CASE STUDY

ROOFING DETAILS

The devil is in the detailing!

PAHO Smart Hospitals Projects started in 2013 have been implemented across nine countries in the Caribbean Region. Lessons have been learnt from the facilities first retrofitted and as the project progresses. Some of these are presented here.

Material Quality

Corrosion on galv. steel flashing sheets after only a few months of installation

Galv. roof sheets installed at same time, no signs of corrosion

Recommended Material Quality

Often we have the availability of materials in the Caribbean Region of substandard quality, including galvanised steel roof sheets. We have observed galvanised steel roof sheets showing signs of rusting (corrosion) within weeks of installation or even while being stored on site.

Lesson Learnt

Verify quality by obtaining the technical specification of the materials from the Supplier to confirm the strength and composition of base metal and thickness and composition of the galvanised coating. Ensure appropriate roof sheets are specified, procured and installed.

It is advisable to purchase from reputable suppliers and/or manufacturers, obtain warranty and test results to review and approve before purchase.

Galvanised steel roofing sheets are normally 22 gauge to 26 gauge. The lower the gauge, the thicker the material. Roof sheet gauge does not represent a consistent sheet thickness from all suppliers, rather, the roof sheets should be specified with required design thickness in millimetres or inches. The appropriate thickness of roof sheets is dependent of the wind forces that the roof needs to withstand and the spacing of the connecting screws. This should be designed by the Engineer and checked against Manufacturer's specifications.

Important – Roof structures including roof sheet thickness and spacing of connections must be designed for wind speeds which account for climate change and is based on the geographic location of the facility.

Quality of Galvanising

Galvanised roof sheets are typically hot-dipped galvanise with zinc (Zn) anticorrosive coating or zinc-iron (Zn-Fe) alloy coating. The anticorrosive coating thicknesses on roof sheets can vary from 12 microns to 180 microns. The thicker the coating, the better the durability of the roof sheet.

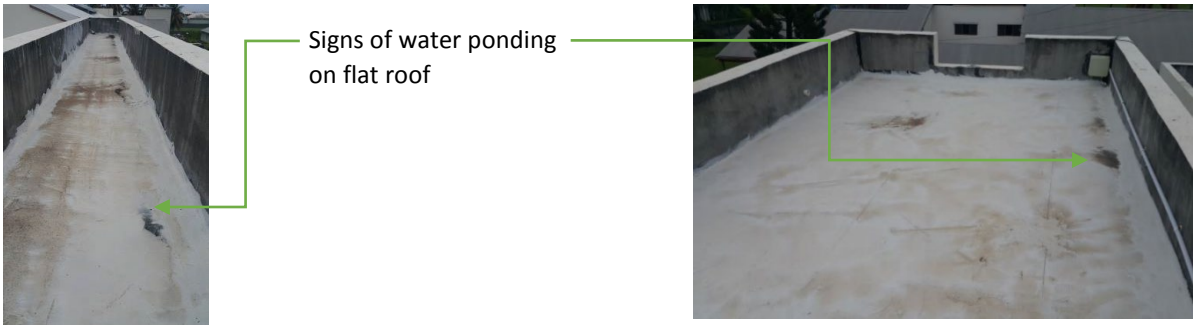
- For a 10-year life span before first maintenance in a tropical region, a total Zn coating thickness of 100 to 175 micrometres (microns) is adequate[1]

Image 1 - Anticorrosive coating layers around corrugated steel roof sheet

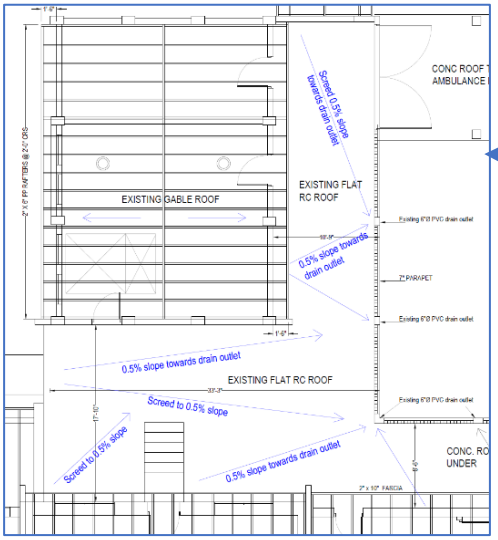
Important Visual Checks before Installation

- Check for uniformity of roof sheets; regularity of (pitch) spacing and dimensions of valleys and crests.
- Check for signs of corrosion
- Check for dents and bends of roof sheets

Detailing – roof drainage



[1] Reference: "IFRC Roofing Manual", service life dependent on thickness of zinc coating chart, pg. 44, https://www.sheltercluster.org/sites/default/files/docs/ifrc-sru_cgi-roofing_manual_e-version_high-res.pdf



Recommended Detailing – roof drainage

Flat rooves should be screed to allow runoff to designed drainage outlets on the roof.

Screed slopes and direction should be specified on the roof plan drawings.

Drainage outlets should be covered with grill to prevent leaves or debris from clogging drain line.

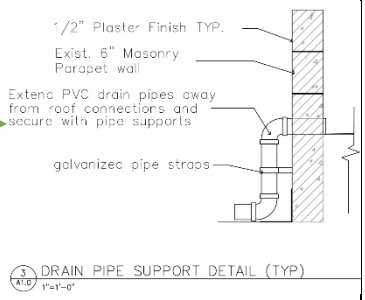
Example, Zurn roof drain inlets

Roof drainage outlets

Water stain under drainpipe along face of wall

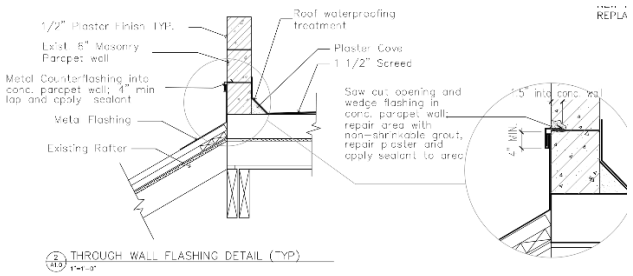
Recommended Detailing – roof drainage outlets

- Drainage outlets should be level with the roof slab to prevent stagnant water, which can breed mosquitoes.
- Outlet pipe should project far enough from wall face to spout water away from building



Roof flashing detail

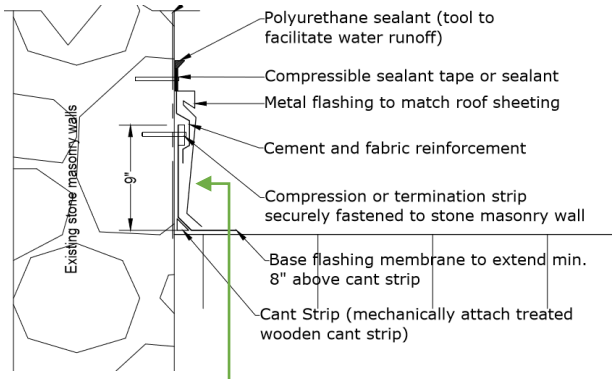
flashing



This flashing detail above regularly results in leaks

Recommended Detailing – flashing

Flashing should be detailed and installed properly to prevent water leaks.



Recommended flashing detail

No Waterproofing

Recommended – Waterproofing

- All reinforced concrete rooves should be waterproofed, as concrete is a porous material
- Waterproofing can be in the form of waterproof additive to concrete, or a waterproofing layer applied to surface, which can be spray, painted or torched-on.
- Waterproofing should be selected for durability, ease of application and should have a warranty
- Waterproofing should be applied according to manufacturer's specifications

Recommended – Roof Colour

- Roof sheets and / or waterproofing should be white or light coloured to reflect sunlight and mitigate heat absorption. This will help reduce the cost of cooling of the building.
- Ensure that reflected sunlight off white rooves do not adversely impact neighbouring buildings.

Lack of Maintenance

Recommended – Maintenance

All rooves and gutters should be cleaned on a regular basis to prevent build-up of leaves and debris, and growth of plants.
It is recommended that rooves and gutters be cleaned twice per year, but if trees surround facility, gutters may need to be cleaned every 3 months.

PLANNED PREVENTATIVE MAINTENANCE should be actively implemented at all facilities!

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