HVAC Notes

HEATING VENTILATING AND AIR CONDITIONING SPECIFICATION

Provide all labour, material, equipment, and contractor's services necessary for complete installation of all work indicated in drawings or spelled out in the contract documents, in full conformity with requirements of Wisconsin building code and of all authorities having jurisdiction.
Secure permits, licenses, and certificates. Pay all fees and charges for all work installed certifying compliance with local codes and governing authorities. Deliver certificates to building owner prior to the commencement of work.

Contractor bidding this job shall visit and inspect the job site prior to submitting his bid. Contractor shall coordinate the site visit with building owner/Architect. Contractor shall ask Architect/owner any questions he may have pertaining to building standards and existing conditions that may prohibit the proper installation of his work as per plan and specifications.

The removal and relocation of certain existing work may be necessary for performance of the general work. Contractor surveying the site shall make all necessary changes required based on existing conditions for proper installation of new work and include all the materials and required work in his bid price. No allowance will be made for failure to do so. Coordinate timetable for all construction operations with building owner.
Materials and workmanship, unless otherwise noted, shall be in accordance with building standards. All materials and equipment shall be new unless otherwise noted.

All duct work and piping is shown as design intent and does not show all offsets, drops and rises of runs. Contractor shall allow in his bid price for drops and rises of duct work and piping to avoid obstructions.

Install all work to be readily accessible for operation, maintenance and repair. Minor deviations from the drawings may be made to accomplish this, but changes which involve extra cost shall not be made without approval.

The contractor shall keep all equipment and materials and all parts of the building, exterior spaces and adjacent street, sidewalks and pavements, free from materials and debris resulting from the execution of this work. Excess materials and debris will not be permitted to accumulate either on the interior or the exterior. Provide for legal removal and disposal of all and debris from the building and site.
Seal openings around ducts and piping through partitions, walls, floors and slabs (not in shafts) with mineral wool or other non-combustible materials and finish as determined by architect or existing building standards.

Provide all necessary flashing and counter flashing to maintain the waterproofing integrity of this building as required by the installation or removal of pipes, ducts, conduits, and equipment. Provide sleeves for duct and piping and provide escutcheons.
Contractor to follow manufacturer's recommendations and building standards for proper installation of equipment.

Contractor to coordinate all floor, wall, and slab penetrations, and exact location support all ceiling-mounted equipment, ductwork and piping from building structure and framing in an approved manner. Where overhead construction does not permit fastening of supports and equipment, provide additional steel framing. For floor-mounted equipment, provide housekeeping pads.
Contractor shall furnish and install all equipment, ductwork, interconnecting piping, and fittings, insulation, interlock and controls.
Contractor is responsible for field conditions and field coordination with other trades.

Equipment shall be handled and installed by the contractor. Contractor shall provide and install all interconnecting piping, refrigerant charge and control wiring as required for a complete and operable installation. This contractor is to assume complete responsibility for handling, installation and all piping connections as required.

This contractor shall provide and assume complete responsibility for start-up and 24 hour/day service with a response time not to exceed 4 hours. Provide a quote for maintenance on a quarterly basis (4 maintenance inspections a year) for a period of one year for all HVAC equipment including pre-purchased equipment as if said pre-purchased equipment were purchased by this contractor.
Contractor to install pressure relief valve on high pressure side of the system and upstream of any intervening valves; remove expansion valves, devices, and connections from air stream; install refrigeration piping of type 'K' copper and to braze all connections and devices.
Equipment exposed to natural elements shall be of welded or soldered construction and shall receive one (1) coat of primer and two (2) coats of paint.

This one year maintenance contract shall include, but is not limited to the following work:
1. Check lines for leakage of refrigerant/water.
2. Refill lines if necessary.
3. Lubricate motors.
4. Check operation of thermostats.
5. Replace return air filters.
6. Clean condenser coils.
7. Check and tighten electrical connections.
8. Check controls.
9. Check for noise and vibration.
10. Check refrigerant pressure during operation.
11. Check current (amperage) draw of all motors.
12. Check operation on condensate drain system.
13. Check and adjust fan belt tension (if applicable).
14. Check air temperature across evaporator.

A written maintenance report shall be forwarded to the owner's facilities operation manager/team/company.

Guarantee:
Contractor shall furnish a written guarantee to replace or repair promptly, and assume full responsibility of all expenses incurred for any workmanship and/or equipment in which defects occur within one year from date of acceptance by owner.
Provide 2- colour engraved nameplates (fastened with epoxy cement) on all major equipment items indicating unit number.

Submittal
Submit coordinated shop drawings and equipment cuts for all equipment, diffusers/registers, automatic control diagrams, ductwork layout, piping layout, and sheet metal construction standards for review and approval prior to purchase, fabrication and installation.
All piping, ductwork and equipment layout shall be submitted on a scale 1/4"=1'-0" drawings, and shall be coordinated and signed by all trades.
Shop drawings shall show location of all existing and new equipment, existing work and new work.
Submit reproducible "as-built" record drawings for building files at completion of the project, to include ductwork, piping, and equipment drawings. Scale 1/4"=1'-0".

Ducting & air distribution work:
Except as noted, all ductwork and other sheet metal work shall be in accordance with latest edition of sheet metal and air conditioning contractor's national association, Inc. (SMACNA). "duct manual and sheet metal construction for ventilating and air conditioning systems. section 1 - low velocity systems". Metal gauge as per SMACNA recommended guidelines.

All ductwork shall be galvanized sheet steel unless otherwise noted:
Minimum ductwork static pressure construction shall be 2 in. W.G. All ducts shall be seal class 'a'. Duct flange systems shall be bolted at corners, with corner inserts, nuts shall be welded, not crimped and be integral with stiffeners.

It shall be this contractor's responsibility to size all ductwork (run-outs not already sized), registers, grilles, etc. The ductwork shall be sized utilizing the equal friction method while not exceeding 0.1" per 100 feet static pressure to ensure a relatively quiet system.
Noise criteria for the above applications shall not exceed 30.

Duct connections to air terminals may be made with flexible duct such that the length of the flex ducts does not exceed 5'-0".
Volume dampers: galvanized steel, per SMACNA "low velocity manual", except provide bearing at one end of damper rod and quadrant, with lever and locks crew at another end. For insulated ducts, quadrants mounted on collar to clear insulation, install with levers accessible. Balancing dampers shall be the opposed blade type.

Access doors: insulate or un-insulated, same as duct.
Provide minimum access door on main duct & location where fire dampers are installed. Access door shall be enough of duct cleaning & damper servicing.

All access doors to be hinged and sealed as per IMC sealing requirements.
Flexible connections: neoprene coated fabric, 30 oz. Per sq. Td. With sewed and cemented seams, like vent fabrics. Provide flexible connections between all equipment and rigid ductwork.
Turning vanes: galvanized steel, small double thickness vanes with minimum 2" inside radius.

Thermal and sound insulation
All materials of insulation shall be of the kind and quality as manufactured by armstrong, certain-teed, johns-manville, knauf, owens-corning and pittsburgh. All material and equipment specified to be insulated shall be thoroughly tested and approved prior to applying the insulation and method of application shall be as follows: the insulation shall be ul approved and is to meet or exceed nfpa90a and b requirements.
Thermal and sound insulation application and material:

1. All supply and return air ductwork located within the upper level ceiling cavities and in chases at exterior locations, and in all other areas where ductwork is exposed, they shall be insulated with two-inch (2") thick, three-quarter pound (3/4 lb.) Density glass fiber with a reinforced foil / kraft (frk) vapor retarder facing.

2. All furnace return air plenums and ductwork approximately ten feet (10') away from furnace inlet shall be lined with one-half inch (1/2") thick, three-pound (3 lb.) Density glass fibre sound insulation. The insulation shall have a black pigmented high velocity (+4000 fpm) facing set to the air stream side. Lined sizes are not indicated on drawings.

3. All refrigerant suction lines shall be covered with three-eighth inch (3/8") thick closed cell insulation.

Registers & grills:
All terminals (registers and grilles) shall be sized based on the following criteria:
Supplies — near ceiling 500 to 600 fpm velocity
— at or near floor 300 to 500 fpm velocity
Returns — high 600 to 700 fpm velocity
— low 300 to 500 fpm velocity

All Grills/registers finish/colour shall to be approved by Architects. Contractor shall provide data sheet to Architects for approval.
All selected air terminals (grills/register) pressure drop shall not exceed 10 Pa.
Supply Air grill for duct/wall mounting, titus or equivalent of sizes as mentioned in drawing/schedule with Opposed blade damper. Selected
Return Air grills for duct/wall mounting, titus or equivalent of sizes as mentioned in drawings/schedule with opposed blade damper.

Furnace and domestic hot water heater vents:
It shall be the contractor's responsibility to locate and size all class "b" furnace vents, coordinate location with architectural layout. Install in accordance with all equipment manufacturer's recommendations and installation requirements.
All flues to be class "b", double wall, extend a minimum of 3'-6" above the roof, and have tall cone flashings and storm collars. Coordinate flue requirements for domestic hot water heaters with plumbing contractor

Equipment

1. The equipment listed in schedule is to be used as a guide. Equipment of equal performance, construction, suitability of use, guarantees, warranties, etc. May be substituted upon approval of the general contractor and engineer.
2. All equipment/devices shall be new and of first rate quality (unless otherwise specified) and is to bear the appropriate aga, csa or ul approved labels, listings, and certifications for the specific design purpose.

Exhausts

1. Vent all toilet exhaust fans out through roof or side wall with vent cap, built-in grills, backdraft damper and bird screen.
2. Vent all kitchen exhaust fans out through roof or side wall with vent cap, built-in backdraft damper and bird screen.

Condensing units

All condensing units to be located as shown in drawings. Condensing unit shall be provided with 6" thick pedestal or on factory fabricated equipment mounting rails. Minimum service clearance of 24" or as suggested by manufacturer shall be provided. 4' x 4' pads of vibration isolation material by "korafund" under four points of support.

Fresh air intake
Outside air intakes shall be 10'-0" above grade and a minimum of 15'-0" from all exhaust air or relief opening and sources of contamination. Fresh air intake louver or duct shall have damper to control the fresh air flow rate.

Piping
A. Condensate drain lines shall be by done by HVAC contractor to nearest plumbing drain or as suggested/approved by Architect. All materials shall be as accepted by code and applicable to its use.
B. Refrigerant line set piping shall be copper type k. All joints to be brazed.

Gas piping
Provide and arrange for all new natural gas services extending from the main service to each item of equipment requiring gas service necessary: furnace, appliance, device & domestic water heater. Include all regulators, valves, fittings, etc., required for a first-class installation in accordance with A.G.A. And gas company requirements.

All underground gas piping shall be wrapped in accordance with guidelines set by local utility, tape coat cold tar tape or equal.
Gas piping lines shall be new-class a-120, black carbon steel, schedule 40 with 150# malleable screwed fittings. Unions shall be 150# malleable iron with brass ground joints. Each gas connection to utilize a cock, union, and dirt pocket.

All connections to the various gas-fired equipment shall be complete with gas cocks, unions and dirt pockets.
Follow all rules, regulations and guidelines as stipulated by the American Gas Association, in addition to the local gas utility, people gas.
This contractor shall be responsible for all gas piping sizing. Verify all items to be connected with the architect and mechanical drawings prior to sizing.

Temperature controls
A. All temperature controls, wiring, etc. Shall be by this contractor. Each piece of equipment shall be wired as instructed by a manufacturer's guide and or representative.
B. All control wiring to be installed in conduit.
C. Coordinate line voltage requirements with the electrical contractor.
D. Items are to be controlled by twelve split systems for furnaces and condensing units.
E. Each installation shall be complete in all aspects and tested for proper operation.

Disconnects and starters
This contractor shall furnish starters, contacts, disconnects, etc. For his equipment for installation by the electrical contractor. This contractor shall coordinate all work and locations of HVAC equipment with the electrical contractor.
All interconnecting wiring at unit shall be factory prewired and require only one power connection to the unit by the electrical contractor. Disconnect switch shall be by the electrical contractor.

Contractor to submit data sheets for all HVAC equipment for rough-in inspection. Shop drawings and equipment submittals must be submitted and approved before any installation takes place. Submit catalogue cut sheet, for the equipment specified, to the architect/engineer for approval prior to the beginning of construction. The contractor shall also assemble printed instructions for the operation and maintenance of each item installed and bind together with equipment cuts and control wiring diagrams.

Miscellaneous
All cutting, coring, and patching shall be by this contractor. Coordinate locations of roof penetrations with the general contractor. All penetrations through foundations and concrete slabs shall be sleeved.

All penetrations through fire-rated assemblies shall be sealed tight with an approved fire stop material, 3m cp 25wb+ caulk or equal.
Utilize isolation methods to prevent the migration of noise created by vibration. Methods include utilization of vibration isolation hangers, pads and flexible duct connections on the furnaces and rooftop packaged HVAC equipment.

The engineer shall not have control over or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures or safety precautions and programs about the work, since they are solely the contractor's responsibility under the contract for construction.

Balancing specification
Balance all air systems:
1. Test and balance HVAC air systems to within +10%, -5% of design flows.
2. Check all fans, instrumentation devices, control devices, dampers, etc., for proper operation and calibration. Report deficiencies which cannot be corrected. Mark and lock manual volume dampers at their proper position.
3. Adjust, test and confirm design air flow rates, pressures, temperatures, air quantities, equipment speed and motor amperages (all phases) for each segment branch, and component of each system.
4. Verify that registers/grills discharge patterns have been properly set. Air flows shall be balanced with the volume dampers installed in branch ductwork or with OBD provided for air terminals. Opposed blade dampers (OBD) in the air terminals shall be set in the fully open position during balancing.
5. Adjustments and tests shall be made under simulated maximum load conditions
6. Perform test per AABB national standards or equivalent NEBB methods.
7. Contractor shall provide air balancing report from (building approved) air balancing company. Balance all outlets to air quantities as noted on drawings
8. Prepare report, including forms, and submit to owner's facilities manager.

HVAC Legends
1. S -Supply 2. RAD-Return Air duct 3. SAD-Supply Air duct 4. FAD-Fresh Air duct 5. EAD-Exhaust Air duct 6. FLAP-Flue Air pipe 7. CFm - ft3/min 8. SAG-Supply Air Grille 9. RAG-Return Air Grille 10. OBD-Opposed blade damper 11. GF-Gas furnace 12. EXF-Exhaust fan 13. ODC-Out door condenser 14. RD-Radiator 15. HS-Heating Supply Air 16. CS-Cooling Supply Air 17. FD-Fire damper 18. CD-Control damper 19. RVC-Roof vent cap

2 HVAC Legend
1 : 100

Sheet List	
Sheet Name	Sheet Number
HVAC Notes & Legends	M.000
HVAC Basement & Roof plan	M.001
HVAC 1st & 2nd Floor plan	M.002

1 HVAC Notes
12" = 1'-0"

Ventilation & Air distribution schedule

Level	Name	Area	Max occupancy	Ventilation Air	Specified Lighting Load per area	Specified Power Load per area	Heating Supply Air	Cooling Supply Air	Heating Return Air	Cooling Return Air	Exhaust Air
1st Floor											
1st Floor	Bed room1	114 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	180 CFM	110 CFM	180 CFM	110 CFM	
1st Floor	Bed room 2	128 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	70 CFM	110 CFM	70 CFM	110 CFM	
1st Floor	Toilet 3 & 6	54 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
1st Floor	Bed room 6	142 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	120 CFM	140 CFM	120 CFM	140 CFM	
1st Floor	1F Corridor	168 SF	0	0 CFM	1.00 W/ft²	0.00 W/ft²	130 CFM	110 CFM	130 CFM	110 CFM	
1st Floor	Bedroom 5	117 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	140 CFM	100 CFM	140 CFM	100 CFM	
1st Floor	Bed room 4	137 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	220 CFM	130 CFM	220 CFM	130 CFM	
1st Floor	Toilet 1	37 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
1st Floor	Toilet 2	37 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
1st Floor	Toilet 5	40 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
1st Floor	Toilet 4	35 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
1st Floor	Bedroom 3	120 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	90 CFM	110 CFM	90 CFM	110 CFM	
2nd Floor											
2nd Floor	Bedroom 7	99 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	120 CFM	110 CFM	120 CFM	110 CFM	
2nd Floor	Bedroom 8	99 SF	2	15 CFM	1.00 W/ft²	0.75 W/ft²	100 CFM	110 CFM	100 CFM	110 CFM	
2nd Floor	Toilet 7	38 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
2nd Floor	Toilet 8	38 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
2nd Floor	Storage	65 SF	0	0 CFM	1.00 W/ft²	0.75 W/ft²	100 CFM	170 CFM	100 CFM	170 CFM	
2nd Floor	Living	227 SF	8	60 CFM	1.00 W/ft²	0.75 W/ft²	270 CFM	280 CFM	270 CFM	280 CFM	
2nd Floor	Dining 1	410 SF	18	135 CFM	1.00 W/ft²	0.75 W/ft²	240 CFM	550 CFM	240 CFM	550 CFM	
2nd Floor	Toilet storage	37 SF	0	0 CFM	0.00 W/ft²	0.00 W/ft²	0 CFM		0 CFM		50 CFM
Grand total: 20		2142 SF	42				1780 CFM				

Air Terminal Schedule

Connection size	Mark	System Type	Flow	Damper	Grill level
1F					
14"x6"	RAG-06	Return Air	110 CFM	OBD	1F
14"x6"	RAG-07	Return Air	110 CFM	OBD	1F
14"x6"	RAG-03	Return Air	140 CFM	OBD	1F
24"x6"	RAG-01	Return Air	220 CFM	OBD	1F
14"x6"	RAG-02	Return Air	140 CFM	OBD	1F
24"x6"	RAG-04	Return Air	180 CFM	OBD	1F
2F					
24"x6"	RAG-08	Return Air	120 CFM	OBD	2F
24"x6"	RAG-09	Return Air	280 CFM	OBD	2F
14"x6"	RAG-10	Return Air	170 CFM	OBD	2F
1F					
18"x6"	SAG-04	Supply Air	180 CFM	OBD	1F
12"x6"	SAG-05	Supply Air	130 CFM	OBD	1F
12"x6"	SAG-06	Supply Air	110 CFM	OBD	1F
12"x6"	SAG-07	Supply Air	110 CFM	OBD	1F
12"x6"	SAG-02	Supply Air	140 CFM		1F
18"x6"	SAG-01	Supply Air	220 CFM	OBD	1F
12"x6"	SAG-03	Supply Air	140 CFM		1F
2F					
12"x6"	SAG-08	Supply Air	120 CFM	OBD	2F
18"x6"	SAG-10	Supply Air	170 CFM	OBD	2F
12"x6"	SAG-09	Supply Air	110 CFM	OBD	2F
18"x6"	SAG-11	Supply Air	275 CFM	OBD	2F
18"x6"	SAG-12	Supply Air	275 CFM	OBD	2F
12"x6"	SAG-13	Supply Air	140 CFM	OBD	2F
12"x6"	SAG-14	Supply Air	140 CFM	OBD	2F

Heating and Cooling Equipment:

GF-01 RESIDENTIAL HEATING/COOLING "CARRIER" AS STANDARD, 95% or higher -EFFICIENCY UPFLOW/HORIZONTAL FURNACE.
with (LOCATION: BASEMENT) OUTPUT CAPACITY - 70,000 Btu/hr with minimum TEMP. RISE 20 F. AIR FLOW - 1800 CFM @ 1.8" ESP. Unit shall be supplied with factory supplied filters & shall be suitable for low temperature installation

GAS Furnace shall be fitted with cased evaporator suitable for horizontal/vertical mounting with capacity 5 TR. Coil face velocity shall not exceed 500 fpm. Coil shall be supplied with TX valve suitable with connected outdoor unit.

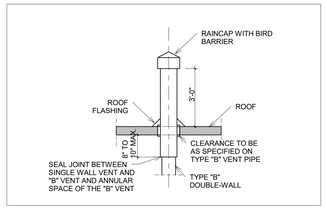
Carrier as standard Variable speed condenser using R 410 refrigerant of capacity 5 TR. Unit shall supplied with all necessary accessories to install in low temperature conditions.

Thermostat suitable for both cooling & heating application shall be supplied.

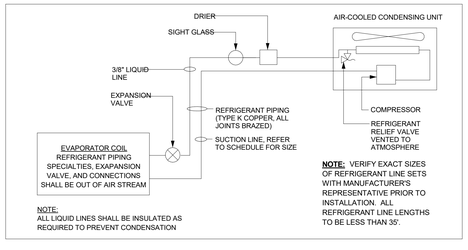
TYPICAL TOILET EXHAUST FANS:

EXF-01 "COOK" GC series as standard exhaust air fan with factory supplied ceiling grille and non return damper of capacity 50 CFM (BATHROOMS) S.P. 0.25 W.G., with direct driven 1 phase EC motor, interlock with light switch

3 Equipment detail
12" = 1'-0"



4 Flue Termination
NTS



5 Refrigeration Detail
NTS

FYF LLC.
Owner: FYF LLC.
43 S Water St E | Fort Atkinson, WI
ilovefunkys@hotmail.com

Zenteno Solutions
Plumbing Designer: Zenteno Solutions
1530 P B Lane # 24646
WICHITA FALLS, TX, 76302
roberto@zenteno.net | 832.449.9278

Desapex
#1075-B, 10th main, HAL 2nd stage, Bengaluru -08
HVAC Designer: Desapex
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openingdesign
Architect: OpeningDesign
312 W. Lakeside St. | Madison, WI 53715
hello@openingdesign.com | 773-425-6456

Date	Description
05.03.2017	Issue for Permit

HVAC Notes & Legends
Lake Geneva | Enter address here

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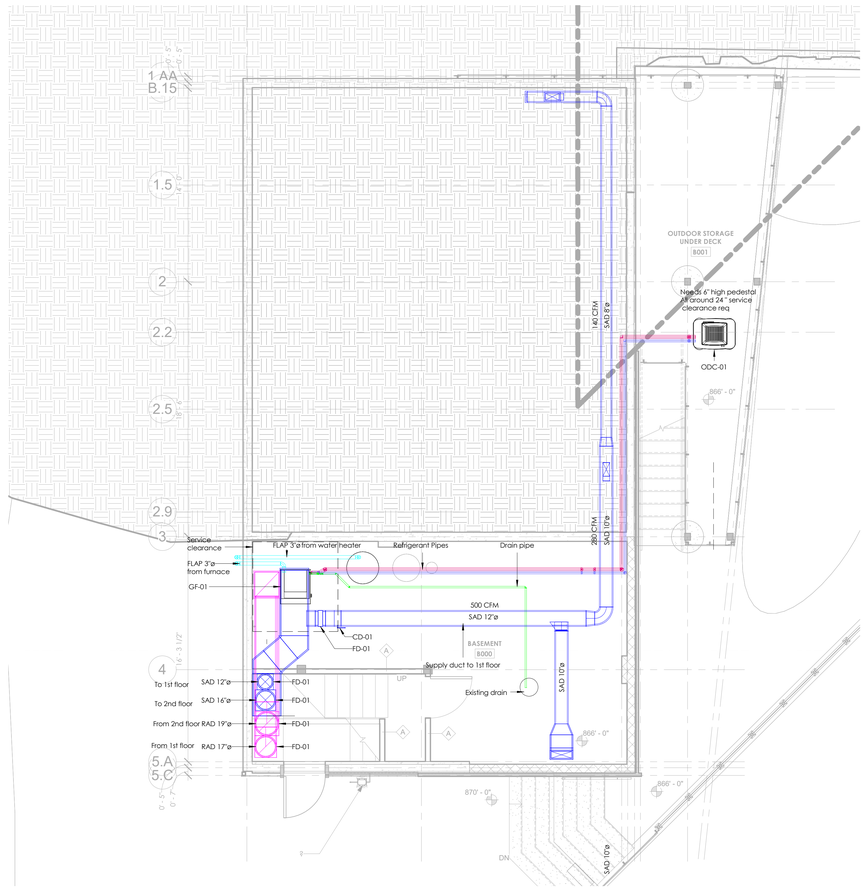
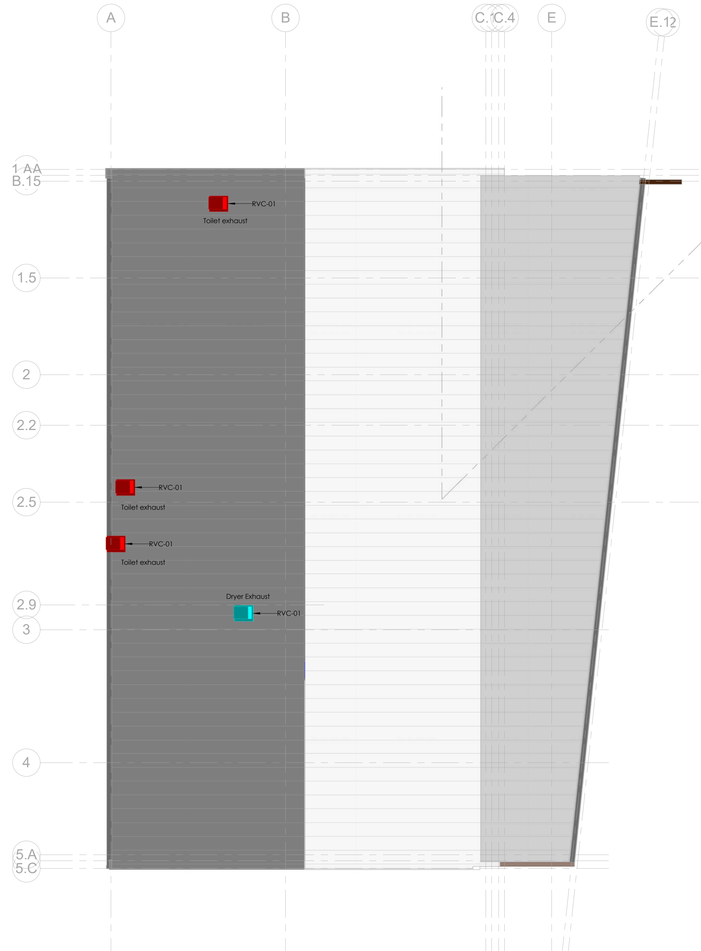


1 Basement
1/4" = 1'-0"



2 Floor plan Roof
1/4" = 1'-0"

FYF LLC.

Owner: FYF LLC.
43 S Water St E | Fort Atkinson, WI
ilovefunkys@hotmail.com

Zenteno Solutions

Plumbing Designer: Zenteno Solutions
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Desapex

#1075-B, 10th main, HAL 2nd stage,
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HVAC Basement & Roof plan
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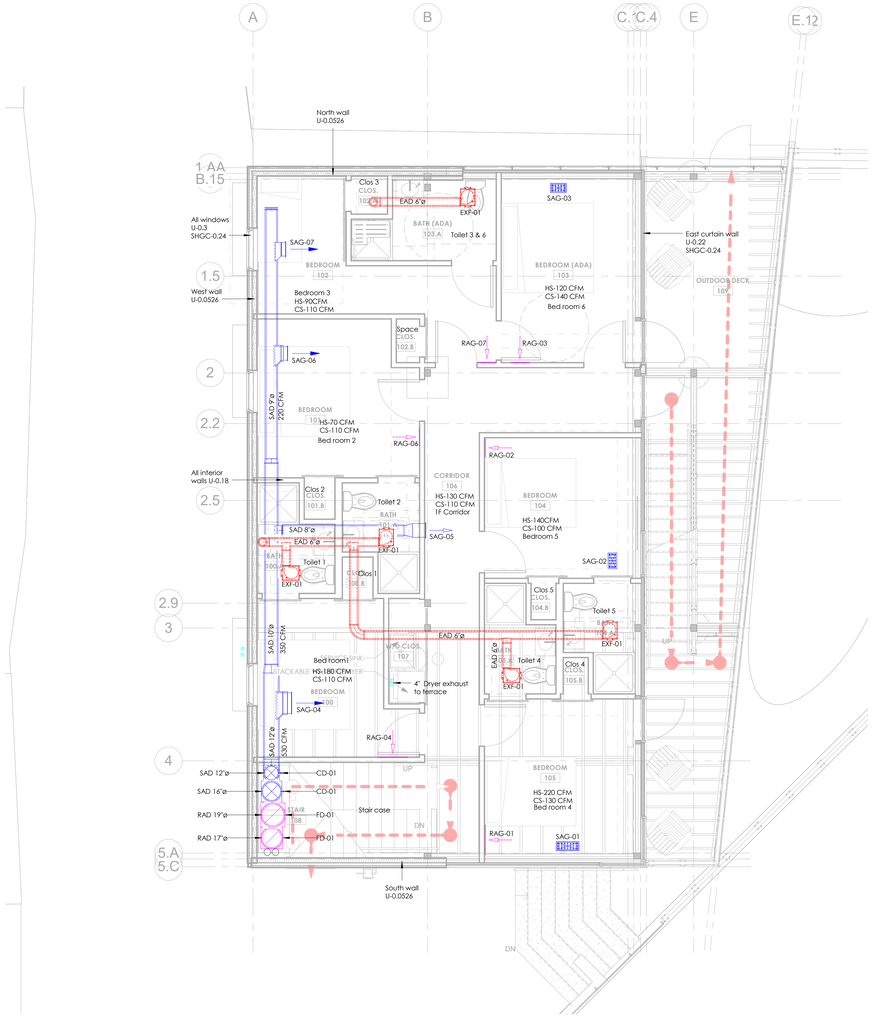
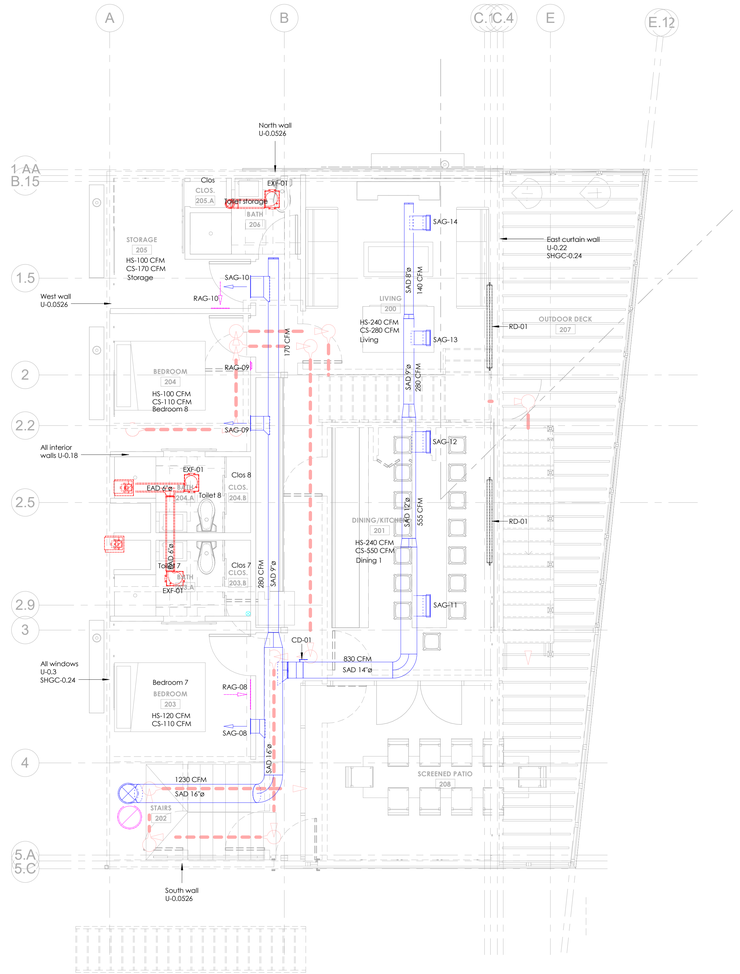


1 1st Floor
1/4" = 1'-0"



2 2nd Floor
1/4" = 1'-0"

FYF LLC.
Owner: FYF LLC.
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ilovefunkys@hotmail.com

Zenteno Solutions
Plumbing Designer: Zenteno Solutions
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HVAC 1st & 2nd Floor plan
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