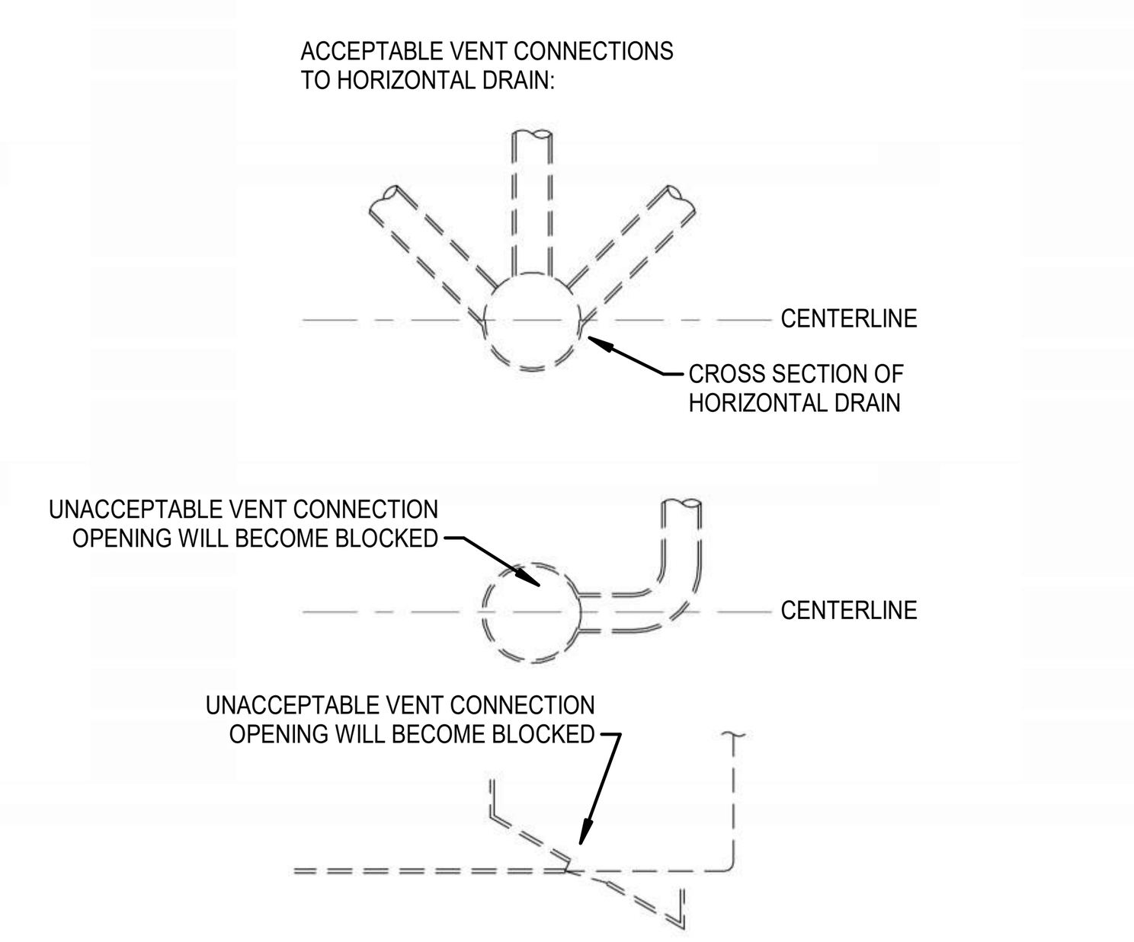


FIGURE 905.3 IPC

FILE NAME: P.09.02 SCALE: NONE

IPC VENT CONNECTIONS ACCEPTED / UNACCEPTED

NOTES:
1. SANITARY END VENTING SIZES SHOWN IN DETAIL P.09.05 ARE FOR REFERENCE ONLY. CONTRACTOR SHALL REFER TO PLANS AND ISOMETRICS FOR PROJECT PIPE SIZES.
2. A MAXIMUM OF EIGHT (8) FIXTURES CONNECTED TO A HORIZONTAL BRANCH DRAIN SHALL BE PERMITTED TO BE CIRCUIT BENT IN ACCORDANCE WITH SECTION 914 OF THE INTERNATIONAL PLUMBING CODE.
3. CIRCUIT VENT SHALL BE PLACED BETWEEN THE FIRST AND SECOND FIXTURE ACCORDANCE WITH IPC CIRCUIT VENTING REQUIREMENTS.

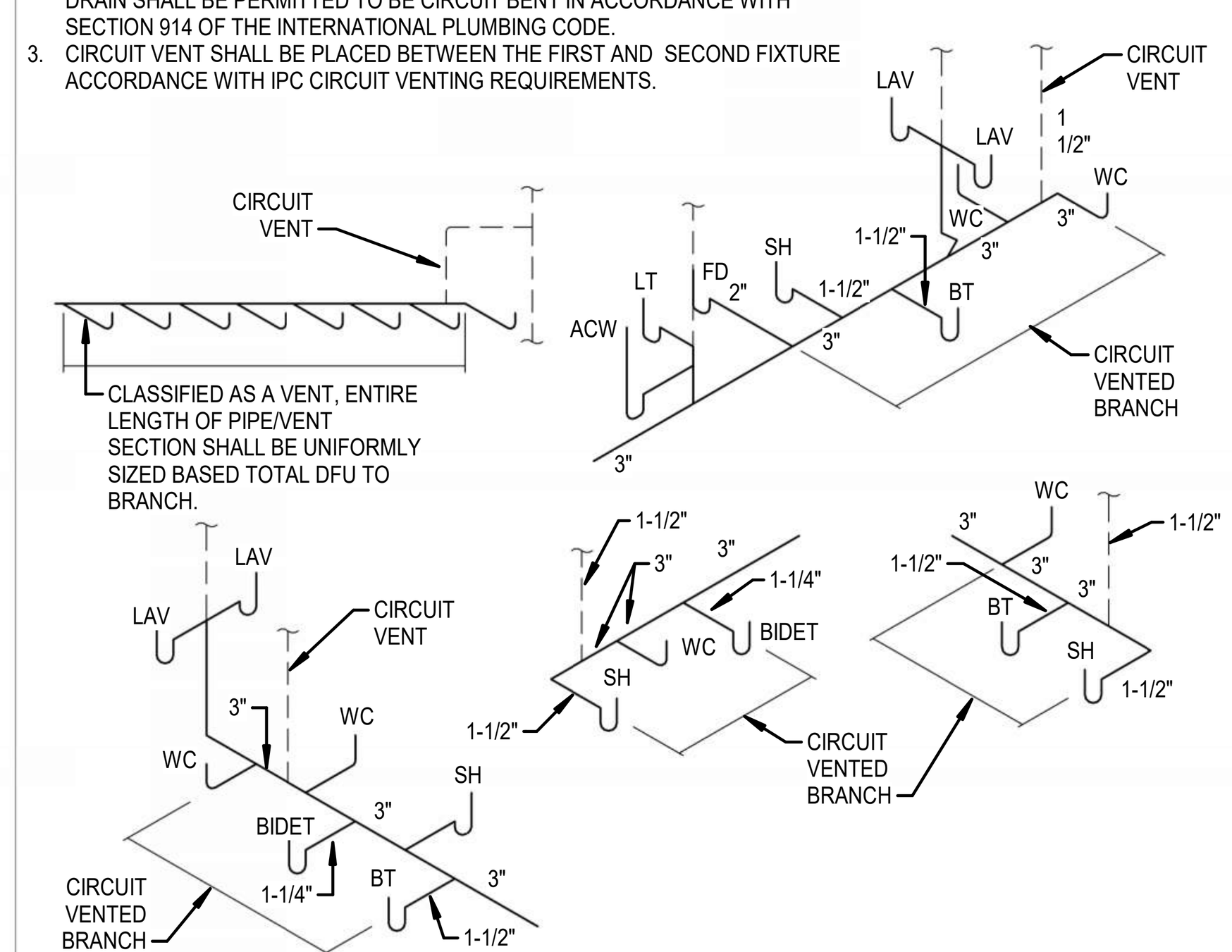
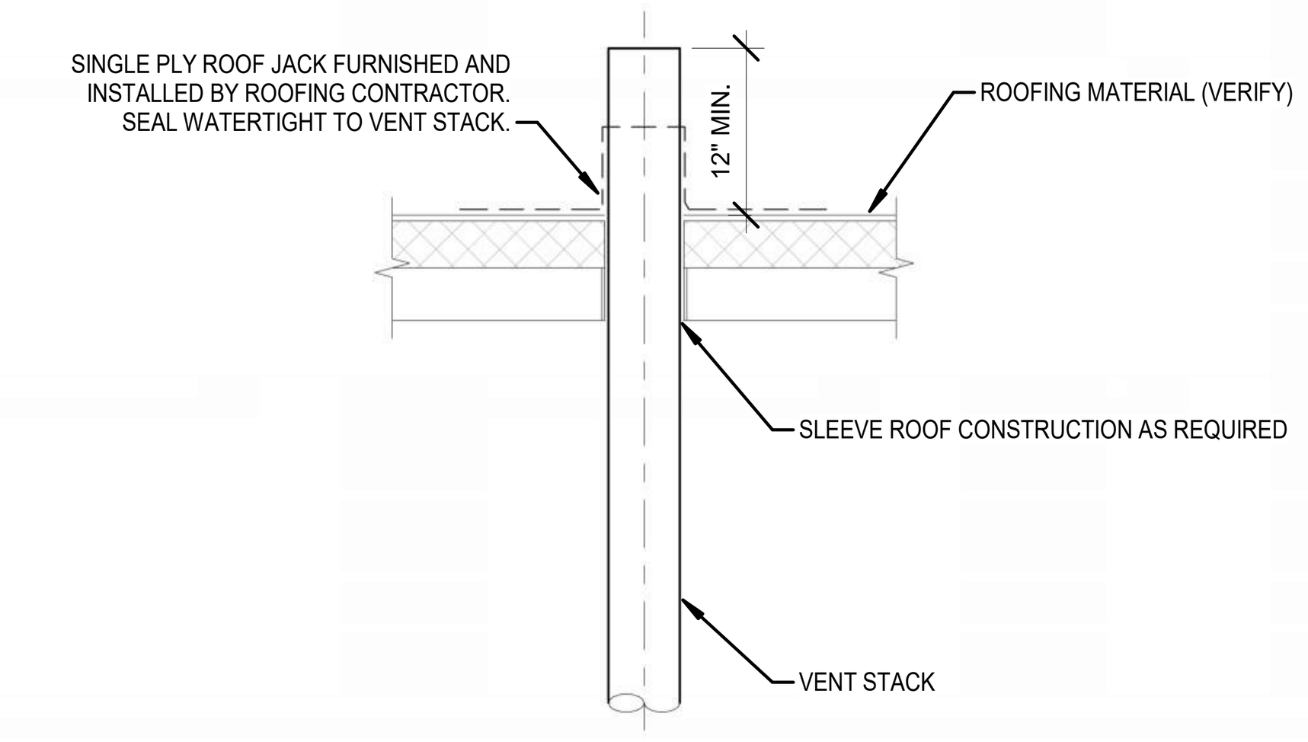


FIGURE 914.1(1)IPC

FILE NAME: P.09.05 SCALE: NONE

CIRCUIT VENTING BRANCH DRAIN ILLUSTRATIONS



FILE NAME: P.05.06 SCALE: NONE

TYPICAL VENT THROUGH FLAT ROOF

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JOEL WILLIAMS
07/15/2025

LAKE HAVASU CITY WATER QUALITY LABORATORY

360 CYPRESS DRIVE
LAKE HAVASU CITY, AZ. 86403

PROJECT NO. 24-077
DATE: 15 JULY 2025
REVISIONS:

SHEET TITLE:
PLUMBING DETAILS

SHEET NUMBER:
P5.2

BID SET

Plot Date: 12/3/2025 11:14:57 AM