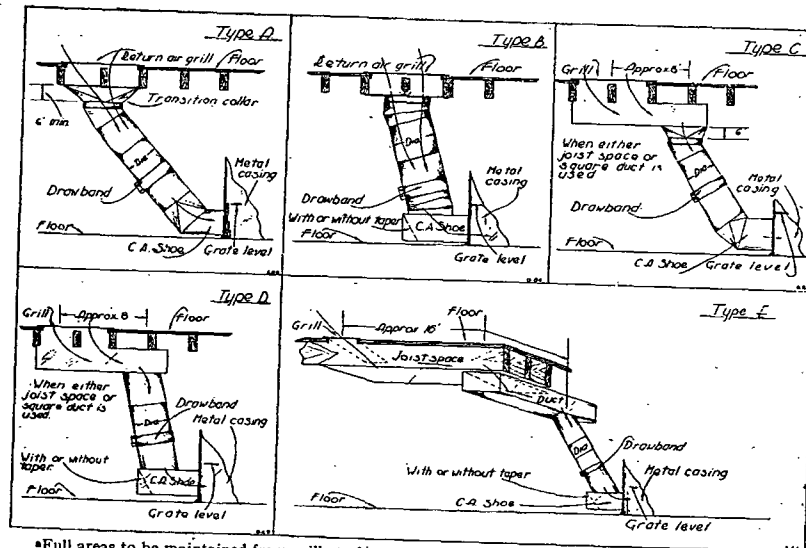


Design Procedure

The steps to be taken in designing a gravity warm air duct system are:

1. Calculate the heat loss from each room as explained in Chapters 4, 5 and 6.
2. Prepare a layout showing (a) furnace, (b) chimney connection, (c) warm air registers (whether floor, base board or wall), (d) return air grilles.
3. Indicate on each warm air run (using symbols shown in Fig. 4). (a) whether the room to be heated is on the first or second story, (b) the approximate length of leader



*Full areas to be maintained from grille to furnace.

FIG. 3. RETURN AIR COMBINATIONS^a

Notes:

- Type A return air is direct from grille to casing, using transition collar and transition type C. A shoe.
 Type B same as A, but without transition fittings (capacity for same size grille and pipe 84 per cent of A).
 Type C uses joist space or square duct and transition fittings (capacity for same size grille and pipe 84 per cent of A).
 Type D same as C, but without transition fittings (capacity for same size grille and pipe 69 per cent of A).
 Type E uses both joist space and square duct, without transition fittings (capacity for same size grille and pipe 44 per cent of A).

pipe in the basement, (c) the number of right angle elbows required, including the elbow at the boot connection. (Consider each 45 deg elbow as equal to $\frac{1}{2}$ of 90 deg elbow, consider the two sharp 90 deg elbows in a cross-over connection as equivalent to three 90 deg elbows), (d) whether the register is to be located in the floor, in the baseboard, or in the wall.

4. Show the number and proposed locations of return air grilles and the type of return air system (see Fig. 3).

5. From Table 6, for first story, or from Table 7 for second story, select the unit number for the warm air system which will supply the heat required to each room, with the number of elbows and length of leader pipe previously determined. Then, using the unit number as found, read directly in Tables 2, 3, or 4 the leader, stack, and register sizes required.

6. From Table 8 select the unit number for the return air system to correspond with

CHAPTER 19. GRAVITY WARM AIR FURNACE SYSTEMS

TABLE 6. WARM AIR CARRYING CAPACITY, BTU DELIVERED, FIRST STORY REGISTERS^{a,b,c}
Length of Leader Pipe—in Feet

UNIT NO.	No of ELBOWS	4 FT	6 FT	8 FT	10 FT	12 FT	14 FT	16 FT	18 FT	20 FT	22 FT	24 FT
1	1	6,020	5,850	5,680	5,510	5,340	5,170	5,000	4,830	4,660	4,490	4,320
2	2	7,620	7,360	7,180	6,970	6,760	6,540	6,320	6,110	5,890	5,680	5,460
3	3	9,400	9,090	8,870	8,600	8,340	8,070	7,810	7,540	7,270	7,010	6,740
4	4	13,550	12,970	12,590	12,210	11,830	11,450	11,080	10,700	10,320	9,950	9,560
5	5	17,520	16,530	16,530	16,040	15,550	15,060	14,550	14,050	13,560	13,060	12,560
1	1	5,850	5,660	5,490	5,330	5,160	5,000	4,840	4,670	4,510	4,340	4,180
2	2	7,360	7,150	6,940	6,730	6,520	6,320	6,110	5,910	5,700	5,500	5,290
3	3	9,090	8,840	8,580	8,320	8,060	7,800	7,550	7,290	7,040	6,780	6,520
4	4	12,910	12,540	12,170	11,800	11,430	11,060	10,690	10,320	9,950	9,580	9,210
5	5	16,940	16,450	15,990	15,500	15,040	14,550	14,080	13,600	13,120	12,650	12,150
1	1	5,620	5,460	5,310	5,150	4,990	4,830	4,670	4,510	4,350	4,190	4,030
2	2	7,120	6,910	6,710	6,510	6,310	6,110	5,900	5,700	5,500	5,300	5,100
3	3	8,780	8,530	8,280	8,030	7,780	7,530	7,280	7,040	6,800	6,550	6,300
4	4	12,450	12,100	11,750	11,400	11,050	10,700	10,350	10,000	9,650	9,300	8,950
5	5	16,360	15,900	15,440	14,970	14,510	14,050	13,600	13,130	12,660	12,200	11,750
1	1	5,420	5,260	5,110	4,960	4,800	4,650	4,500	4,350	4,190	4,040	3,890
2	2	6,860	6,660	6,460	6,270	6,080	5,890	5,690	5,500	5,300	5,110	4,910
3	3	8,460	8,200	7,980	7,740	7,500	7,260	7,020	6,780	6,550	6,310	6,070
4	4	12,010	11,670	11,330	10,990	10,650	10,310	9,970	9,630	9,290	8,950	8,610
5	5	15,770	15,320	14,880	14,420	13,980	13,540	13,100	12,650	12,200	11,750	11,310
1	1	5,240	5,090	4,940	4,790	4,640	4,500	4,350	4,200	4,050	3,910	3,760
2	2	6,630	6,440	6,250	6,060	5,880	5,690	5,500	5,320	5,130	4,940	4,750
3	3	8,180	7,950	7,720	7,490	7,260	7,030	6,800	6,560	6,330	6,100	5,860
4	4	11,610	11,290	10,950	10,620	10,300	9,970	9,640	9,320	8,990	8,660	8,320
5	5	15,250	14,800	14,380	13,950	13,520	13,090	12,650	12,230	11,800	11,370	10,940

^aTable 6 applies to baseboard and floor locations of warm air registers.

^bConsider each 45 deg elbow as equal to one-half of a 90 deg elbow.

^cConsider each 90 deg offset between boot and stackhead equal to one 90 deg round elbow.