Components of Building wastewater system
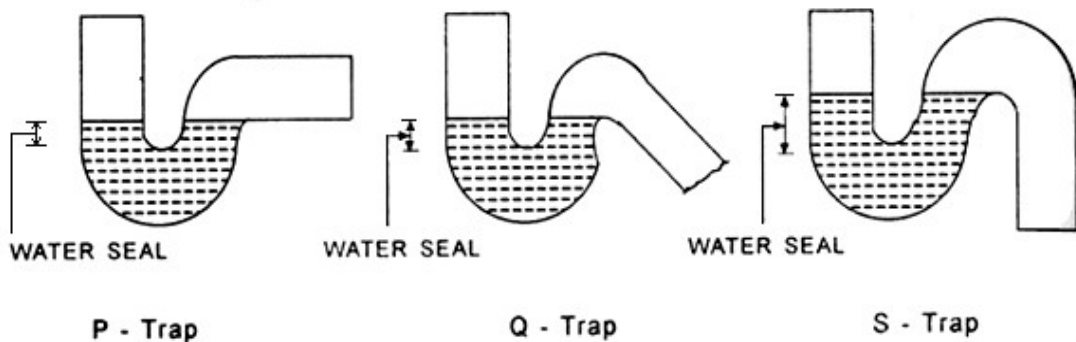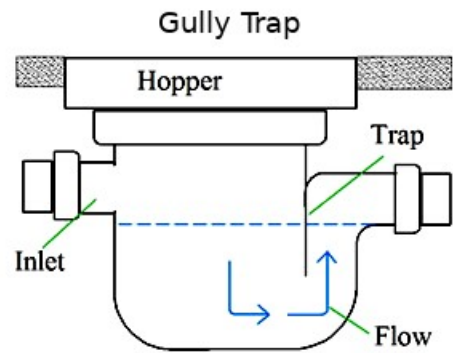
1. Fixtures
2. Traps
   - Floor Trap
   - Gully Trap
   - P-trap, q-trap, S-trap
   - … …
3. Branch pipes
4. Vertical pipes / Stack
   - Single stack system
   - One pipe system
   - Two pipe system
5. Building drain
6. Buidling sewer

Gully Trap

Hopper

Trap

Inlet

Flow

WATER SEAL   WATER SEAL   WATER SEAL

P - Trap   Q - Trap   S - Trap

Table 8.7.14
Fixture Units for Different Sanitary Appliances or Groups

Type of Fixture	Fixture Unit Value as Load Factors
One bathroom group consisting of water closet, wash basin and bath tub or shower stall :	
a) Flush Tank water closet	6
b) Flush-valve water closet	8
Bathtub*	3
Bidet	3
Combination sink and tray (drain board)	3
Drinking fountain	0.5
Floor traps†	1
Kitchen sink, domestic	2
Wash basin, ordinary‡	1
Wash basin, surgeon's	2
Shower stall, domestic	2
Shower (group) per head	3
Urinal, wall lip	4
Urinal, stall	4
Water closet, tank operated	4
Water closet, valve operated	8
* A shower head over a bath tub does not increase the fixture unit value.	
† Size of floor trap shall be determined by the area of surface water to be drained.	
‡ Wash basin with 32 mm and 40 mm trap have the same load value.	

Table 8.7.16 [BNBC]:
Maximum number of Fixture Units that can be Connected to Branches and Stacks

Diameter of Pipe (mm)	Maximum Number of Fixture Units that can be Connected			
	Any Horizontal Fixture Branch[a]	One Stack of 3 Storeys in Height or 3 Intervals	More than 3 Storeys in Height	
			Total for stack	Total at One Storey or Branch Interval
30	1	2	2	1
40	3	4	8	2
50	6	10	24	6
65	12	20	42	9
75	20	30	60	16
100	160	240	500	90
125	360	540	1100	200
150	620	960	1900	350
200	1400	2200	3600	600
250	2500	3800	5600	1000
300	3900	6000	8400	1500
375	7000	b	b	b

a Does not include branches of the building sewer.
b Sizing load based on design criteria.

Table 8.7.17 [BNBC]:
Maximum number of Fixture Units that can be Connected to Building Drains and Sewers

Diameter of Pipe (mm)	Maximum Number of Fixture Units that can be Connected to any Portion* of the Building Drain or the Building Sewer for Various Slopes			
	1/200	1/100	1/50	1/25
100	-	180	216	250
150	-	700	840	1000
200	1400	1600	1900	2300
250	2500	2900	3500	4200
300	2900	4600	5600	6700
375	7000	8300	10000	12000

* Includes branches of building sewer

Home Assignment:
After the class and
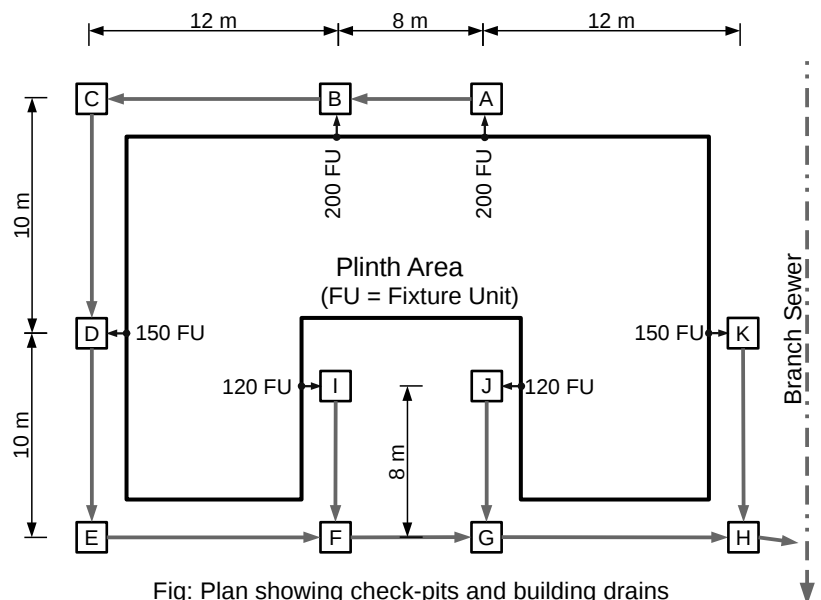Studying the following example
Do the same for the right Figure.

Fig: Plan showing check-pits and building drains

Example :

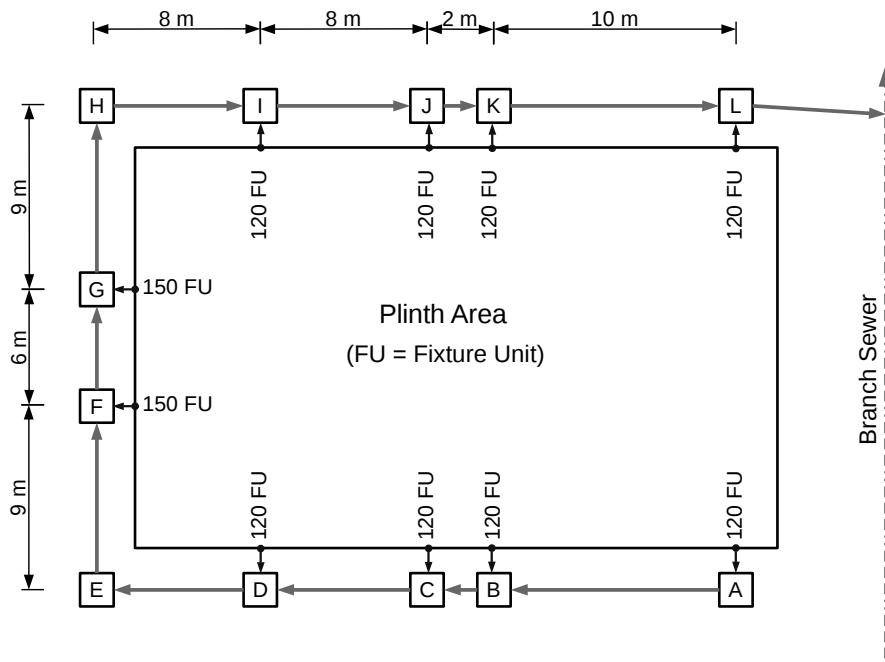Design the following building drains for the plan.

Fig: Plan showing check-pits and building drains

* Elevation of the last pit [L] is 0mm   * use the plan and BNBC Table 8.7.17 attached

Solution:

(- List all the pipes as in Column 1 & 2 and calculate the FU for each pipe from the figure.
- Determine the required diameter & slope of the pipe, comparing the FU from BNBC table 8.7.17
– Determine difference in elevation by multiplying slope and length.
– *Calculate the elevations in column 8 by adding or subtracting the difference.*
– *If calculations starts from the lowest check pit, the elevation-differences will be added;*
– *if calculation starts from the highest pit (A) than the difference should be subtracted to get the consecutive elevation.)*

1	2	3	4	5	6		7	8
Pipe	Length (m)	FU	Diameter (mm)	Slope	Difference in Elevation (mm)		Check-pit	Elevation mm
AB	10	120	150	1/100	100		A	585
BC	2	240	150	1/100	20		B	485
CD	8	360	150	1/100	80		C	465
DE	8	480	150	1/100	80		D	385
EF	9	480	150	1/100	90		E	305
FG	6	630	200	1/200	30		F	215
GH	9	780	200	1/200	45		G	185
HI	8	780	200	1/200	40		H	140
IJ	8	900	200	1/200	40		I	100
JK	2	1020	200	1/200	10		J	60
KL	10	1140	200	1/200	50		K	50
				Total:	585		L	0*

* *elevation value given in question. Calculation for elevation starts from this check-pit.*