

Low Slope roofing

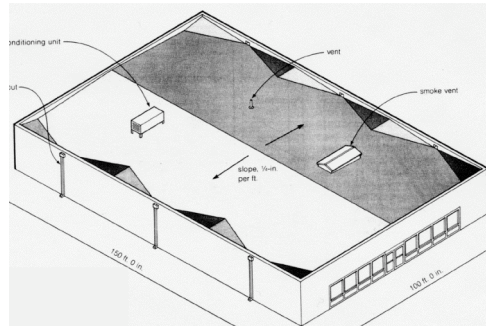
...not flat

Most common low-slope

B.U.R	Built-up Roof	\$204/square
Modified Bitumen		\$190/square
E.P.D.M	Ethylene Propylene Diene Monomer	\$173/square – adhered \$127/square - fastened \$121/square – ballasted
P.V.C.	Polyvinyl Chloride	\$200/square – adhered \$147/square - fastened \$140/square – ballasted
C.S.P.E.	Chlorosulfonated Polyethylene - Hypalon	\$208/square – adhered \$192/square - fastened \$180/square – ballasted

*R.S. Means 2003

- Not flat
- Usual slope is 1/4" per foot
- Must be drained.... And drained (need separately piped backup drains with inlets no more than 2" above primary roof drains)



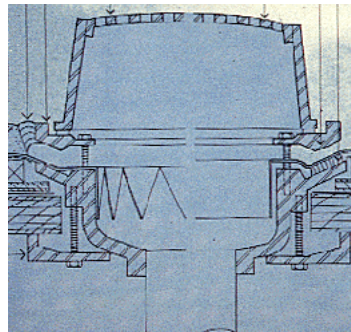
Roof Drains

-Locate in low points of roof...(NOT OVER COLUMNS!!!!!!!!!!!!!!)

- Strainer must project at least 4 inches above roof

-Strainer area must be at least 2 times the required drain pipe area

Some building codes require a **separately piped** overflow with an inlet **no more than 2 inches** above the primary drains



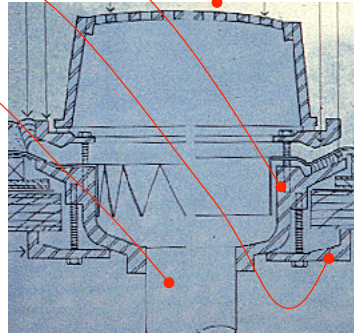
Roof Drain parts

Strainer (area twice the size of the drain pipe)

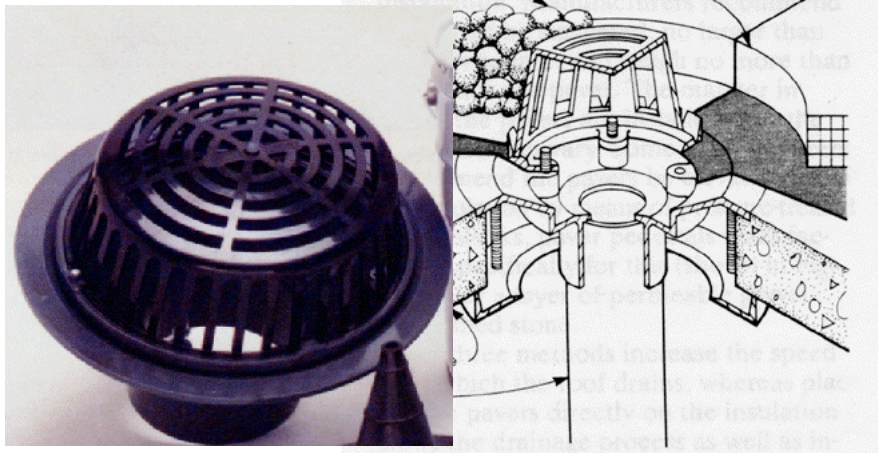
Hub or sump

Clamp to hold sump to roof deck

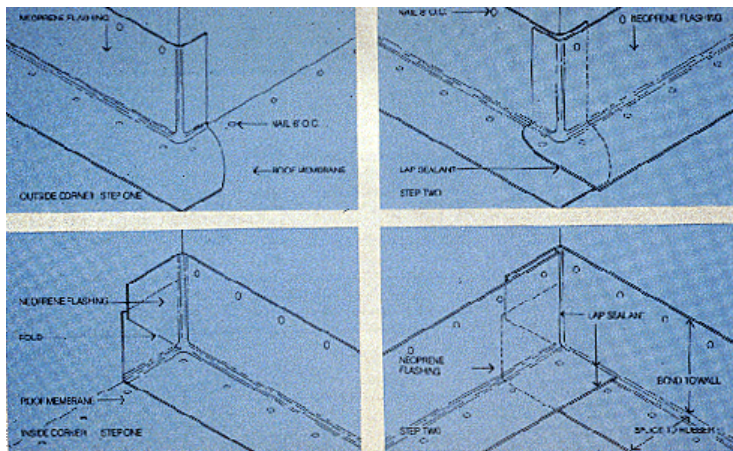
Drain pipe



Protective mat
Insulation board
Gravel ballast

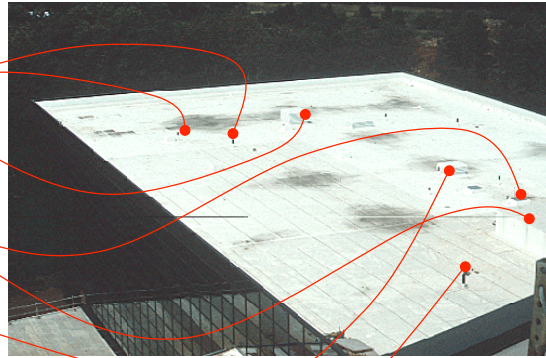




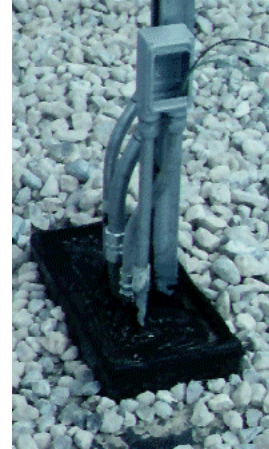
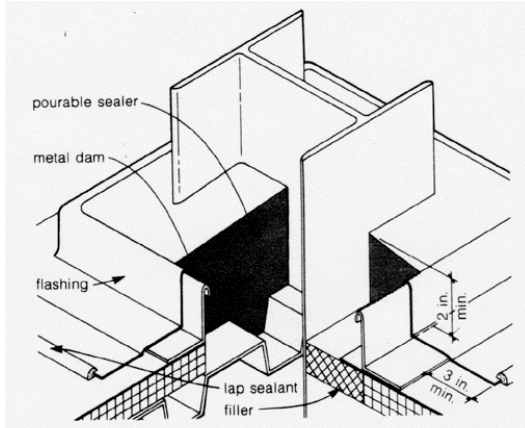


Full of holes

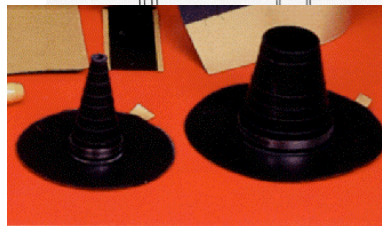
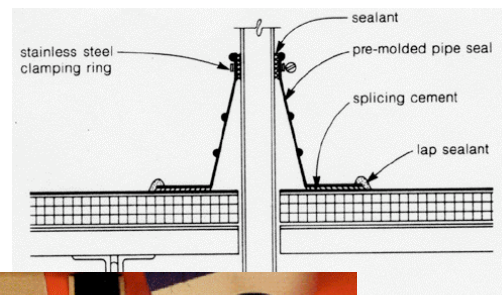
- Typical holes made for
 - Plumbing vents through the roof (VTR)
 - Power ventilators through the roof
 - Electrical power to ventilators
 - Roof access hatches
 - Mechanical penthouses
 - Supports for mechanical equipment (curbs)
 - Roof drains
 - Roof overflow drains



Pitch pan: A metal pan shaped enclosure (with a hole in the bottom) that is filled with a pourable sealant in the hope that it will flow around the irregular shape of the element(s) puncturing the roof. Should be filled to the top and sloped to run water away from the penetrations. Not desirable. Use large pipes and clamped boot/cones instead....usually leaks.



Cone shaped pipe boots

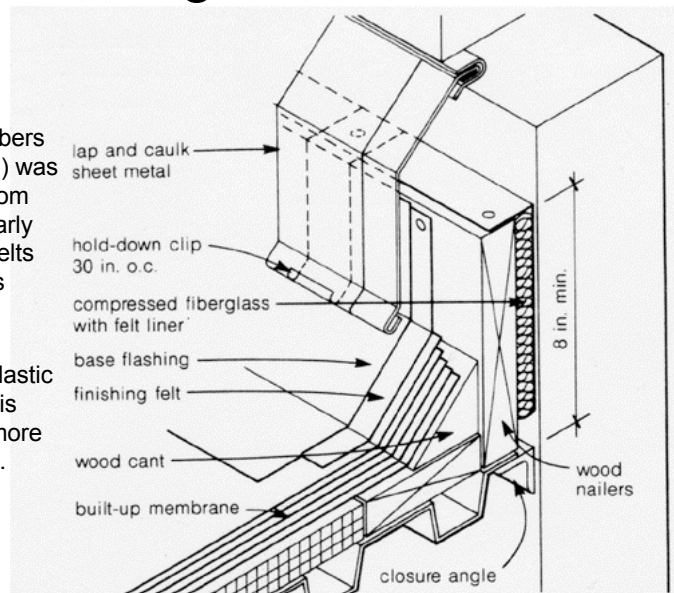


1970, beginning of change

- Oil embargo causes energy crisis
- Refineries get more gasoline out of each barrel, leaving the asphaltic bitumen with less plasticizers
- Increased insulation values in roofs meant the BUR wasn't as warm as before... we were pumping less heat through the roof

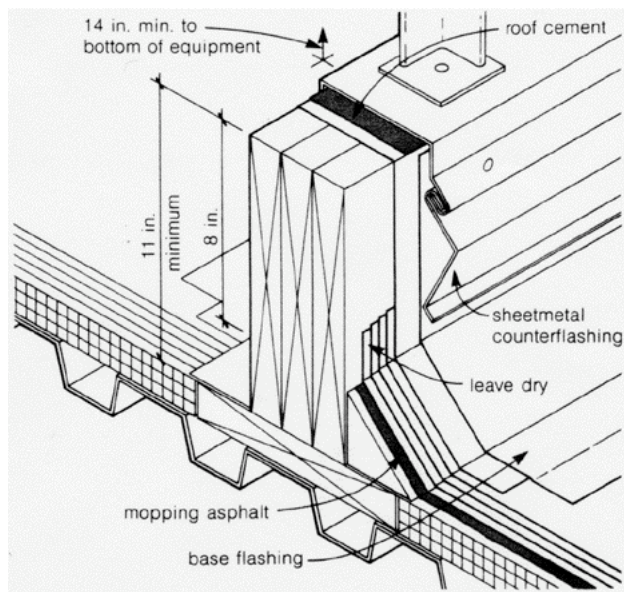
Watching them crack

- Asbestos fibers (reinforcing) was removed from the felts. Early fiberglass felts were not as flexible as asbestos.
- With less plastic bitumen, this produced more brittle roofs.



Stressed out roof

- Temperature changes (and internal flaws) were the major stresses for the BUR
- Even with carefully detailed joints to allow for movement the BUR's could fail in a rapid temp. change.
 - Chinook winds could change the temperature from -10 to + 50 in under six hours!
 - Jim Bofferding would take us up on roofs to watch them crack on Chinook days.



BUR & insulation

- BUR required insulation that wouldn't melt and would be compatible with the asphaltic bitumens – a mineral board or perlite board... but not much 'R' value per inch of thickness.
- Manufacturers offer foam plastic insulation with a mineral board adhered to the top to keep the foam from melting or breaking down in contact with the asphaltic compounds.