

OFFICE OF THE CHIEF ENGINEER & ADDL. SECY. PWD, RAJ.,
JAIPUR

No: CE(B)/SE(B)/PWD/468

Dated: 17.08.11

CIRCULAR

During inspection of building works, it has been observed that the Roof Terrace of existing buildings as well as newly constructed buildings is not being finished with proper slope, proper location and fixing of rainwater pipe, providing Khurra at the inlet of rainwater pipe, inside slope on the top of the parapet etc. These are very essential and important items and therefore the following guidelines are provided to follow in the field.

1. The top of the roof terrace should be provided with slope of 1 in 50 to drain the rainwater.
2. The location of rainwater pipes should be decided keeping in view the location of doors and windows and in such way that one rainwater pipe of dia 100 mm discharges the rainwater of roof area of 40 sqm. approximately. The spacing of the rainwater pipes can be taken as 6m. Approximately.
3. The top of coping provided on parapet should be provided inside slope towards roof terrace.
4. The Khurra of size 40 cm x 40 cm should be laid in cement concrete finished with 12mm cement mortar (1:3) at the inlet of each rainwater pipe.
5. The down take pipe should be provided with shoe and it should be 15cm above plinth protection.

To explain above guidelines, the copies of 3 sketches are enclosed herewith for ready references.

The field Engineers are directed to ensure the compliance of the above guidelines while finishing the Roof Terrace and fixing rainwater pipes.

Chief Engineer & Addl. Secy

Copy to following :

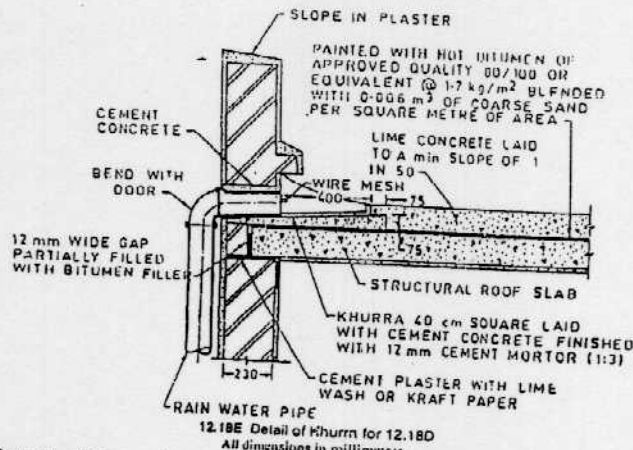
1. The Addl. Chief Engineer PWD Zone Ajmer -----(All)
2. The Superintending Engineer PWD Circle -----(All)
3. The Ex. En. PWD Dn. -----(All)

It is also requested to bring the above guidelines under the notice to all Asstt. Engineers under your control.

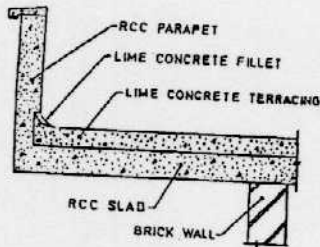
Chief Engineer & Addl. Secy

Handwritten notes on the left margin: 4951-54, 2/19/11, Sts & on why keys, LIA Slope, 10/11/11, circular

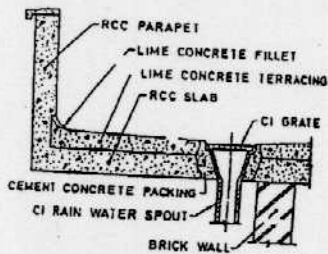
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12.18E Detail of Khurra for 12.18D
All dimensions in millimetres.
FIG. 12.18 TYPICAL DETAILS AT JUNCTION BETWEEN LIME CONCRETE WATERPROOFED ROOF FINISH AND PARAPET WALL — Concluded



12.19A Junction Between Roof Slab and RCC Parapet



12.19B Details of Roof Slab and Rain Water Pipe

FIG. 12.19 TYPICAL DETAILS AT THE JUNCTION BETWEEN LIME CONCRETE WATERPROOFED ROOF FINISH AND RCC PARAPET WALL

2.5 Finish

Roof finish should be as described in Chapter 11 using burnt clay flat terracing tiles to IS 2690 (Part 1) : 1993 and IS 2690 (Part 2) : 1992. However in extreme conditions where there is considerable expansion and contraction, two layers of tiles may be laid on the lime concrete; the tiles should be joined by non-shrinking impervious mortar by adding an integral waterproofing admixtures or 5 percent engine oil and finished neat.

To drain rainwater every 40 m² area of roof shall have a 100 mm dia rainwater pipe or as in Table 3 of IS 2527 : 1984 depending on the rainfall intensities of the locality.

3 BITUMEN FELT

3.1 General

Bitumen felt is one of the materials used for waterproofing of roofs. Waterproofing treatment with bitumen felt is adopted not only in the case of buildings and structures, but also in railway coaches, bus bodies, etc.

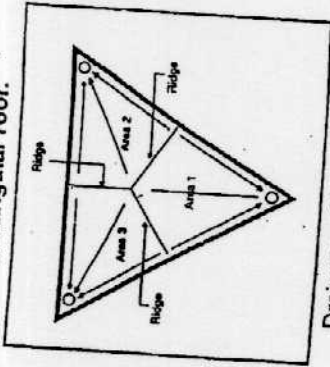
3.2 Materials

- a) Regarding of the roof surface shall be carried out with suitable cement mortar incorporating clean, medium coarse sand or with a lime-SURKHI mortar or any other suitable material.
- b) Bitumen primer shall conform to IS 3384 : 1986.
- c) Bitumen felt shall conform to IS 1322 : 1993 and IS 7193 : 1974.

Note : +25, +50 etc. shows the thk. of screed over structural slab for providing slope for water draining purpose.

- Portion ABCD (Area 1) will drain the water in RWP No. 1
- Portion ADHI (Area 2) will drain the water in RWP No. 2
- Portion CDEF (Area 4) will drain the water in Pipe No. 4
- Portion FDGH (Area 3) will drain the water in Pipe No. 3

Example 2 : Drainage of a triangular roof.



Drainage of Triangular roof
Fig. 108

Example 3 : Drainage when pipes are inside the roof.

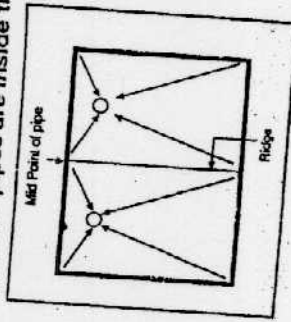


Fig. 109

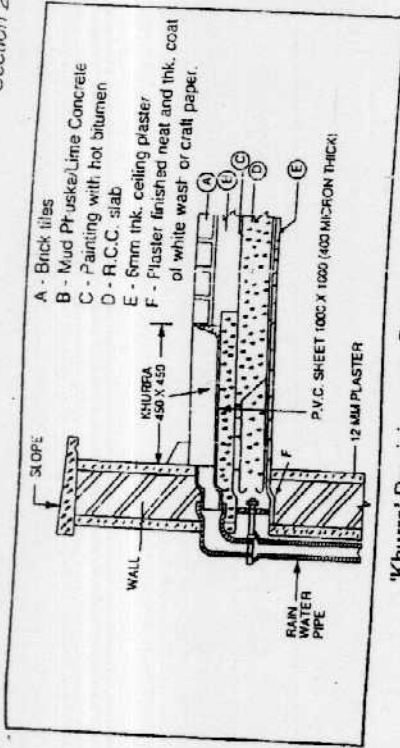
Problem No. 6 : water not going smoothly through rainwater pipes on the roof and staying around the mouth of the pipe.

Causes

- (i) Khurra not provided near the rain water pipe.
- (ii) Strainer not provided.

Remedies

- (i) Provide khurra near the mouth of rain water pipe as shown below (Fig. 110)
- (ii) Strainer should be provided having at least $1\frac{1}{2}$ to 2 times the area of rainwater pipes.



'Khurra' Provision near Rain Water Pipe
Fig. 110

Problem No. 7 : Outside of parapet walls getting dirty after rains

Cause

Coping over parapet wall provided in the wrong direction (i.e. sloping towards outside) due to which water along with dirt falls on the outside of parapet wall and makes it dirty.

Remedy

Provide coping over parapet wall sloping inside (see Fig. 95 & 96).

Problem No. 8 : Water pipes running at the roof in zig zag directions causing obstruction to walking and cleaning of roof.

Causes

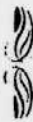
- (1) Water tank location not appropriately chosen.
- (2) Pipe routing not properly planned.
- (3) Pipes directly placed on the roof without leaving any gap.

Remedies

- (1) Water tank should not be located in the middle of roof. It should be located on one side of the roof near service shaft so that water pipes can directly connect to the tank through service shaft and they needn't run on the roof.
- (2) In case water pipes need to go over the roof then they should be routed along the wall by clamping instead of running directly over the roof. If it is necessary to go for the pipe to run over the roof, then pipe should be routed over pedestals instead of touching the roof so that roof can be properly cleaned.

Remedy

- (1) Reduce spacing of J-hook bolts i.e. increase the number of J-hook bolts.
- (2) Tighten all nuts properly ensuring that every bolt has G.I. and bitumen washer below the nut.
- (3) If regular wind storms come in an area, it is better to put a continuous M.S. called "wind tie" strip running across A.C. sheets and in the line of bolts over which nuts can be tightened.



Problem No. 4 : Plinth protection getting broken where rain water pipe from roof throws the water.

Causes

Water from rainwater pipe hits the plinth protection vertically. Due to the continuous hitting with increased pressure of water, plinth protection gets damaged locally at that place.

Remedy

Provide shoes at the end of rain water pipe as shown in fig. 106 so that water doesn't hit the plinth protection vertically.

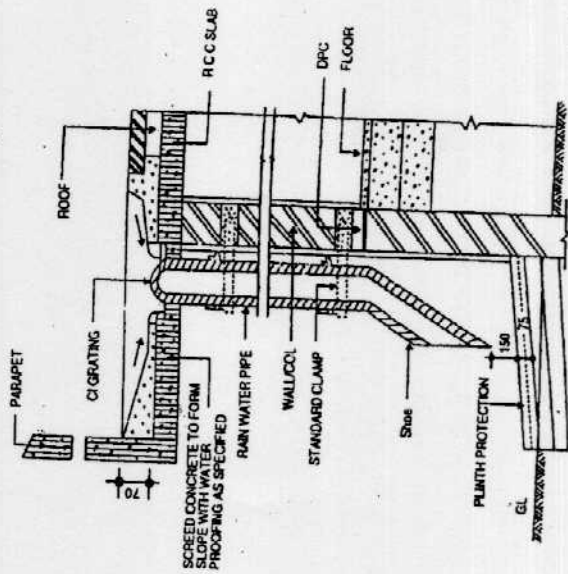
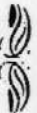


Fig. 106



Problem No. 5 : Water staying on the roof here and there.

Cause

Slope over the roof for drainage of water not properly provided.

Remedy

Roof drainage is a very important aspect in the building. For proper roof drainage roof should be divided in few portions (if roof is big) and then each portion should be sloped towards the corresponding rain water pipe by creating proper ridges at various places. In actual execution correct slopes and ridges as planned should be achieved through water level and marking 'thias' before casting the concrete.

The following diagrams show a typical arrangement for drainage of various shapes of roof corresponding to various locations of rain water drain pipes (Fig. 107 to 109)

Example 1 : Drainage of a rectangular roof.

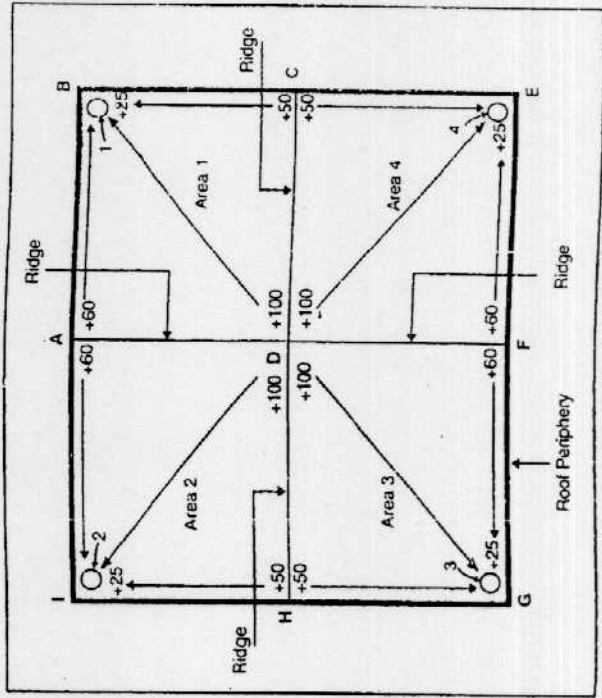


Fig. 107

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