

MECHANICAL SPECIFICATIONS

HVAC SPECIFIC:

1. **SUPPORTS and ANCHORS** shall be provided for mechanical work. No chain, type of wire.
2. **SHEET METAL** shall be SMACNA and Code standard with 45 degree max reducing, 20 degree max expanding transitions. (Min 26 GA when located in and/or penetrating into garages)
3. **DUCT INSULATION:** Rectangular supply and return HVAC ducts routed in unconditioned interior spaces shall have R=8 (2") (Ducts in floor trusses R=6), UL-181 Class-1 antimicrobial fiberglass ductuliner attached with stic-klips 15" OC each way and 100% coverage of flame proof adhesive. Increase duct to allow for liner. Insulate concealed round ducts with ASTM C 553 type-1 UL-181 Class-1 covered fiberglass wired and taped in place. Where noted on plan, normally line round ducts with Schuller Permocoat Spiracoustic acrylic polymer coated self-supporting fiberglass preformed liner. Elbows for rectangular duct shall be provided multi-blade turning vanes or 1.5 centerline radius. Provide Ruskin ELF-118 or equal storm louvers with 1/4" galv mesh and .12" max air friction.
4. **SEAL DUCT JOINTS and SEAMS** with Childers, 3-M, Hard-cast or equal per Code. **SPIRAL DUCT:** Use listed joint sealant on exposed galvanized spiral with neat sealant edges (provide and remove masking tape after application).
5. **EXHAUST DAMPERS (RD), FIRE DAMPERS (FD) and FIRE/SMOKE DAMPERS (FSJ):** UL listed for the rated assembly being penetrated, including wall/ceiling/floor penetration openings.
6. **FIRE CAULK:** UL listed for the rated assembly being penetrated, including wall/ceiling/floor penetration openings.

GENERAL:

1. **LOCAL and STATE CODES/ORDINANCES and CONDITIONS of CONTRACT** shall be followed. **SUBMIT** plans to Building department for plan review. Follow correction requirements. Pay all Fees and attain all permits.
2. **ADOPTED ENERGY CODE** shall be followed. All equipment, insulation, and controls shall conform.
3. **VISIT SITE** daily to ascertain existing conditions prior to ordering equipment to fabricating duct and piping.
4. **MECHANICAL DRAWINGS** are schematic and not to be scaled. Refer to Arch/Certified drawings and site measurements for dimensions.
5. **RECORD** scale drawings shall be provided by contractor and submitted to Division 15 Engineer at completion, showing all piping, duct and equipment changes.
6. **EQUIPMENT SHOWN ON DRAWINGS and SPECIFICATIONS:** Contractor shall order, purchase, receive, uncrate, assemble, and install all items in conformance to manufacturer's recommendations. Contractor shall insure all equipment for full replacement value.
7. **SUBMITTALS:** Contractor shall check submittals for 100% compliance with Contract Documents. Submit 4 copies to Division 15 Engineer for review prior to ordering.
8. **BASE BID** on specified equipment as shown on plans and in specifications.
9. **SUBSTITUTIONS** will be processed as change-orders after bidding, with all electrical, building alterations, and dollar amounts are included and approved in writing by owner prior to ordering equipment or fabrication.
10. **EXTRA COSTS or CHANGES** allowed only if approved in writing by Engineer with dollar amount prior to ordering.
11. **ELECTRICAL COORDINATION:** Confirm voltage, phase, and ampacity with Electrical Contractor prior to ordering equipment. All 24v controls including interlock wiring for mechanical equipment by Division 15 Contractor. Control and heating/cooling equipment to automatically restart after power failure. All wire in conduit per NEC latest edition.
12. **CURBS, SUPPORTS and ANCHORS** shall be provided for MECHANICAL work. No chain, tape, or wire.
13. **SLEEVES and COLLARS** shall be provided for all ductwork and pipes thru walls, floors, and ceilings. Provide chrome plated scutcheons for exposed piping penetrations thru ceilings, floors, and walls in finished areas. All water, soil, waste, vent and trim includings fittings to be chrome plated where exposed.
14. **CONCEAL** all work in finished areas.
15. **CUT and PATCH** to match adjacent areas. No structural member shall be cut or notched.
16. **OPERATING MANUAL** shall be provided by owner and engineer for all systems and equipment including manufacturer's maintenance manuals. Include lubrication, filter types and sizes, starting and stopping procedures. List HVAC Contractor's telephone number.
17. **CALLY CONTRACTOR WITH EXPERIENCE** on at least 3 projects of this type may bid.
18. **RFI** (Request for information) from contractor shall include at least one proposed solution that complies with the intent of Contract Documents.
19. **AIR BALANCE REPORT:** shall be submitted to the Building Department and engineer by a licensed air balancing contractor.
20. **WARRANTY** on all new and new equipment for one year from the date of acceptance by owner.

PLUMBING SPECIFICATIONS

PLUMBING SPECIFIC:

1. **SOIL, WASTE and VENT PIPING** shall be PVC dual cement ASTM-D2665 schedule-40 as Code approved. Provide cleanouts 100ft min OC of appropriate type inside buildings. Pipe end cap pan drain with P-trap 3/4" minimum to waste. Vent thru roof cross sectional area to be equal to or greater than building sewer main.
2. **FLOOR DRAIN TRAP PRIMER:** Provide Prime-Perfect with 1/2" CW and valve to each Floor Drain in equipment rooms and where required by Code.
3. **WATER PIPING** shall be 15% silver Sili-Phos brazed joint type-K copper ASTM-B88 if buried or within 6" of grade. Use no-lead 95/5 soldered joint type-M copper above grade. (Code approved plastic piping may be used inside the building with owners written consent. Provide a copy/letter to the engineer FAX: 303-394-2984).
4. **INSULATION - WATER PIPING:** Per Code. **FREEZE PROTECTION:** Route all piping inboard of building insulation to avoid freezing. Electric heat trace all piping located in unheated areas with Chromalox 7.0 watts/ft M cable and 1" thick fiberglass piping insulation with cover.
5. **SHOCK ABSORBER:** Provide Josam 75000-S 1/2" copper piston-type at CW and HW Clothes Washer connections.
6. **GAS PIPING:** Use black steel ASTM-A53 schedule-40 with malleable screwed fittings inside building and from meter to building where not buried. Buried piping shall be welded with forged steel fittings and mill wrapped with unbroken layer of coal tar Kraft Protecto-Wrap including fittings. Verify gas line routing with Architect and Building Department prior to installation. Costs involved in gas service shall be included in bid. Provide line size valve just prior to entering building. Provide equipment regulators to suit pressure supplied. Gas piping on roof shall run on 12" high pitch pocket supports per Code.
7. **VALVES:** Isolate each piece of equipment and each rough-in excluding waste and vent. **WATER:** Apollo ball valve line-size rated for 200 PSIG WOG. **GAS:** AGA listed line-size lubricated.
8. **PRESSURE TEST** all piping per Code but to at least 150% max WP.
9. **SHOWER VALVES** Shower and tub/shower combination valves shall be balanced pressure, thermostatic or combination balanced-pressure/thermostatic valves and shall be equipped with a means to limit maximum temperature of 120°F.

GENERAL:

10. **LOCAL and STATE CODES/ORDINANCES and CONDITIONS of CONTRACT** shall be followed. SUBMIT plans to Building Department for Plan Review. Follow correction requirements. Pay all Fees and attain all Permits.
11. **ADOPTED ENERGY CODE** shall be followed. All equipment, insulation, and controls shall conform.
12. **VISIT** site daily to ascertain existing conditions prior to ordering equipment or fabricating duct and piping.
13. **PLUMBING DRAWINGS** are schematic and not to be scaled. Refer to Architectural/Certified drawings and site measurements for dimensions.
14. **RECORD** scaled drawings shall be provided by Contractor and submitted to Division 15 Engineer at completion showing all piping, duct, and equipment changes.
15. **EQUIPMENT SHOWN ON DRAWINGS and SPECIFICATIONS:** Contractor shall order, purchase, receive, uncrate, assemble, and install all items in conformance to Manufacturer's recommendations. Additionally Contractor shall install and final connect Owner furnished items as indicated on drawings. Contractor shall insure all equipment for full replacement value.
16. **SUBMITTALS:** Contractor shall check Submittals for 100% compliance with Contract Documents. Submit four (4) copies to Division 15 Engineer for review prior to ordering.
17. **BASE BID** on specified equipment as shown on plans and in specifications.
18. **SUBSTITUTION** will be processed as change-orders after Bidding with all electrical, building alterations, and dollar amounts are included and approved in writing by owner prior to ordering equipment or fabrication.
19. **EXTRA COSTS or CHANGES** allowed only if approved in writing by Engineer with dollar amount prior to ordering.
20. **ELECTRICAL COORDINATION:** Confirm voltage, phase, and ampacity with Electrical Contractor prior to ordering equipment. All 24v controls including interlock wiring for Plumbing equipment by Division 15 Contractor. Plumbing equipment to automatically reset after power failure. All wire in conduit per NEC latest edition.
21. **CURBS, SUPPORTS, and ANCHORS** shall be provided for PLUMBING work. No chain, tape, wire.
22. **SLEEVES and COLLARS** shall be provided for all pipes (two pipe sizes larger) thru walls, floors, and ceilings. Provide chrome plated escutcheons for exposed piping penetrations thru ceilings, floors, and walls in finished areas. All water, soil, waste, vent and trim including fittings to be chrome plated where exposed.
23. **CONCEAL** all work in finished areas.
24. **CUT and PATCH** to match adjacent areas. No structural member shall be cut or notched.
25. **EXCAVATE** for all PLUMBING work. Compact to 95% AASHO or Proctor density in 6" maximum layers at optimum moisture content. Rework if any settlement within first years Guarantee.
26. **OPERATING MANUAL** shall be provided Owner and Engineer for all systems and equipment including manufacturer's maintenance manuals. Include lubrication, filter types and sizes, starting and stopping procedures. List HVAC, Plumbing, and Control Contractor's telephone numbers.
27. **ONLY CONTRACTORS WITH EXPERIENCE** on at least 3 projects of this type may bid.
28. **RFI** (Request For Information) from Contractor shall include at least one proposed solution which complies with the intent of Contract Documents.
29. **GUARANTEE** all labor and new equipment for one year from the date of acceptance by Owner.

PLUMBING LEGEND			PLUMBING LEGEND		
SYMBOL	ABBREV.	DESCRIPTION	SYMBOL	ABBREV.	DESCRIPTION
	G	NATURAL GAS LINE		PA	PIPE ANCHOR
	HWS	HEATING WATER SUPPLY		PG	PIPE GUIDE
	HWR	HEATING WATER RETURN		BSV	BALANCE VALVE W/MEMORY
	CWS	CHILLED WATER SUPPLY		AGC	AGA LISTED GAS COCK
	CWR	CHILLED WATER RETURN		PG	TOP CONNECTION
	CS	CONDENSER WATER SUPPLY		BC	BOTTOM CONNECTION
	CR	CONDENSER WATER RETURN		PG	SIDE T-CONNECTION
	CHS	DUAL TEMPERATURE SUPPLY		PG	SHOCK ABSORBER
	CHR	DUAL TEMPERATURE RETURN		PG	CIRCUIT SETTER (GPM)
	D	DRAIN PIPE		PRD	PIPE RISER DOWNWARD
	HPS	HIGH PRESSURE STEAM		PRU	PIPE RISER UPWARD
	HPR	HIGH PRESSURE COND. RETURN		PDC	POINT OF DUCT CONNECTION NEW TO EXISTING
	LPS	LOW PRESSURE STEAM		SC	SECTION CUT: (A) SECTION I.D. (1) SHEET NO. WHERE SHOWN
	LPR	LOW PRESSURE COND. RETURN		PPC	POINT OF PIPE CONNECTION NEW TO EXISTING
	CP	CONDENSATE PUMP DISCHARGE		UD	UNDERCUT DOOR, 1"
	FOS	FUEL OIL SUPPLY		CW	COLD WATER (K-COPPER BURIED)
	FOR	FUEL OIL RETURN		HW	HOT WATER (M-COPPER ABOVE GRADE)
	FOV	FUEL OIL VENT		HW	HOT WATER (M-COPPER)
	RS	REFRIGERANT SUCTION		HW	HOT WATER (M-COPPER)
	RL	REFRIGERANT LIQUID		HWC	HW CIRCULATING (M-COPPER)
	RD	REFRIGERANT DISCHARGE		NP	NON-POTABLE WATER
	FI	FLOW INDICATOR		NG	NATURAL GAS
	BV	LINE SIZE BALL VALVE		V	VENT (DWV COPPER)
	GV	GLOBE VALVE		CHV	CHEMICAL VENT PIPE
	CV	CHECK VALVE		San S	SANITARY WASTE ABOVE GRADE (CAST IRON)
	FCV	FLOW CONTROL VALVE W/CHECK		San S	SANITARY WASTE BELOW GRADE (CAST IRON)
	BSV	PLUG OR BALANCING SHUT-OFF VALVE		Per D	PERIMETER DRAIN
	NOV	NO. VALVE W/LOCKING COVER		GW	GREASE WASTE PIPE
	BSR	PLUG OR BALANCING SHUT-OFF VALVE IN RISER		CHW	CHEMICAL WASTE PIPE
	SVR	SHUT-OFF VALVE IN RISER		ST	STORM DRAIN/BUILDING STORM SEWER PIPE
	DV	DRAIN VALVE W/HOSE END		OST	OVERFLOW STORM DRAIN PIPE
	SBV	STRAINER W/BLOW-OFF VALVE		VAC	VACUUM PIPE
	TCV	TEMPERATURE CONTROL VALVE, 3-WAY		CA	COMPRESSED AIR PIPE
	TCV	TEMPERATURE CONTROL VALVE, 2-WAY		VC	VERTICAL CLEANOUT
	PRV	PRESSURE REDUCING VALVE		COTG	CLEANOUT TO GRADE
	SV	SAFETY OR RELIEF VALVE		FCO	FLOOR CLEANOUT (FLUSH COVER PLATE)
	AV	AIR VENT		CO	SAN S CLEANOUT IN CRAWLSPACE
	PIT	PRESSURE-TEMP. TAP		WCO	WCO CLEANOUT (FLUSH COVER PLATE)
	PG	PRESSURE GAUGE W/FILL & COCK		RD	

MECH. EQUIP. WIRING AND CONNECTION SCHEDULE				
ITEM	FURNISHED BY	SET IN PLACE OR MOUNTED BY	WIRED AND/OR CONNECTED BY	REMARKS
EQUIPMENT MOTORS LINE VOLTAGE ELECTRIC HEATERS, SMOKE/FIRE DAMPERS, ETC.	MC	MC	EC	
MOTOR CONTROLLERS, STARTERS, PUSHBUTTON STATIONS, PILOT LIGHTS, ETC.	MC	EC	EC	
MULTI-SPEED SWITCHES LINE VOLTAGE THERMOSTATS	MC	EC	EC	
DISCONNECT SWITCHES (FUSED OR UNFUSED) THERMAL OVERLOAD SWITCHES, TRANSFER SWITCHES, GEN SETS, ETC.	EC	EC	EC	
LOW VOLTAGE THERMOSTATS, CONTROL RELAYS, TIME CLOCK, CONTROL TRANSFORMER, CONTROL PANELS, PRESSURESTATS, MOTOR VALVES, EP & FE SWITCHES; DAMPER MOTORS, SOLENOID VALVES, ETC. AND ALL INTERLOCK WIRING, DDC CONTROLS	MC	MC	MC	

MC = MECHANICAL CONTRACTOR; EC = ELECTRICAL CONTRACTOR.

2015 EEC MINIMUM HOT WATER PIPING INSULATION REQUIREMENTS							
TABLE C403.2.1 ¹							
MINIMUM PIPE INSULATION THICKNESS (in inches) ²							
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu · in./h · ft ² · °F	Mean Rating Temperature, °F	< 1	1 to < 1½	1½ to < 4	4 to < 8	≥ 8
> 350	0.02 – 0.04	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.09 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	50	0.5	1.0	1.0	1.0	1.5

For Sh: 1 inch = 25.4 mm, °C = [°F] - 32/1.8.

¹ For piping smaller than 1½ inches and located in partitions under conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch.

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HVAC DUCTWORK		CONTROLS	
	SUPPLY DUCT UP		THERMOSTAT/SENSOR
	SUPPLY DUCT DOWN		NIGHT THERMOSTAT
	RETURN OR EXHAUST DUCT UP		HUMIDISTAT/SENSOR
	RETURN OR EXHAUST DUCT DOWN		STARTER
	ROUND DUCT SECTION UP		PRESSURE SWITCH
	TRUNK DUCT ELBOW (TURNING VANES REQ'D)		DIFFERENTIAL AIR PRESSURE SENSOR
	TRUNK DUCT ELBOW (R/W=1 or Larger) (NO TURNING VANES REQ'D)		SWITCH
	VOLUME DAMPER		FLOW METER
	FIRE DAMPER (FS FIRE/SMOKE) RADIATION DAMPER		LOW LIMIT THERMOSTAT
	EQUIPMENT SYMBOL (SEE EQUIPMENT SCHEDULE)		TEMPERATURE CONTROL (T.C.) DAMPER
	ROUND BRANCH DUCT TO SIDE OF MAIN DUCT		SMOKE DETECTOR (DUCT)
	ROUND BRANCH DUCT TO TOP OF MAIN DUCT		CIRCUIT TRANSFORMER
	RECTANGULAR BRANCH DUCT TO SIDE OF MAIN DUCT		PRESSURE DIFFERENTIAL SENSOR
	ROUND GALV STEEL DUCT		UNDERCUT DOOR 1"
	INSUL FLEX ROUND DUCT		RADIATION DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)
	SHEET METAL DIMENSION		FIRE DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)
	DIMENSION INSIDE INSULATION		FIRE/SMOKE DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)

SHEET LOG		09.09.19	CONSTRUCTION DOCUMENTS
MECHANICAL SHEETS		.	
SPECS, ABBRS, LEGEND AND SHEET LOG	M0.1	●	
STUDIO MECHANICAL PLAN, SCHEDULES AND DETAILS	M1.1	●	
MAIN LEVEL MECHANICAL PLAN AND GAS ISOMETRIC	M2.1	●	
2ND FLOOR MECHANICAL PLAN	M2.2	●	
EQUIPMENT SCHEDULES AND DETAILS	M3.1	●	

CODE	
2015 INTERNATIONAL	MECHANICAL CODE
2015 INTERNATIONAL	PLUMBING CODE
2015 INTERNATIONAL	ENERGY CONSERVATION CODE
2015 INTERNATIONAL	BUILDING CODE

ABBREVIATIONS							
ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
AFF	ABOVE FINISHED FLOOR	FR	FLOOR REGISTER	LRA	LOCKED ROTOR AMPS	RH	RELATIVE HUMIDITY
ALT	ALTITUDE	FT	FOOT OR FEET	LWT	LEAVING WATER TEMPERATURE	RLA	RUNNING LOAD AMPS
BHP	BRAKE HORSEPOWER	FU	FIXTURE UNITS	MAX	MAXIMUM	RFM	REVOLUTIONS PER MINUTE
BTU	BRITISH THERMAL UNIT	GA	GAUGE	MCA	MINIMUM CIRCUIT AMPS	SL	SEA LEVEL
COTG	CLEAN OUT TO GRADE	GAL	GALLONS	MBH	BTU PER HOUR (THOUSAND)	SENS	SENSIBLE
CU FT	CUBIC FEET	GPH	GALLONS PER HOUR	MIN	MINIMUM	SPEC	SPECIFICATION
CU IN	CUBIC INCH	GPM	GALLONS PER MINUTE	NC	NOISE CRITERIA	SQ	SQUARE
CFM	CUBIC FEET PER MINUTE	HD	HEAD	N.O.	NORMALLY OPEN	STD	STANDARD
SCFM	CFM, STANDARD CONDITIONS	HG	MERCURY	N.C.	NORMALLY CLOSED	STP	STATIC PRESSURE
dB	DECIBEL	HGT	HEIGHT	N/A	NOT APPLICABLE	SA	SUPPLY AIR
DW	DOMESTIC COLD WATER	HORZ	HORIZONTAL	NIC	NOT IN CONTRACT	TEMP	TEMPERATURE
DEG OR °	DEGREE	HP	HORSEPOWER	NTS	NOT TO SCALE	TD	TEMPERATURE DIFFERENCE
DHW	DOMESTIC HOT WATER	HW	DOMESTIC HOT WATER	NO	NUMBER	TG	TRANSFER GRILLE
DIA	DIAMETER	HWC	HOT WATER CIRCULATING (DOMESTIC)	OA	OUTSIDE AIR	TP	TOTAL STATIC PRESSURE
DB	DRY-BULB	HZ	HERTZ	OD	OUTSIDE DIAMETER	TSTAT	THERMOSTAT
EAT	ENTERING AIR TEMP.	ID	INSIDE DIAMETER	PPM	PARTS PER MILLION	TONS	TONS OF REFRIGERATION
EFF	EFFICIENCY	IE	INVERT ELEVATION	%	PERCENT	TAV	VARIABLE AIR VOLUME
ELEV	ELEVATION	IN	INCHES	PH OR Ø	PHASE (ELECTRICAL)	VEL	VELOCITY
ESP	EXTERNAL STATIC PRESSURE	IN W.C.	INCHES WATER COLUMN	PSF	POUNDS PER SQUARE FOOT	VERT	VERTICAL
EWT	ENTERING WATER TEMP.	KW	KILOWATT	PSI	POUNDS PER SQUARE INCH	V	VENT
EXH	EXHAUST	KWH	KILOWATT HOUR	PSIA	PSI ABSOLUTE	VOL	VOLUME
F	FÄHRENHEIT	LAT	LEAVING AIR TEMPERATURE	PSIG	PSI GAUGE	W	WASTE
FLA	FULL LOAD AMPS	LBS OR #	POUNDS	PRESS	PRESSURE	WT	WEIGHT
FPM	FEET PER MINUTE	LF	LINEAR FEET	RA	RETURN AIR	WB	WET-BULB
FPS	FEET PER SECOND			RECIRC	RECIRCULATE		

SYMBOL	DESCRIPTION
CONTROLS	
	THERMOSTAT/SENSOR
	NIGHT THERMOSTAT
	HUMIDISTAT/SENSOR
	STARTER
	PRESSURE SWITCH
	DIFFERENTIAL AIR PRESSURE SENSOR
	SWITCH
	FLOW METER
	LOW LIMIT THERMOSTAT
	TEMPERATURE CONTROL (T.C.) DAMPER

SPECS, ABBRS, LEGEND AND SHEET LOG	M0.1	●	
STUDIO MECHANICAL PLAN, SCHEDULES AND DETAILS	M1.1	●	
MAIN LEVEL MECHANICAL PLAN AND GAS ISOMETRIC	M2.1	●	
2ND FLOOR MECHANICAL PLAN	M2.2	●	
EQUIPMENT SCHEDULES AND DETAILS	M3.1	●	

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PROJECT:
JOHN HOTCHKISS
COMMERCIAL OFFICE

2290 OLD RANCH RD
COLORADO SPRINGS

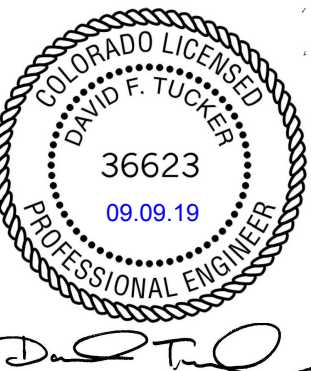
CLIENT:

SHEET:

SPECS,
ABBRVS,
LEGEND AND
SHEET LOG

REFERENCE DATE: 05/20/2019

ISSUED: 08/06/2019

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JOB NO: 19-048

DRAWN BY: DAC
CHECKED BY: DFT
SCALE: AS NOTED

SHEET NUMBER

MO.1

2015 IMC VENTILATION REQUIREMENTS:

NATURAL VENTILATION CALCULATION:

STUDIO OFFICE:
700 sf x 0.04 = **28 sf** of openings required.
84 sf of operable openings are provided.

2015 IMC REFRIGERATION COMPLIANCE:

TABLE 1103.1 REFRIGERANT R410A POUNDS PER 1000 CF OF SPACE = **26.0 LBS**
SPACE VOLUME 8'x 700 SF = 6300 CF;
ALLOWABLE REFRIG. = 6.3 x 26 LBS = **163.8 LBS**

SYSTEM REFRIGERANT QUANTITY:

VAPOR LINES (3/8"; 0.36 LBS/100 FT)
(60' x 0.36 LB)/100' = **0.22 LBS**
LIQUID LINES (1/4"; 6.68 LBS/100 FT)
(60' x 6.68 LB)/100' = **4.01 LBS**
RESEVIER = **7.1 LBS**
TOTAL = 11.4 LBS << 162 LBS ALLOWABLE.

24"x36" ATTIC ACCESS

700 SF

GARAGE DOOR OPENER OUTLET

1" I.D. PVC DRAIN LINE, INSULATED PER MFGR INSTRUCTIONS (TYP).

1/4"LL, 3/8" VAPOR LINESET (TYP)

1
IU 1

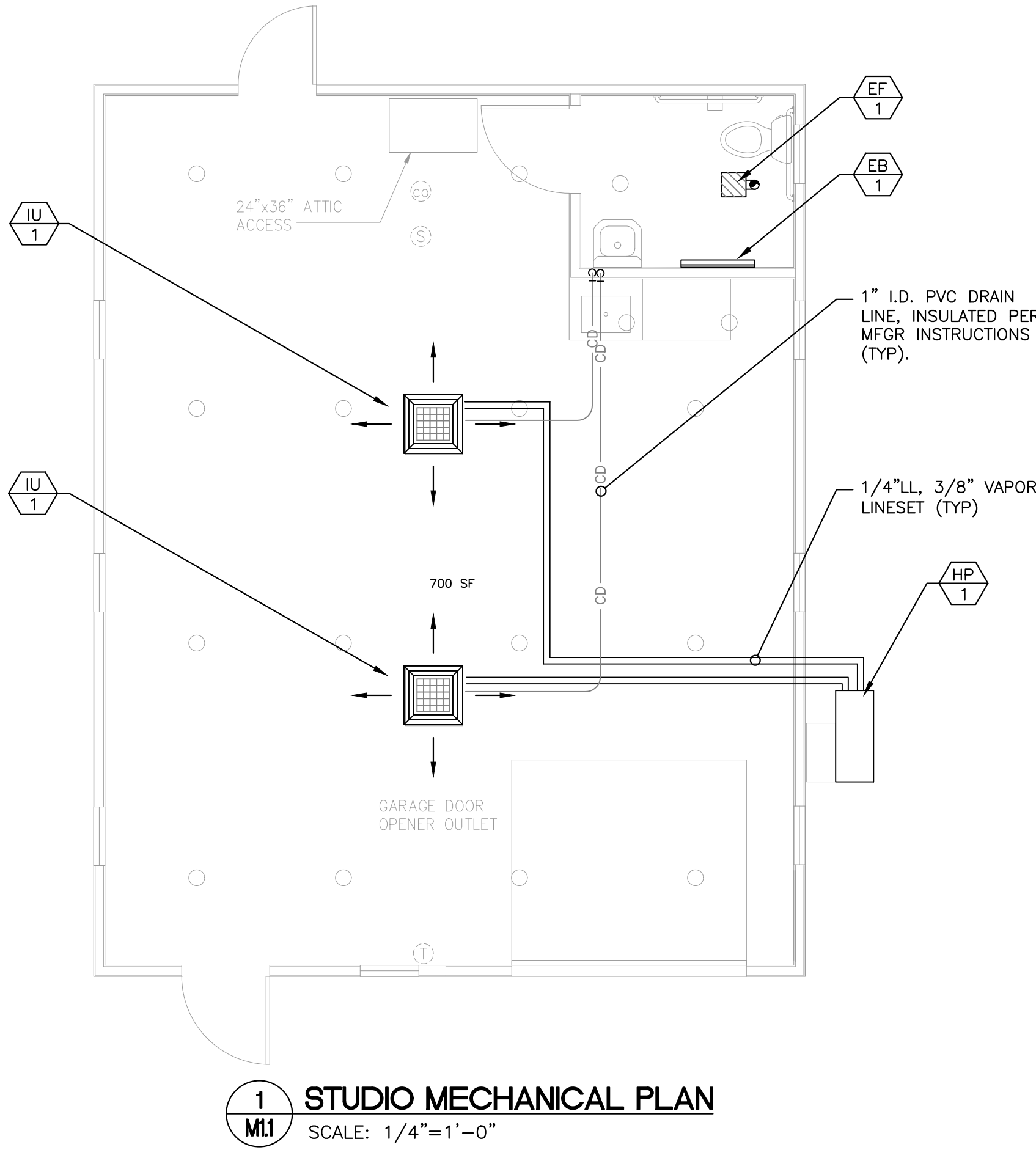
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EB 1

1
HP 1

1
ML1

STUDIO MECHANICAL PLAN

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



1 STUDIO MECHANICAL PLAN



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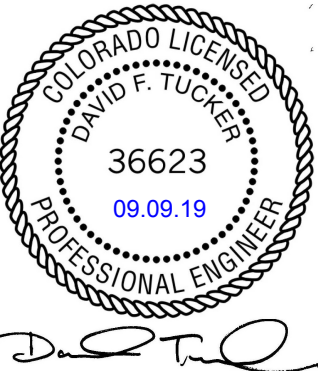

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2290 OLD RANCH RD
COLORADO SPRINGS

CLIENT:

SHEET:
STUDIO PLAN,
SCHEDULES
AND DETAILS

[illegible]



PROJECT:
JOHN HOTCHKISS
COMMERCIAL OFFICE

CLIENT:

HEET:

FIRST FLOOR
MECHANICAL
PLAN

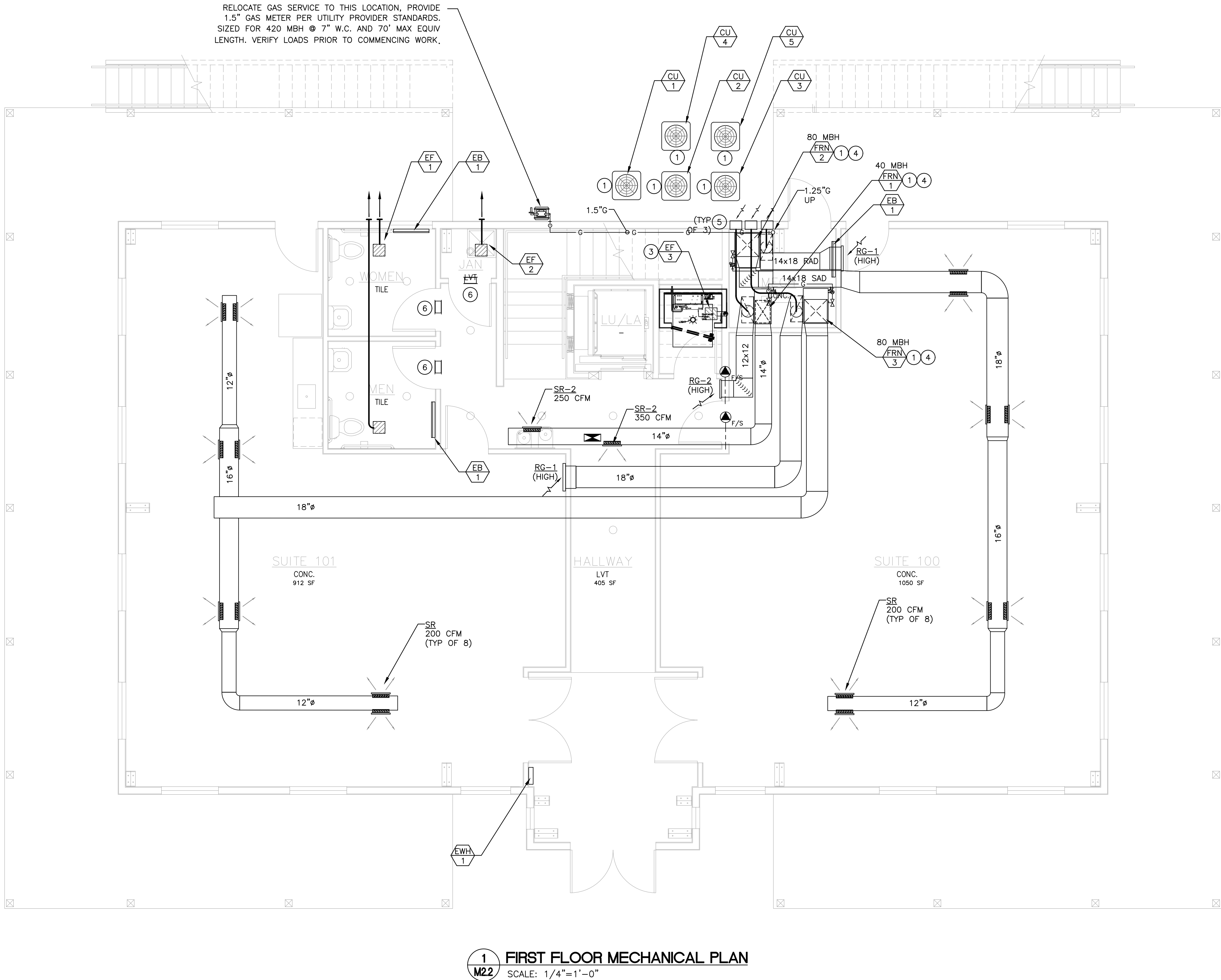
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RAWN BY: DAC
HECKED BY: DFT
CALE: AS NOTED

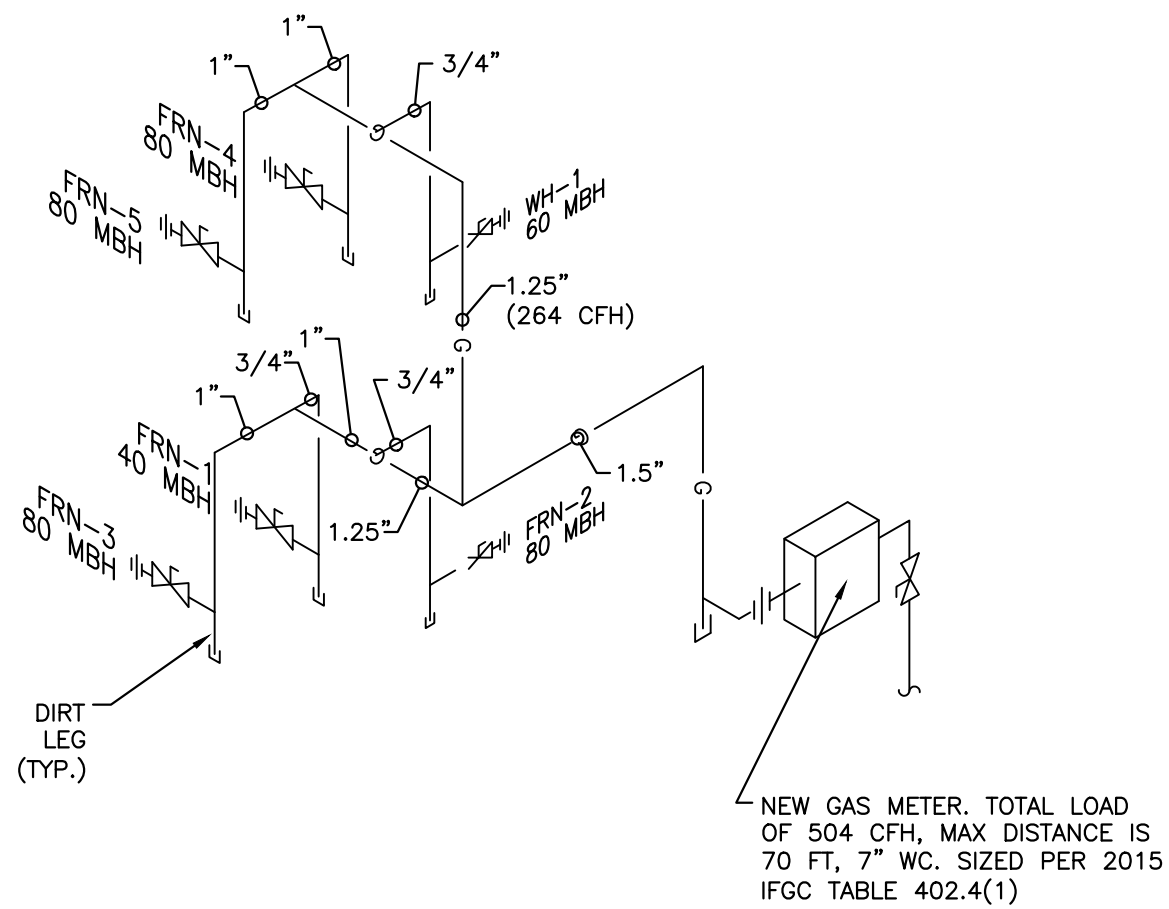
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M2.1



CIRCLE NOTES

- ① **RS/RL LINES:** RS/RL line-set from condensing unit to furnace evaporative coil. Per manufacturers recommendations.
- ② **NOT USED THIS PAGE**
- ③ **EXHAUST DUCT:** 4"Ø duct through roof to approved roof cap. Termination to be at least 10 ft from outside air intake into building.
- ④ **DIRECT VENT:** Route two 3" inch PVC (vent and combustion air) through roof to concentric rooftop termination. Install per manufacturer's instructions. Terminate at least 10 ft from outside air intakes into space.
- ⑤ **OUTSIDE AIR:** 10"Ø outside air duct with auto damper. Intake location to be at least 10 ft. from vents or bldg exhaust terminations. Duct to return air inlet of furnace.
- ⑥ **TRANSFER GRILLES:** Provide 14x8 transfer grille (IG) on both sides of wall to allow transfer airflow.



2 GAS ISOMETRIC
M2.2 SCALE: NONE

2015 IMC VENTILATION REQUIREMENTS:

OFFICE SUITE (EACH, TYPICAL):

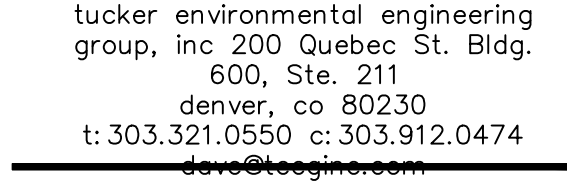
$$\begin{aligned} 1090 \text{ sf} \times 5 \text{ ppl}/1000 \text{ sf} &= 6 \text{ ppl} \times (5 \text{ cfm/p}) = 30 \text{ cfm} \\ 0.06 \text{ cfm/sf} \times 1090 \text{ sf} &= 65.4 \text{ cfm} \\ 30 \text{ cfm} + 65.4 \text{ cfm} &= 95.4 \text{ cfm} \\ 95.4 \text{ cfm} / 0.8 &= \underline{119 \text{ CFM OSA}} \text{ required, 400 CFM provided.} \end{aligned}$$

COORRIDORS:

$$0.06 \text{ cfm/sf} \times 580 \text{ sf} = 34.8 \text{ cfm}$$
$$34.8 \text{ cfm} / 0.8 = \underline{44 \text{ CFM OSA required.}}$$

11 + 10 = 44 CFM OSA required, 200 CFM provided.

1 **FIRST FLOOR MECHANICAL PLAN**
M22 SCALE: 1/4"=1'-0"

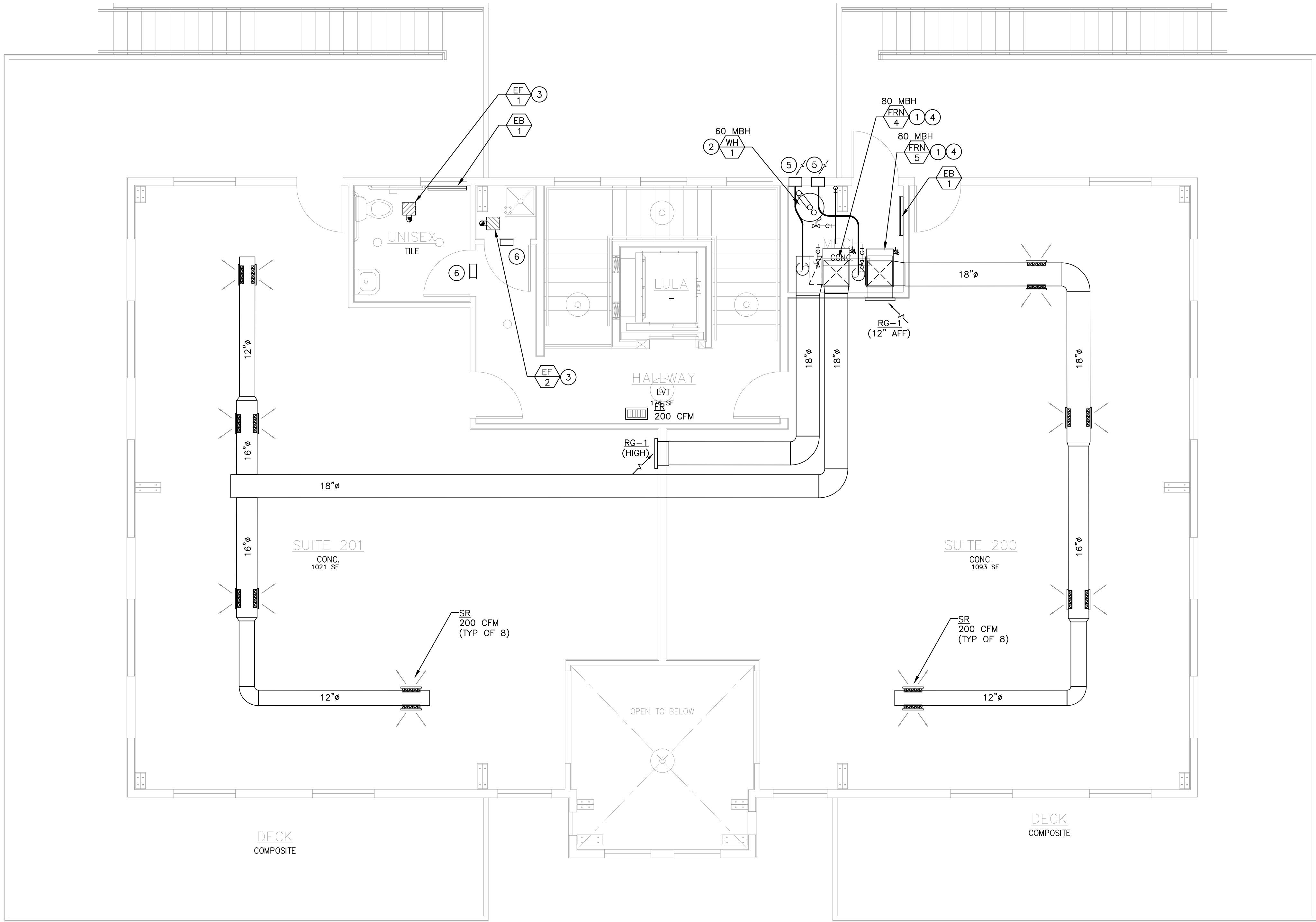


2290 OLD RANCH RD
COLORADO SPRINGS

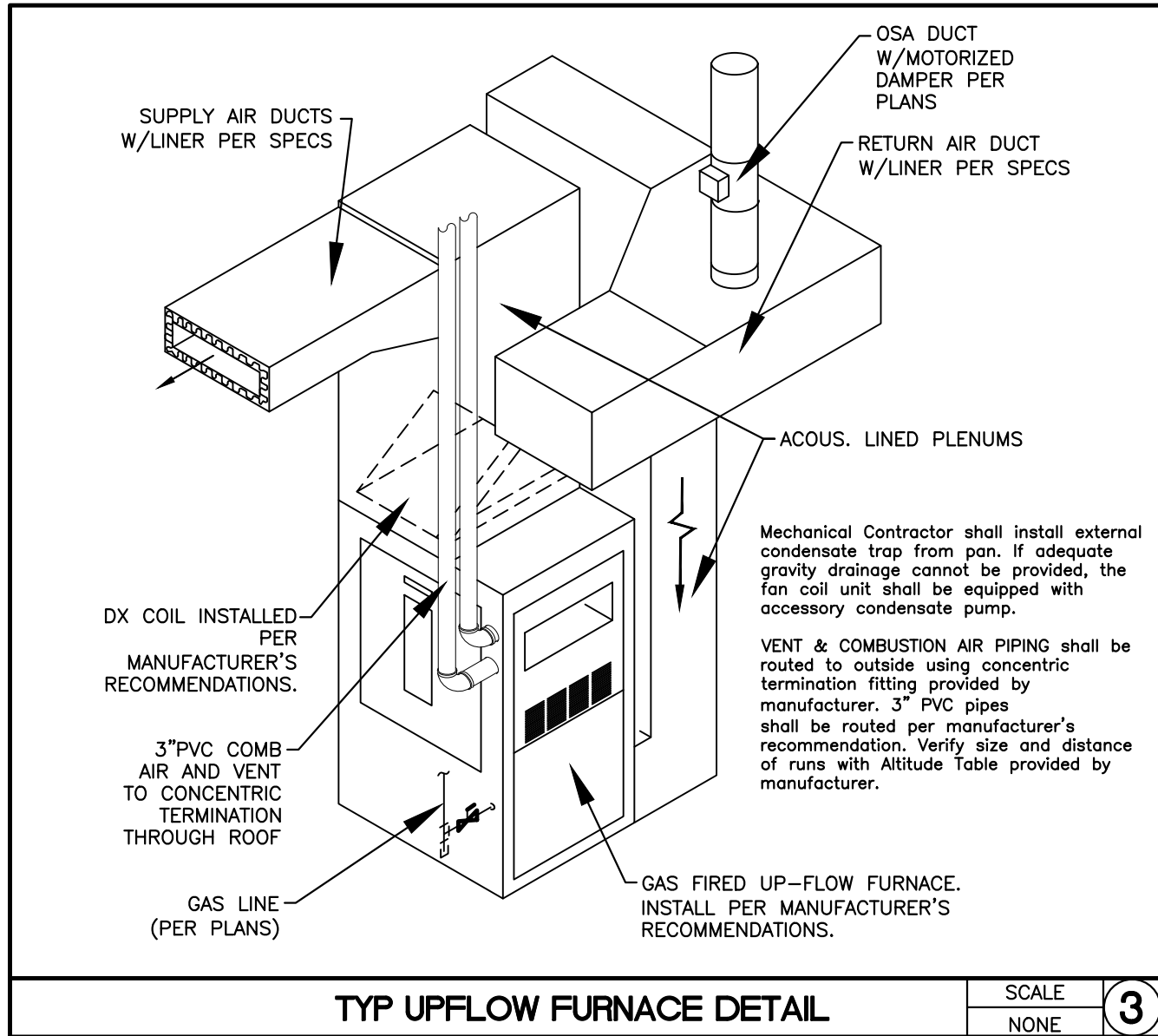
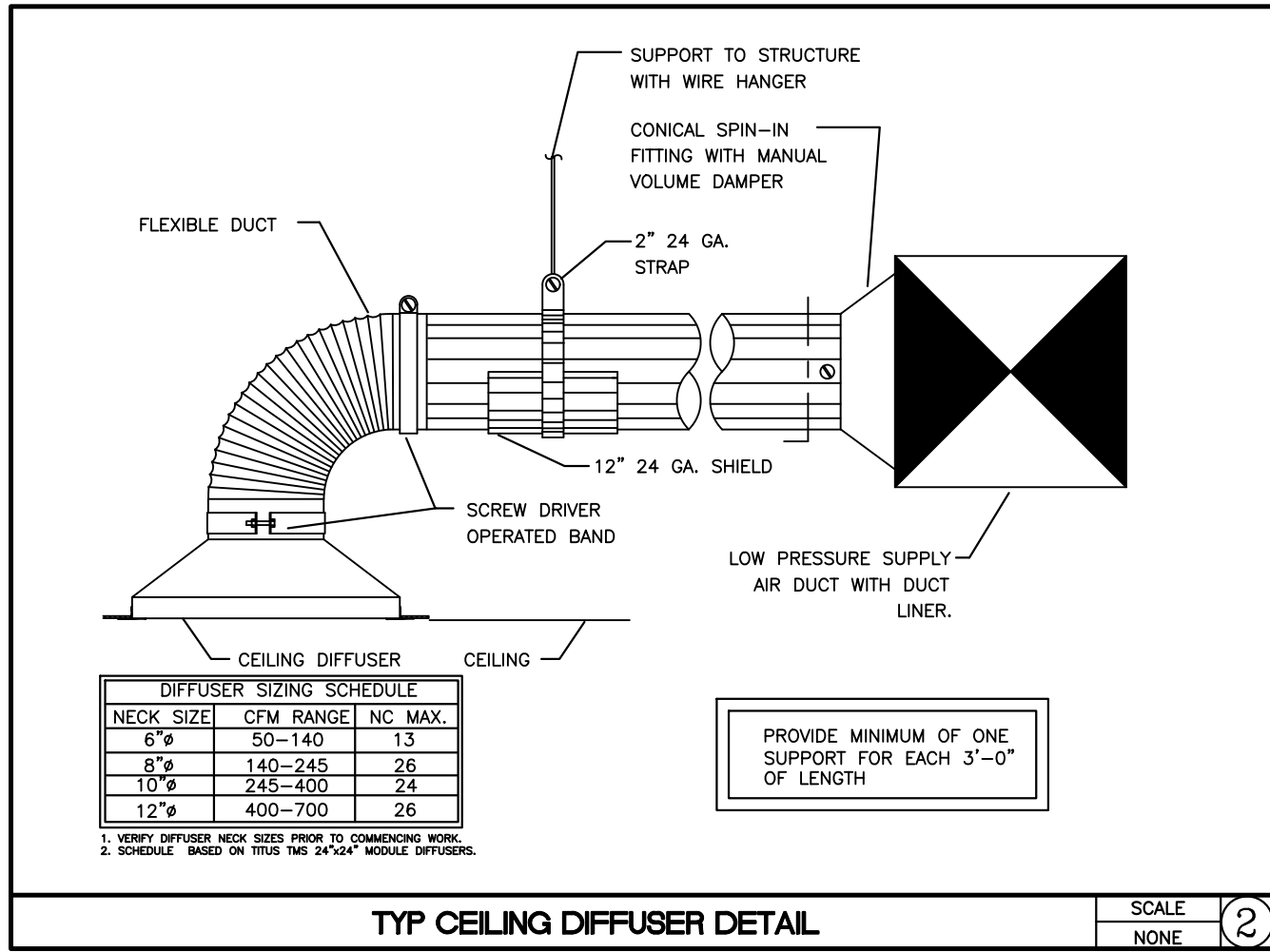
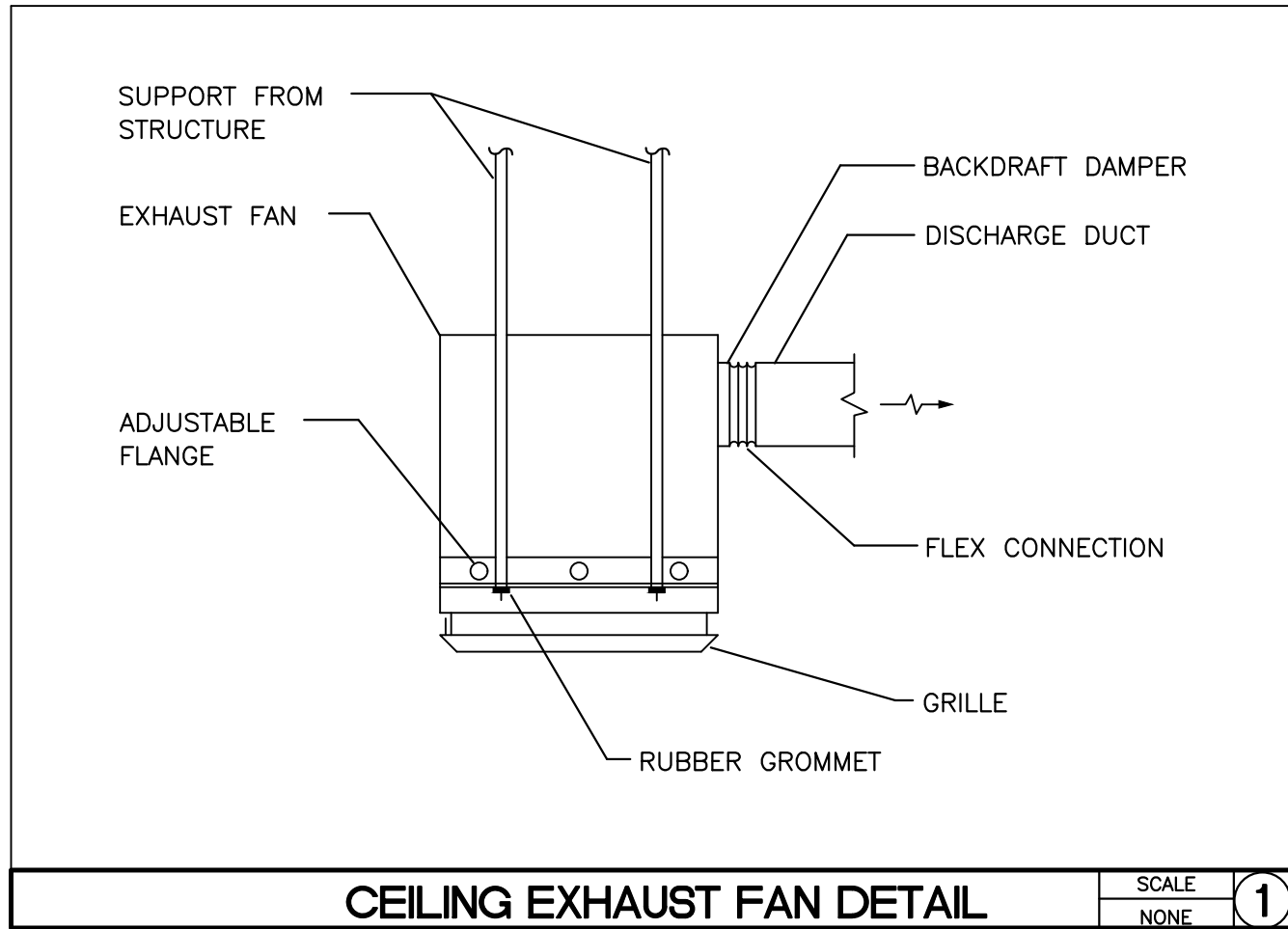
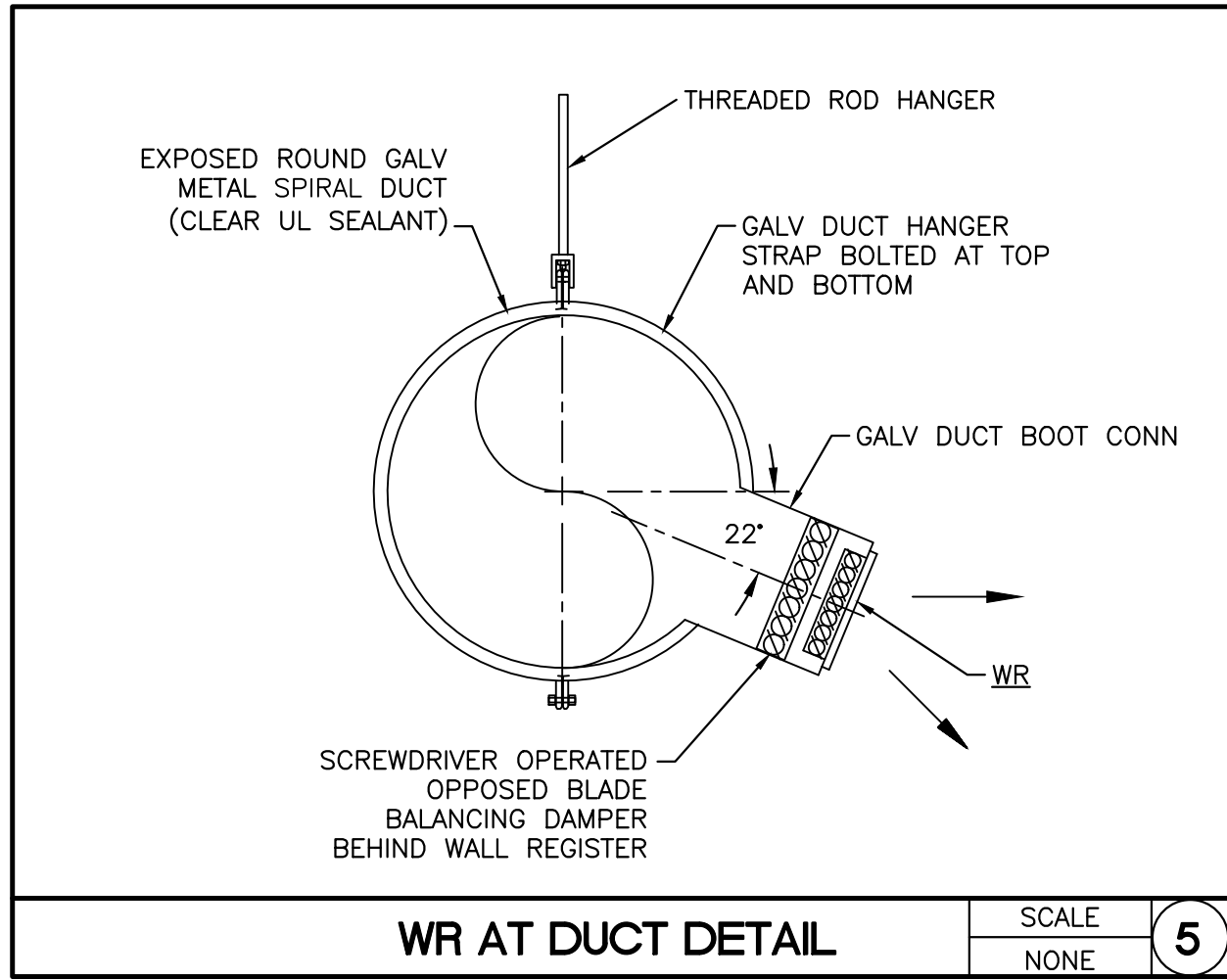
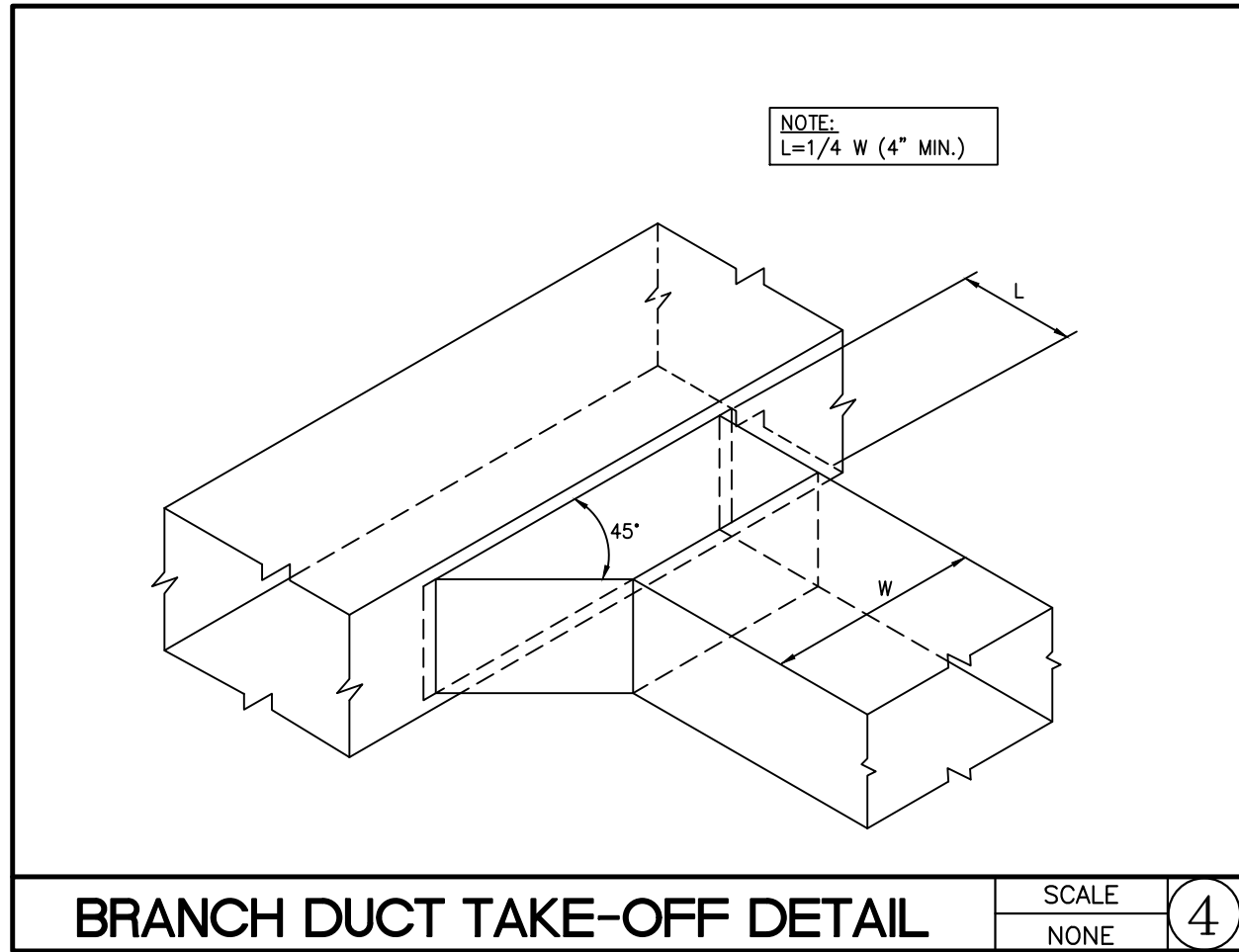
[illegible]

DRAWN BY: DAC
CHECKED BY: DFT
SCALE: AS NOTED

SHEET NUMBER



1 SECOND FLOOR MECHANICAL PLAN
M23 SCALE: 1/4"=1'-0"



GRILLE, REGISTER AND DIFFUSER SCHEDULE								
PLAN CODE	MANUFACTURER	MODEL #/ SERIES	TYPE	CONSTRUCTION	NOM. CFM	SIZE (IN.)	FINISH	REMARKS
<u>WR</u>	SHOEMAKER	901 SERIES	WALL REGISTER	STEEL	40	28x10	PER ARCH	<u>8</u> <u>9</u>
<u>SR</u>	SHOEMAKER	USR34	SPIRAL DBL DEFL	ALUM	SEE PLANS	14x6	ALUM	<u>8</u> <u>9</u>
<u>SR-2</u>	SHOEMAKER	USR34	SPIRAL DBL DEFL	ALUM	SEE PLANS	14x8	ALUM	<u>8</u> <u>9</u>
<u>FR</u>	SHOEMAKER	AFP-GG	FLOOR REGISTER	ALUM	SEE PLANS	14x6	PER ARCH	<u>8</u> <u>9</u>
<u>RG-1</u>	SHOEMAKER	935 SERIES	RETURN GRILLE	STEEL	SEE PLANS	22x22	PER ARCH	<u>8</u> <u>9</u>
<u>RG-2</u>	SHOEMAKER	935 SERIES	RETURN GRILLE	STEEL	SEE PLANS	12x18	PER ARCH	<u>8</u> <u>9</u>
<u>TG</u>	SHOEMAKER	915 SERIES	TRANSFER GRILLE	ALUM	SEE PLANS	14x8	PER ARCH	<u>8</u>
<u>1</u> T-BAR CLG TYPE <u>2</u> MULTI-BLADE DAMPER <u>3</u> ADJUSTABLE BLADES DAMPERS <u>4</u> PERFORATED 4-WAY <u>5</u> EGG-CRATE 1/2"x1/2"x1/2" <u>6</u> 24x24 LAY-N PANEL <u>7</u> FILTER GRILLE <u>8</u> SURFACE MOUNT GRILLE <u>9</u> OPPOSED BLADE DAMPER								

CONDENSING UNIT (Air Cooled) SCHEDULE																	
PLAN CODE	MFGR	MODEL #	COOLING DATA				FAN / MOTOR DATA				ELECTRICAL				WT	DIMENSIONS	NOTES:
CU #			ARI TONS	TOTAL COOL MBH	SENS COOL MBH	SEER	Compr Motor RLA	Cond Fan FLA	Cond Fan RPM	Total Sound dbA	VOLT	Phase	MCA	MAX FUSE	LBS	INCHES	
CU 1	CARRIER	24ACB6-24	2.0	24	—	13	19.0	1.2	800	76	208/230	1	1403	25	127	26"x26"x26"	1 2 3 5 6 8
CU 2	CARRIER	24ACB6-48	4.0	48	—	13	19.0	1.2	800	76	208/230	1	26.2	40	236	31"x31"x39"	1 2 3 5 6 8
CU 3	CARRIER	24ACB6-48	4.0	48	—	13	19.0	1.2	800	76	208/230	1	26.2	40	236	31"x31"x39"	1 2 3 5 6 8
CU 4	CARRIER	24ACB6-48	4.0	48	—	13	19.0	1.2	800	76	208/230	1	26.2	40	236	31"x31"x39"	1 2 3 5 6 8
CU 5	CARRIER	24ACB6-48	4.0	48	—	13	19.0	1.2	800	76	208/230	1	26.2	40	236	31"x31"x39"	1 2 3 5 6 8
1 COOLING BASIS: Inside Evap. Coil EAT=78°Fdb / 67°Fwb. OSA EAT=95°Fdb/67°Fwb. R=22. 2 REFRIGERATION PIPING: ACR copper cleaned and de-greased. Size 3/8" per Mgr for length and capacity. Insulate RS with 1/2"Armofores. 3 THERMOSTAT: HONEYWELL 24x programmable outdoor changeover heat/cool with FAN ON/AUTO switch. 4 LOCATE ON 12"TH ROOF. 12"TH ROOF ON vibration Isolators. 5 LOCATE ON 4"THICK CONCR. FEM. on groke. 6 MAX LOCATION: 100ft max vertical if above evap coil, 50ft max vertical if below evap coil.																	
7 RESIDENTIAL: Filter, Dryer, Thermal Exp. Valve, Cycle Protector, Solenoid Valve, Hard Start Kit, Compressor, Blasket. 8 COMMERCIAL: Filter, Dryer, Thermal Exp. Valve, Cycle Protector, Solenoid Valve, Hard Start Kit, Site Glass, Freeze-Stat, Anti-Cycle Timer, Hall Guards, Accumulator, Motor-Master Control, Ball Bearing Fan Motor, Low Ambient Control to -20°F.																	

GAS FIRED FURNACE SCHEDULE															
PLAN CODE	MFGR	MODEL #	HEATING DATA			FAN DATA			COOLING DATA		ELECTRICAL			WT (lbs)	NOTES:
<u>FRN</u> #			MBH INPUT HI-HEAT	AFUE %	VENT/ INTAKE	CFM at S.L.	E.S.P. " WC	FAN SPEED	OSA INTAKE MIN SETTING CFM	ARI TONS	MBH TOTAL	V-HZ-PH MAX FUSE	FAN HP	incl coil	
<u>FRN 1</u>	CARRIER	59TP6A040-10	40	95	3"ø	800	0.5	High	200	2.0	24.0	115-60-1 15A	1/2 (ECM)	200	<u>1</u> <u>2</u> <u>3</u> <u>4</u> UPFLOW SUPPLY BOTTOM RETURN
<u>FRN 2</u>	CARRIER	59TP6A080-16	80	95	3"ø	1600	0.5	High	400	4.0	47.0	115-60-1 15A	3/4 (ECM)	200	<u>1</u> <u>2</u> <u>3</u> <u>4</u> UPFLOW SUPPLY BOTTOM RETURN
<u>FRN 3</u>	CARRIER	59TP6A080-16	80	95	3"ø	1600	0.5	High	400	4.0	47.0	115-60-1 15A	3/4 (ECM)	200	<u>1</u> <u>2</u> <u>3</u> <u>4</u> UPFLOW SUPPLY BOTTOM RETURN
<u>FRN 4</u>	CARRIER	59TP6A080-16	80	95	3"ø	1600	0.5	High	400	4.0	47.0	115-60-1 15A	3/4 (ECM)	200	<u>1</u> <u>2</u> <u>3</u> <u>4</u> UPFLOW SUPPLY SIDE RETURN
<u>FRN 5</u>	CARRIER	59TP6A080-16	80	95	3"ø	1600	0.5	High	400	4.0	47.0	115-60-1 15A	3/4 (ECM)	200	<u>1</u> <u>2</u> <u>3</u> <u>4</u> UPFLOW SUPPLY SIDE RETURN
<u>1</u> MOTORIZED OSA INTAKE DAMPER: Set at CFM listed. <u>2</u> THERMOSTAT: 33 Connectstat programmable auto changerover heat/cool with FAN ON/AUTO switch. <u>3</u> FILTERS: 1"thick replaceable. Provide new set at Cert of Occ <u>4</u> CONTROLS: High limit, safety. <u>5</u> FRESH AIR DAMPER control by CO Sensor located in space. <u>6</u> ELECTRONIC AIR FILTER on Return Air. <u>7</u> HUMIDIFIER Carrier Model 49FP mounted on supply duct.															

EXHAUST FAN SCHEDULE																	
PLAN CODE	MFGR	MODEL #	TYPE	Area Served	FAN DATA						ELECTRICAL			WT (lbs)	FAN CONTROL	NOTES:	
EF #					CFM at S.L.	S.P. " WC	RPM	FINISH	BLADE TYPE	DRIVE	OUTLET SIZE	VOLTS	Phase	HP (watts)	incl curb		
EF 1	PANASONIC	FV-0511VK2	Recessed Ceiling	Restroom	80	.25	1315	STD	FC	ECM	4"ø	120	1	(13.4)	12	D	1 2 4 5
EF 2	PANASONIC	FV-0511VK2	Recessed Ceiling	Mop Sink	80	.25	1315	STD	FC	ECM	4"ø	120	1	(13.4)	12	A	1 2 4 5
EF 3	PANASONIC	FV-0511VK2	Recessed Ceiling	Lift Mech	80	.25	1315	STD	FC	ECM	4"ø	120	1	(13.4)	12	F	1 2 4 5
1 INTEGRAL GRAVITY BACKDRAFT DAMPER 2 DUCT FROM FAN OUTLET TO EXTERIOR (see plan). 3 FLUSH 8x4 BRICK LOUVER (22GAGE) 4 SMACNA OUTLET ROOF CAP 5 1/4" GALV MESH BIRD SCREEN 6 12" HIGH MFGOR'S ROOF CURB 7 18" HIGH MFGOR'S VENTIL ROOF CURB 8 THERMAL PROTECTION AUTO-RESET, INTERNAL DISCONNECT. 9 BAROMETRIC WEIGHTED BACKDRAFT DAMPER 10 MOTORIZED BACKDRAFT DAMPER 11 UL FIRE DAMPER WITH ACCESS 12 COMBINATION STATIONARY EXTERIOR ZOGAGE LOUVER. 13 UL LISTED, NFPA 96 RATED, NON-OVERLOADING. 14 BACKWARD INCLINED BLADES, MOTOR OUT OF AIRSTREAM. 15 HAND GUARD EXTERIOR BACK-DRIFT DAMPER 16 EXPLOSION PROOF MOTOR, NON-SPARKING BLADES AND HOUSING 17 IN-ADAPTOR KIT 18 -SPARE- 19 -SPARE- 20 SEPARATE WALL SWITCH 21 SWITCH ON WITH ROOM LIGHTS 22 7-DAY TIME CLOCK SET ON DURING OCCUPIED HOURS 23 MOTION SENSOR WITH DELAY 24 INTERLOCK ON WITH HVAC BLOWER MOTOR SERVING AREA 25 COOLING-ONLY T-STAT FAN ON ABOVE 75°F 26 FAN MTD PRESSURE-SWITCH WITH 10MIN "ON" CYCLE. 27 CO SENSOR: UL LISTED. UPON ACTIVATION, FAN CYCLES TO PURGE AREA OF CARBON MONOXIDE. 28 INTERLOCK ROOF TOP UNITS "ON" WITH EXHAUST FAN.																	

MECHANICAL SPECIFICATIONS

HVAC SPECIFIC:

- SUPPORTS and ANCHORS** shall be provided for mechanical work. No chain, tape or wire.
- SHEET METAL** shall be SMACNA and Code standard with 45 degree max reducing, 20 degree max expanding transitions. (Min 26 GA when located in and/or penetrating into garages)
- DUCT INSULATION:** Rectangular supply and return HVAC ducts routed in unconditioned interior spaces shall have R=8 (2") (Ducts in floor trusses R=6), UL-181 Class-1 antimicrobial fiberglass ductuliner attached with stick-klips 15" OC each way and 100% coverage of flame proof adhesive. Increase duct to allow for liner. Insulate concealed round ducts with ASTM C 553 type-1 UL-181 Class-1 covered fiberglass wired and taped in place. Where noted on plan, normally line round ducts with Schuller Permocoat Spiroacoustic acrylic polymer coated self-supporting fiberglass preformed liner. Elbows for rectangular duct shall be provided multi-blade turning vanes or 1.5 centerline radius. Provide Ruskin ELF-118 or equal storm louvers with 1/4" galv mesh and .12" max air friction.
- SEAL DUCT JOINTS and SEAMS** with Childers, 3-M, Hard-cast or equal per Code. **SPIRAL DUCT:** Use listed joint sealant on exposed galvanized spiral with neat sealant edges (provide and remove masking tape after application).
- RAISING DAMPERS (RD), FIRE DAMPERS (FD) and FIRE/SMOKE DAMPERS (ES):** UL listed for the rated assembly being penetrated, including wall/ceiling/floor penetration openings.
- FIRE CAULK:** UL listed for the rated assembly being penetrated, including wall/ceiling/floor penetration openings.

GENERAL:

- LOCAL and STATE CODES/ORDINANCES and CONDITIONS of CONTRACT** shall be followed. **SUBMIT** plans to Building department for plan review. Follow correction requirements. Pay all Fees and attain all Permits.
- ADOPTED ENERGY CODE** shall be followed. All equipment, insulation, and controls shall conform.
- VISIT SITE** daily to ascertain existing conditions prior to ordering equipment to fabricating duct and piping.
- MECHANICAL DRAWINGS** are schematic and not to be scaled. Refer to Arch/Certified drawings and site measurements for dimensions.
- RECORD** scale drawings shall be provided by contractor and submitted to Division 15 Engineer at completion, showing all piping, duct and equipment changes.
- EQUIPMENT SHOWN ON DRAWINGS and SPECIFICATIONS:** Contractor shall order, purchase, receive, uncrate, assemble, and install all items in conformance to manufacturer's recommendations. Contractor shall insure all equipment for full replacement value.
- SUBMITTALS:** Contractor shall check submittals for 100% compliance with Contract Documents. Submit 4 copies to Division 15 Engineer for review prior to ordering.
- BASE BID** on specified equipment as shown on plans and in specifications.
- SUBSTITUTIONS** will be processed as change-orders after bidding, with all electrical, building alterations, and dollar amounts are included and approved in writing by owner prior to ordering equipment or fabrication.
- EXTRA COSTS or CHANGES** allowed only if approved in writing by Engineer with dollar amount prior to ordering.
- ELECTRICAL COORDINATION:** Confirm voltage, phase, and amperity with Electrical Contractor prior to ordering equipment. All 24v controls including interlock wiring for mechanical equipment by Division 15 Contractor. Control and heating/cooling equipment to automatically restart after power failure. All wire in conduit per NEC latest edition.
- CURBS, SUPPORTS and ANCHORS** shall be provided for MECHANICAL work. No chain, tape, or wire.
- SLEEVES and COLLARS** shall be provided for all ductwork and pipes thru walls, floors, and ceilings. Provide chrome plated scutechcons for exposed piping penetrations thru ceilings, floors, and walls in finished areas. All water, soil, waste, vent and trim including fittings to be chrome plated where exposed.
- CONCEAL** all work in finished areas.
- CUT and PATCH** to match adjacent areas. No structural member shall be cut or notched.
- OPERATING MANUAL** shall be provided by owner and engineer for all systems and equipment including manufacturer's maintenance manuals. Include lubrication, filter types and sizes, starting and stopping procedures. List HVAC Contractor's telephone number.
- ONLY CONTRACTORS WITH EXPERIENCE** on at least 3 projects of this type may bid.
- RFI** (Request for information) from contractor shall include at least one proposed solution that complies with the intent of Contract Documents.
- AIR BALANCE REPORT:** shall be submitted to the Building Department and engineer by a licensed air balancing contractor.
- WARRANTY:** All labor and new equipment for one year form the date of acceptance by owner.

PLUMBING SPECIFICATIONS

PLUMBING SPECIFIC:

1. **SOIL, WASTE and VENT PIPING** shall be PVC dual cement ASTM-D2665 schedule-40 as Code approved. Provide cleanouts 100ft min OC of appropriate type inside buildings. Pipe end cap pan drain with P-trap 3/4" minimum to waste. Vent thru roof cross sectional area to be equal to or greater than building sewer main.
2. **FLOOR DRAIN TRAP PRIMER:** Provide Prime-Perfect with 1/2" CW and valve to each Floor Drain in equipment rooms and where required by Code.
3. **WATER PIPING** shall be 15% silver Sili-Phos brazed joint type-K copper ASTM-B88 if buried or within 6" of grade. Use no-lead 95/5 soldered joint type-M copper above grade. (Code approved plastic piping may be used inside the building with owners written consent. Provide a copy/letter of approval to the engineer FAX: 303-394-2984).
4. **INSULATION - WATER PIPING:** Per Code. **FREEZE PROTECTION:** Route all piping inboard of building insulation to avoid freezing. Electric heat trace all piping located in unheated areas with Chromalox 7.0 watts/ft MI cable and 1" thick fiberglass piping insulation with cover.
5. **SHOCK ABSORBER:** Provide Josam 75000-S 1/2" copper piston-type at CW and HW Clothes Washer connections.
6. **GAS PIPING:** Use black steel ASTM-A53 schedule-40 with malleable screwed fittings inside building and from meter to building where not buried. Buried piping shall be welded with forged steel fittings and mill wrapped with unbroken layer of coal tar Kraft Protecto-Wrap including fittings. Verify gas line routing with Architect and Building Department prior to installation. Costs involved in gas service shall be included in bid. Provide line size valve just prior to entering building. Provide equipment regulators to suit pressure supplied. Gas piping on roof shall run on 12" high pitch pocket supports per Code.
7. **VALVES:** Isolate each piece of equipment and each rough-in excluding waste and vent. **WATER:** Apollo ball valve line-size rated for 200 PSIG WOG. GAS: AGA listed line-size lubricated.
8. **PRESSURE TEST** all piping per Code but to at least 150% max WP.
9. **SHOWER VALVES** Shower and tub/shower combination valves shall be balanced pressure, thermostatic or combination balanced-pressure/thermostatic valves and shall be equipped with a means to limit maximum temperature of 120°F.

GENERAL:

10. **LOCAL and STATE CODES/ORDINANCES and CONDITIONS of CONTRACT** shall be followed. SUBMIT plans to Building Department for Plan Review. Follow correction requirements. Pay all Fees and attain all Permits.
11. **ADOPTED ENERGY CODE** shall be followed. All equipment, insulation, and controls shall conform.
12. **VISIT** site daily to ascertain existing conditions prior to ordering equipment or fabricating duct and piping.
13. **PLUMBING DRAWINGS** are schematic and not to be scaled. Refer to Architectural/Certified drawings and site measurements for dimensions.
14. **RECORD** scaled drawings shall be provided by Contractor and submitted to Division 15 Engineer at completion showing all piping, duct, and equipment changes.
15. **EQUIPMENT SHOWN ON DRAWINGS and SPECIFICATIONS:** Contractor shall order, purchase, receive, uncrate, assemble, and install all items in conformance to Manufacturer's recommendations. Additionally Contractor shall install and final connect Owner furnished items as indicated on drawings. Contractor shall insure all equipment for full replacement value.
16. **SUBMITTALS:** Contractor shall check Submittals for 100% compliance with Contract Documents. Submit four (4) copies to Division 15 Engineer for review prior to ordering.
17. **BASE BID** on specified equipment as shown on plans and in specifications.
18. **SUBSTITUTION** will be processed as change-orders after Bidding with all electrical, building alterations, and dollar amounts are included and approved in writing by owner prior to ordering equipment or fabrication.
19. **EXTRA COSTS or CHANGES** allowed only if approved in writing by Engineer with dollar amount prior to ordering.
20. **ELECTRICAL COORDINATION:** Confirm voltage, phase, and ampacity with Electrical Contractor prior to ordering equipment. All 24v controls including interlock wiring for Plumbing equipment by Division 15 Contractor. Plumbing equipment to automatically reset after power failure. All wire in conduit per NEC latest edition.
21. **CURBS, SUPPORTS, and ANCHORS** shall be provided for PLUMBING work. No chain, tape, wire.
22. **SLEEVES and COLLARS** shall be provided for all pipes (two pipe sizes larger) thru walls, floors, and ceilings. Provide chrome plated escutcheons for exposed piping penetrations thru ceilings, floors, and walls in finished areas. All water, soil, waste, vent and trim including fittings to be chrome plated where exposed.
23. **CONCEAL** all work in finished areas.
24. **CUT and PATCH** to match adjacent areas. No structural member shall be cut or notched.
25. **EXCAVATE** for all PLUMBING work. Compact to 95% AASHO or Proctor density in 6" maximum layers at optimum moisture content. Rework if any settlement within first years Guarantee.
26. **OPERATING MANUAL** shall be provided Owner and Engineer for all systems and equipment including manufacturer's maintenance manuals. Include lubrication, filter types and sizes, starting and stopping procedures. List HVAC, Plumbing, and Control Contractor's telephone numbers.
27. **ONLY CONTRACTORS WITH EXPERIENCE** on at least 3 projects of this type may bid.
28. **RFI** (Request For Information) from Contractor shall include at least one proposed solution which complies with the intent of Contract Documents.
29. **GUARANTEE** all labor and new equipment for one year from the date of acceptance by Owner.

PLUMBING LEGEND			PLUMBING LEGEND		
SYMBOL	ABBREV.	DESCRIPTION	SYMBOL	ABBREV.	DESCRIPTION
	G	NATURAL GAS LINE		PA	PIPE ANCHOR
	HWS	HEATING WATER SUPPLY		PG	PIPE GUIDE
	HWR	HEATING WATER RETURN		BSV	BALANCE VALVE W/MEMORY
	CWS	CHILLED WATER SUPPLY		AGC	AGA LISTED GAS COCK
	CWR	CHILLED WATER RETURN		PG	TOP CONNECTION
	CS	CONDENSER WATER SUPPLY		BC	BOTTOM CONNECTION
	CR	CONDENSER WATER RETURN		PG	SIDE T-CONNECTION
	CHS	DUAL TEMPERATURE SUPPLY		PG	SHOCK ABSORBER
	CHR	DUAL TEMPERATURE RETURN		PG	CIRCUIT SETTER (GPM)
	D	DRAIN PIPE		PRD	PIPE RISER DOWNWARD
	HPS	HIGH PRESSURE STEAM		PRU	PIPE RISER UPWARD
	HPR	HIGH PRESSURE COND. RETURN		PDC	POINT OF DUCT CONNECTION NEW TO EXISTING
	LPS	LOW PRESSURE STEAM		SC	SECTION CUT: (A) SECTION I.D. (1) SHEET NO. WHERE SHOWN
	LPR	LOW PRESSURE COND. RETURN		PPC	POINT OF PIPE CONNECTION NEW TO EXISTING
	CP	CONDENSATE PUMP DISCHARGE		UD	UNDERCUT DOOR, 1"
	FOS	FUEL OIL SUPPLY		CW	COLD WATER (K-COPPER BURIED)
	FOR	FUEL OIL RETURN		HW	HOT WATER (M-COPPER ABOVE GRADE)
	FOV	FUEL OIL VENT		HW	HOT WATER (M-COPPER)
	RS	REFRIGERANT SUCTION		HW	HOT WATER (M-COPPER)
	RL	REFRIGERANT LIQUID		HWC	HW CIRCULATING (M-COPPER)
	RD	REFRIGERANT DISCHARGE		NP	NON-POTABLE WATER
	FI	FLOW INDICATOR		NG	NATURAL GAS
	BV	LINE SIZE BALL VALVE		V	VENT (DWV COPPER)
	GV	GLOBE VALVE		CHV	CHEMICAL VENT PIPE
	CV	CHECK VALVE		San S	SANITARY WASTE ABOVE GRADE (CAST IRON)
	FCV	FLOW CONTROL VALVE W/CHECK		San S	SANITARY WASTE BELOW GRADE (CAST IRON)
	BSV	PLUG OR BALANCING SHUT-OFF VALVE		Per D	PERIMETER DRAIN
	NOV	NO. VALVE W/LOCKING COVER		GW	GREASE WASTE PIPE
	BSR	PLUG OR BALANCING SHUT-OFF VALVE IN RISER		CHW	CHEMICAL WASTE PIPE
	SVR	SHUT-OFF VALVE IN RISER		ST	STORM DRAIN/BUILDING STORM SEWER PIPE
	DV	DRAIN VALVE W/HOSE END		OST	OVERFLOW STORM DRAIN PIPE
	SBV	STRAINER W/BLOW-OFF VALVE		VAC	VACUUM PIPE
	TCV	TEMPERATURE CONTROL VALVE, 3-WAY		CA	COMPRESSED AIR PIPE
	TCV	TEMPERATURE CONTROL VALVE, 3-WAY		VC	VERTICAL CLEANOUT
	PRV	PRESSURE REDUCING VALVE		COTG	CLEANOUT TO GRADE
	SV	SAFETY OR RELIEF VALVE		FCO	FLOOR CLEANOUT (FLUSH COVER PLATE)
	AV	AIR VENT		CO	SAN S CLEANOUT IN CRAWLSPACE
	PIT	PRESSURE-TEMP. TAP		WCO	WCO CLEANOUT (FLUSH COVER PLATE)
	PG	PRESSURE GAUGE W/FILL & COCK		RD, OD	ROOF DRAIN, OVERFLOW DRAIN
	T	THERMOMETER			

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HVAC DUCTWORK		CONTROLS	
	SUPPLY DUCT UP		THERMOSTAT/SENSOR
	SUPPLY DUCT DOWN		NIGHT THERMOSTAT
	RETURN OR EXHAUST DUCT UP		HUMIDISTAT/SENSOR
	RETURN OR EXHAUST DUCT DOWN		STARTER
	ROUND DUCT SECTION UP		PRESSURE SWITCH
	TRUNK DUCT ELBOW (TURNING VANES REQ'D)		DIFFERENTIAL AIR PRESSURE SENSOR
	TRUNK DUCT ELBOW (R/W=1 or Larger) (NO TURNING VANES REQ'D)		SWITCH
	VOLUME DAMPER		FLOW METER
	FIRE DAMPER (FS FIRE/SMOKE) RADIATION DAMPER		LOW LIMIT THERMOSTAT
	EQUIPMENT SYMBOL (SEE EQUIPMENT SCHEDULE)		TEMPERATURE CONTROL (T.C.) DAMPER
	ROUND BRANCH DUCT TO SIDE OF MAIN DUCT		SMOKE DETECTOR (DUCT)
	ROUND BRANCH DUCT TO TOP OF MAIN DUCT		CIRCUIT TRANSFORMER
	RECTANGULAR BRANCH DUCT TO SIDE OF MAIN DUCT		PRESSURE DIFFERENTIAL SENSOR
	ROUND GALV STEEL DUCT		UNDERCUT DOOR 1"
	INSUL FLEX ROUND DUCT		RADIATION DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)
	SHEET METAL DIMENSION		FIRE DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)
	DIMENSION INSIDE INSULATION		FIRE/SMOKE DAMPER (U.L. LISTED FOR RATED ASSEMBLY BEING PENETRATED)

MECH. EQUIP. WIRING AND CONNECTION SCHEDULE				
ITEM	FURNISHED BY	SET IN PLACE OR MOUNTED BY	WIRED AND/OR CONNECTED BY	REMARKS
EQUIPMENT MOTORS LINE VOLTAGE ELECTRIC HEATERS, SMOKE/FIRE DAMPERS, ETC.	MC	MC	EC	
MOTOR CONTROLLERS, STARTERS, PUSHBUTTON STATIONS, PILOT LIGHTS, ETC.	MC	EC	EC	
MULTI-SPEED SWITCHES LINE VOLTAGE THERMOSTATS	MC	EC	EC	
DISCONNECT SWITCHES (FUSED OR UNFUSED) THERMAL OVERLOAD SWITCHES, TRANSFER SWITCHES, GEN SETS, ETC.	EC	EC	EC	
LOW VOLTAGE THERMOSTATS, CONTROL RELAYS, TIME CLOCK, CONTROL TRANSFORMER, CONTROL PANELS, PRESSURESTATS, MOTOR VALVES, EP & PE SWITCHES; DAMPER MOTORS, SOLENOID VALVES, ETC. AND ALL INTERLOCK WIRING, DDC CONTROLS	MC	MC	MC	

MC = MECHANICAL CONTRACTOR; EC = ELECTRICAL CONTRACTOR.

2015 EEC MINIMUM HOT WATER PIPING INSULATION REQUIREMENTS							
TABLE C403.2.1							
MINIMUM PIPE INSULATION THICKNESS (in inches) ^a							
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu · in./h · ft ² · °F	Mean Rating Temperature, °F	< 1	1 to < 1½	1½ to < 4	4 to > 8	≥ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	50	0.5	1.0	1.0	1.0	1.5

For S1: 1 inch = 25.4 mm, °C = (°F) ÷ 1.8.

^a For piping smaller than 1½ inches and located in partitions under conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch.

ABBREVIATIONS							
ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
AFF	ABOVE FINISHED FLOOR	FR	FLOOR REGISTER	LRA	LOCKED ROTOR AMPS	RH	RELATIVE HUMIDITY
ALT	ALTITUDE	FT	FOOT OR FEET	LWT	LEAVING WATER TEMPERATURE	RLA	RUNNING LOAD AMPS
BHP	BRAKE HORSEPOWER	FU	FIXTURE UNITS	MAX	MAXIMUM	RPM	REVOLUTIONS PER MINUTE
BTU	BRITISH THERMAL UNIT	GA	GAUGE	MCA	MINIMUM CIRCUIT AMPS	SL	SEA LEVEL
COTG	CLEAN OUT TO GRADE	GAL	GALLONS	MBH	BTU PER HOUR (THOUSAND)	SENS	SENSIBLE
CU FT	CUBIC FEET	GPH	GALLONS PER HOUR	MIN	MINIMUM	SPEC	SPECIFICATION
CU IN	CUBIC INCH	GPM	GALLONS PER MINUTE	NC	NOISE CRITERIA	SQ	SQUARE
CFM	CUBIC FEET PER MINUTE	HD	HEAD	N.O.	NORMALLY OPEN	STD	STANDARD
SCFM	CFM, STANDARD CONDITIONS	HG	MERCURY	N.C.	NORMALLY CLOSED	SP	STATIC PRESSURE
dB	DECIBEL	HGT	HEIGHT	N/A	NOT APPLICABLE	SA	SUPPLY AIR
CW	DOMESTIC COLD WATER	HORIZ	HORIZONTAL	NC	NOT IN CONTRACT	TEMP	TEMPERATURE
DEG OR °	DEGREE	HP	HORSEPOWER	NTS	NOT TO SCALE	TD	TEMPERATURE DIFFERENCE
DHW	DOMESTIC HOT WATER	HW	DOMESTIC HOT WATER	NO	NUMBER	TG	TRANSFER GRILLE
DIA	DIAMETER	HWC	HOT WATER CIRCULATING (DOMESTIC)	OA	OUTSIDE AIR	TSP	TOTAL STATIC PRESSURE
DB	DRY-BULB	HZ	HERTZ	OD	OUTSIDE DIAMETER	TSTAT	THERMOSTAT
EAT	ENTERING AIR TEMP.	ID	INSIDE DIAMETER	PPM	PARTS PER MILLION	TONS	TONS OF REFRIGERATION
EFF	EFFICIENCY	IE	INVERT ELEVATION	%	PERCENT	VAV	VARIABLE AIR VOLUME
ELEV	ELEVATION	IN	INCHES	PH OR Ø	PHASE (ELECTRICAL)	VEL	VELOCITY
ESP	EXTERNAL STATIC PRESSURE	IN W.C.	INCHES WATER COLUMN	PSF	POUNDS PER SQUARE FOOT	VERT	VERTICAL
EWT	ENTERING WATER TEMP.	KW	KILOWATT	PSI	POUNDS PER SQUARE INCH	V	VENT
EXH	EXHAUST	KWH	KILOWATT HOUR	PSIA	PSI ABSOLUTE	VOL	VOLUME
F	FAHRENHEIT	LAT	LEAVING AIR TEMPERATURE	PSIG	PSI GAUGE	W	WASTE
FLA	FULL LOAD AMPS	LBS OR #	POUNDS	PRESS	PRESSURE	WT	WEIGHT
FPM	FEET PER MINUTE	LF	LINEAR FEET	RA	RETURN AIR	WB	WET-BULB
FPS	FEET PER SECOND			RECIRC	RECIRCULATE		

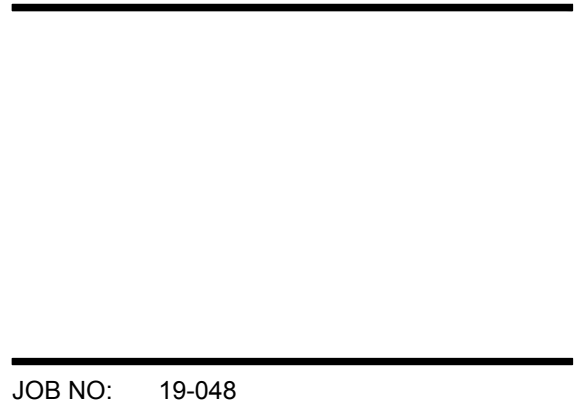
SPECS, ABBRS, LEGEND AND SHEET LOG	P0.1	●	
STUDIO PLUMBING PLAN, SCHEDULES AND DETAILS	P1.1	●	
FIRST FLOOR PLUMBING PLAN AND ISOMETRIC	P2.1	●	
SECOND FLOOR PLUMBING PLAN AND ISOMETRIC	P2.2	●	

CODE	
2015	INTERNATIONAL MECHANICAL CODE
2015	INTERNATIONAL PLUMBING CODE
2015	INTERNATIONAL ENERGY CONSERVATION CODE
2015	INTERNATIONAL BUILDING CODE
2016	DENVER BUILDING CODE AMENDMENTS

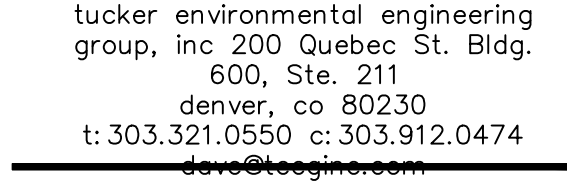


2290 OLD RANCH RD
COLORADO SPRINGS

SHEET:

[illegible]

P0.1



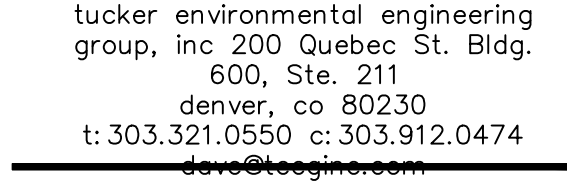
2290 OLD RANCH RD
COLORADO SPRINGS

SHEET:
FIRST FLOOR
PLAN AND
ISOMETRIC

[illegible]

DRAWN BY: DAC
CHECKED BY: DFT
SCALE: AS NOTED

SHEET NUMBER



2290 OLD RANCH RD
COLORADO SPRINGS

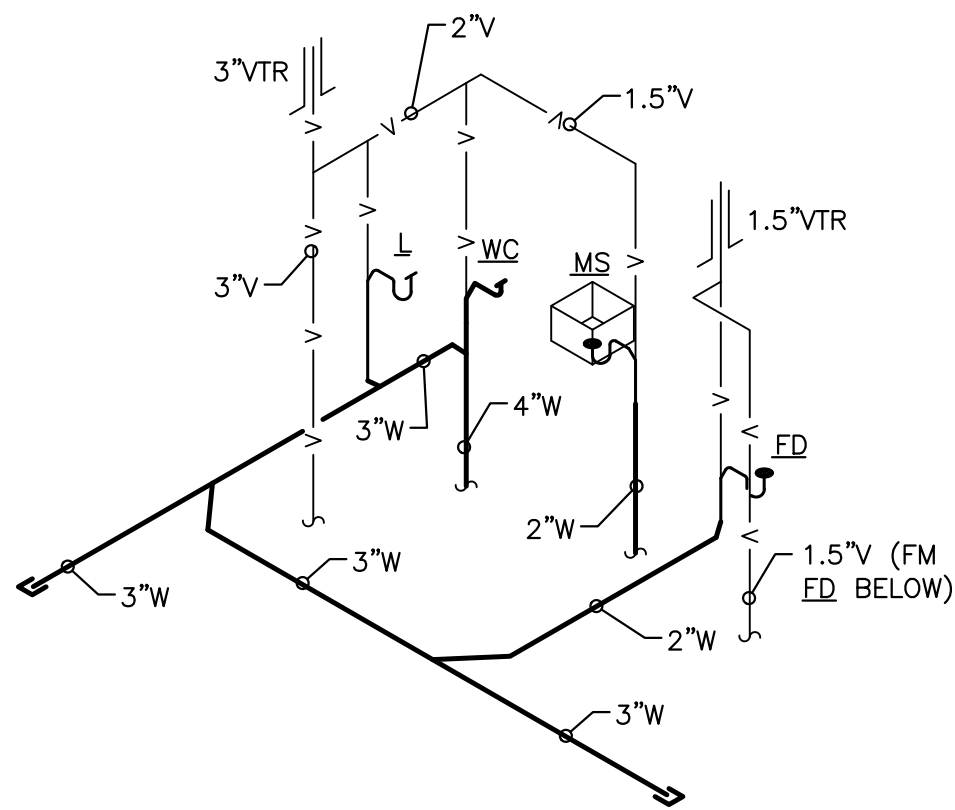
SHEET: **SECOND
FLOOR PLAN
AND
ISOMETRIC**

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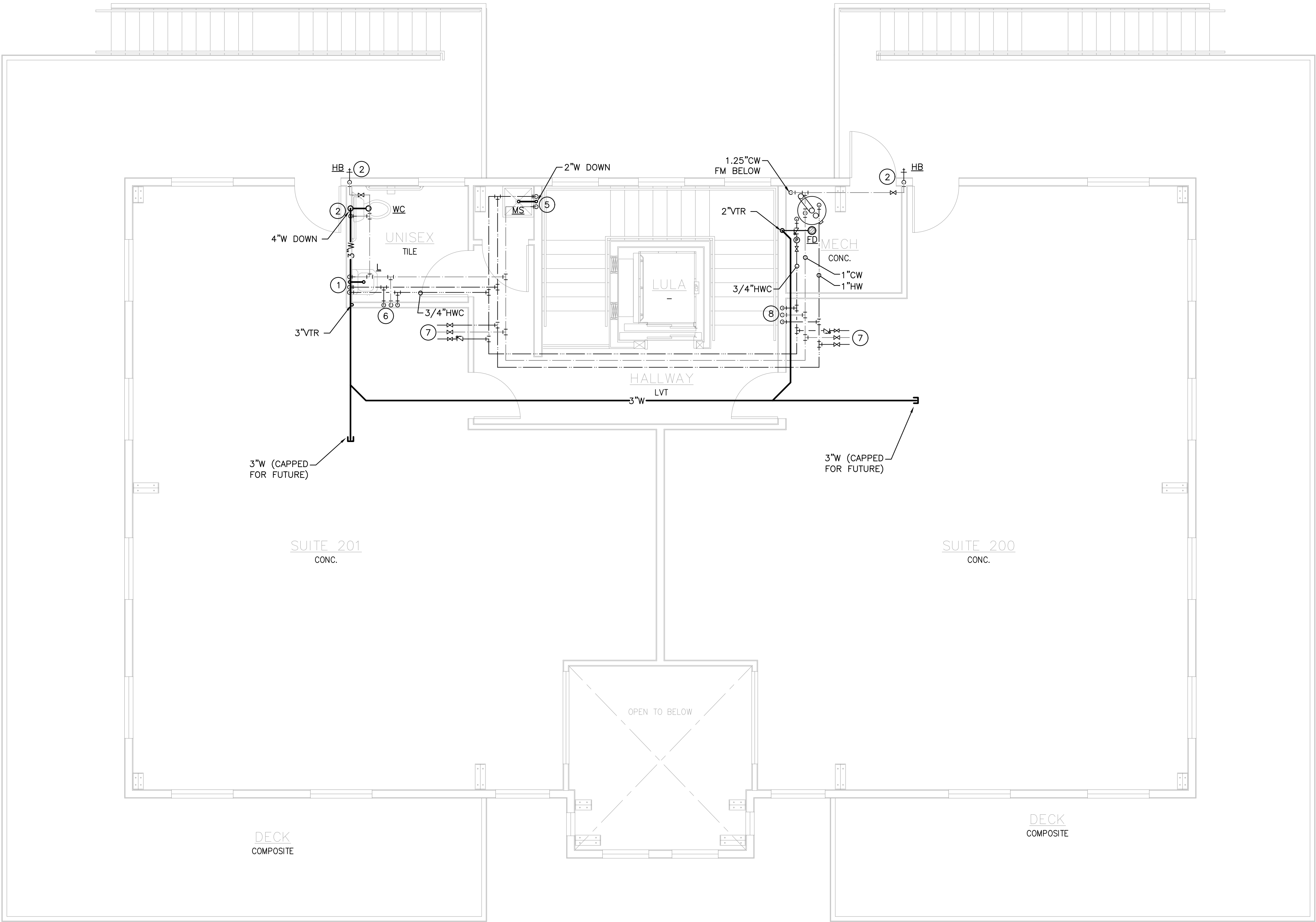
DRAWN BY: DAC
CHECKED BY: DFT
SCALE: AS NOTED

SHEET NUMBER

- ## SHEET NOTES
- GENERAL NOTES:
- ALL COLD AND HOT WATER SUPPLY LINES ARE TO BE 3/4" UNLESS NOTED OTHERWISE, OR FINAL CONNECTION.
 - ALL HW CIRCULATION LINES ARE TO BE 1/2" UNDO.
 - HW AND HW CIRCULATION LINES TO BE INSULATED AS REQUIRED FOR 120°F FLUID BY IECC.
- ① 1/2" CW & HW TO FIXTURE.
 - ② 1/2" CW TO FIXTURE.
 - ③ 1/2" HWC ROUTED DOWN TO WITHIN 6" OF FIXTURE SHUT OFF.
 - ④ 1/2" CW & HW ROUTED DOWN TO FIXTURE FROM ABOVE.
 - ⑤ 3/4" CW & HW ROUTED DOWN TO 1/2" FIXTURE SHUTOFFS AND 1/2" CW AND HW ROUTED DOWN TO FIXTURE BELOW.
 - ⑥ 1" CW & HW AND 3/4"HWC ROUTED DOWN TO LOWER FLOOR.
 - ⑦ 3/4" CW & HW AND 1/2" HWC SHUTOFFS AND STUB-OUT FOR POSSIBLE FUTURE CONNECTION.
 - ⑧ 3/4" CW & HW AND 1/2" HWC ROUTED DOWN.



2 WASTE AND VENT ISOMETRIC
P2.2 SCALE: NONE



1 SECOND FLOOR PLUMBING PLAN
P22 SCALE: 1/4"=1'-0"