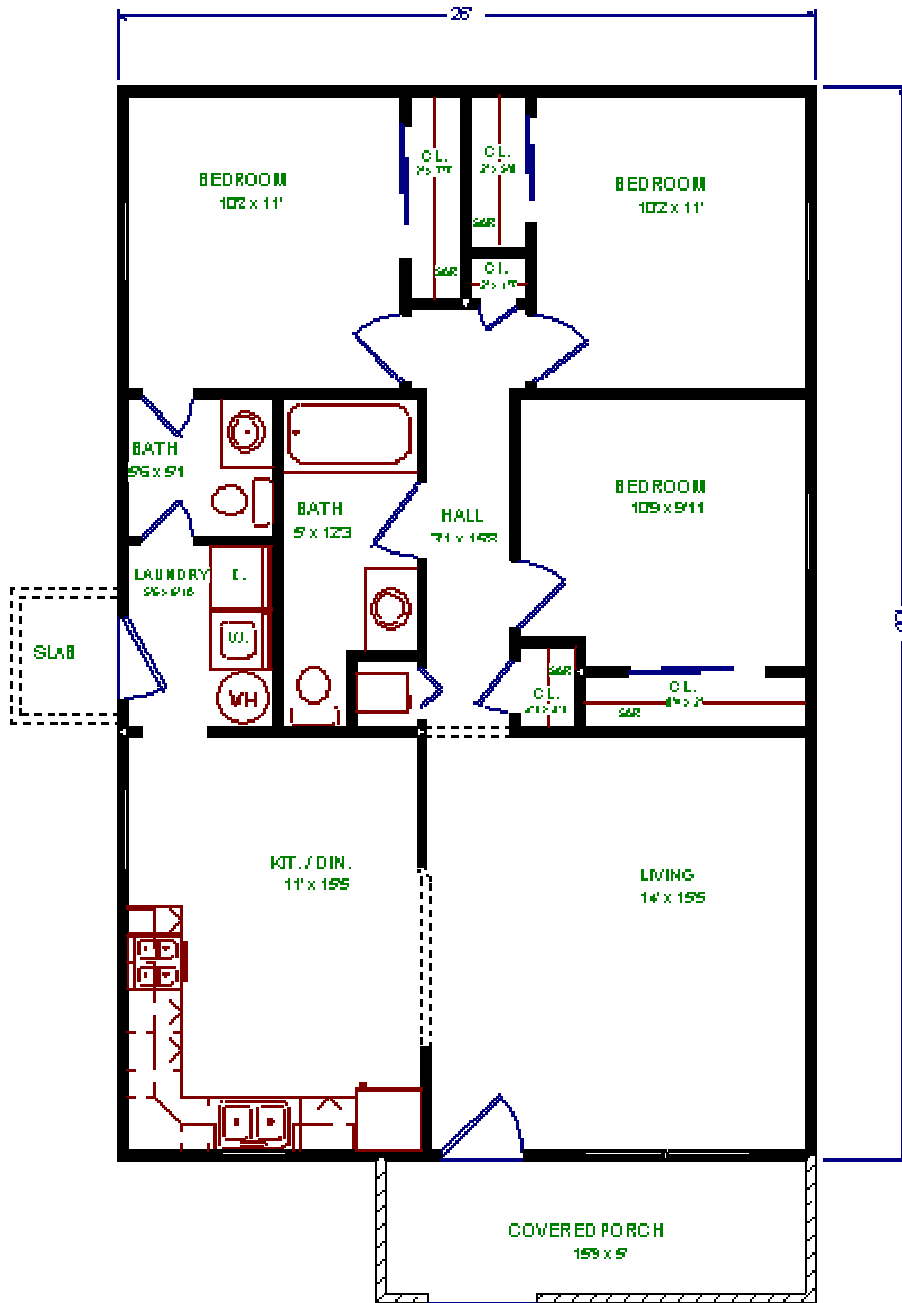


Project #3: Residential HVAC System Design

Due Tuesday, 29 November 2005

The objective of this project is to design the HVAC system for a low-income residence. You may work in teams of up to three students.

The building has the following floor plan and is located in suburban Washington, D.C.



PLAN# 1040-3A1

Heating and cooling loads for each room of the residence have been calculated and are summarized in the following table.

Room	Heating Load (Btu/hr)	Sensible Cooling Load (Btu/hr)
Living Room	7138.5	5353.8
Kitchen	5661.5	4246.2
Bedroom 1	5000.0	3750.0
Bedroom 2	4600.0	3450.0
Bedroom 3	4600.0	3450.0
Bathroom 1	2692.3	2019.2
Bathroom 2	1015.4	761.5
Laundry Room	<u>1292.3</u>	<u>969.2</u>
	32,000	24,000

Notes:

- The loads associated with the closets and hallway have been integrated into the other rooms. You should not deliver supply air to the hallway.
- Note that you may need more than one diffuser in some of the rooms
- In the text example, supply outlets in the kitchen and bathroom were integrated into the base of the cabinetry. It is also quite acceptable to have diffusers in the floor.
- The room dimensions, somewhat legible in the figure, are give interior room dimensions.
- Assume that the house has a crawl space and that both the ductwork and HVAC equipment are in the crawl space. The furnace is installed horizontally and has a total length, including the cooling coil, of 60 inches.
- You should use a standard size of 12" x 2.5" for outlet diffusers.
- The return grilles should be mounted on the wall at floor level and have a size of 12"x6".
- Your return duct system should have at least two return grilles – one in the living room or kitchen and at least one in, or near, the bedrooms, possibly in the hallway.

Your task for this project is to design a supply and return duct system to deliver 1200 cfm with a total duct system pressure drop of no more than 0.15 inWG (inches of water):

Feel free to email me (michael.brandemuehl@colorado.edu) a pdf file of your layout before November 23 for feedback on the placement of diffusers and overall layout of your system.

Deliverables

Your submittal should take the form of a technical report. Your report should include the following elements:

1. A one-page summary giving project objective and overall conclusions.
2. A step-by-step description of your design methodology.
3. Detailed calculations used to determine your design.
4. Calculations of the actual pressure drop through the designed duct system.
5. A one-line drawing showing the supply and return duct layout and all. Fittings should be labeled on the drawing.
6. A scaled drawing, with sizes and flows, of your supply and return duct system design.

Project #3 Evaluation

Names: _____

Overall Presentation _____ /10

Organization
Grammar and Writing

Supply Duct System Layout _____ /15

Overall layout
Diffuser placement
Fitting selection
Drawing

Return Duct System Layout _____ /15

Overall layout
Grille placement
Fitting selection
Drawing

Supply Duct System Sizing _____ /30

Methodology
Effective length calculations
Available pressure calculations
Branch duct size calculations
Trunk duct size calculations
Drawing

Return Duct System Sizing _____ /25

Methodology
Effective length calculations
Available pressure calculations
Branch duct size calculations
Trunk duct size calculations
Drawing

System Pressure Drop Calculation _____ /5

Calculations

Total: _____ /100