RESERVOIR DESIGN FOR THE NEXT 80 YEARS

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WHY IS RESERVOIR DESIGN IMPORTANT?

Water is a FOOD GRADE product

Reservoir QUALITY & SECURITY starts at DESIGN

COMMUNITY HEALTH depends on QUALITY WATER

DESIGN FOR A LIFETIME

- 80-100 years is the expected lifespan of a benchmark reservoir

10 telemetry upgrades

3 platform upgrades

2 ladders

3 roof replacement

4 security upgrades

4 coatings

20 cleans

IN A WORLD OF ROBOTS…

…WHO WILL BE CLEANING OUR TANKS IN YEARS TO COME??

CONSIDER THE NEXT GENERATION

- Climate and the environment…so why should tank maintenance be any different?
- Are your reservoirs friendly for person/diver entry?
- What might “Robot Friendly” tanks look like?

ACCESS – POOR
access hatch not above vehicle area

ACCESS – POOR
no EWP access and structural issues

ACCESS - IMPROVED

Safe to Climb

Additional space made available

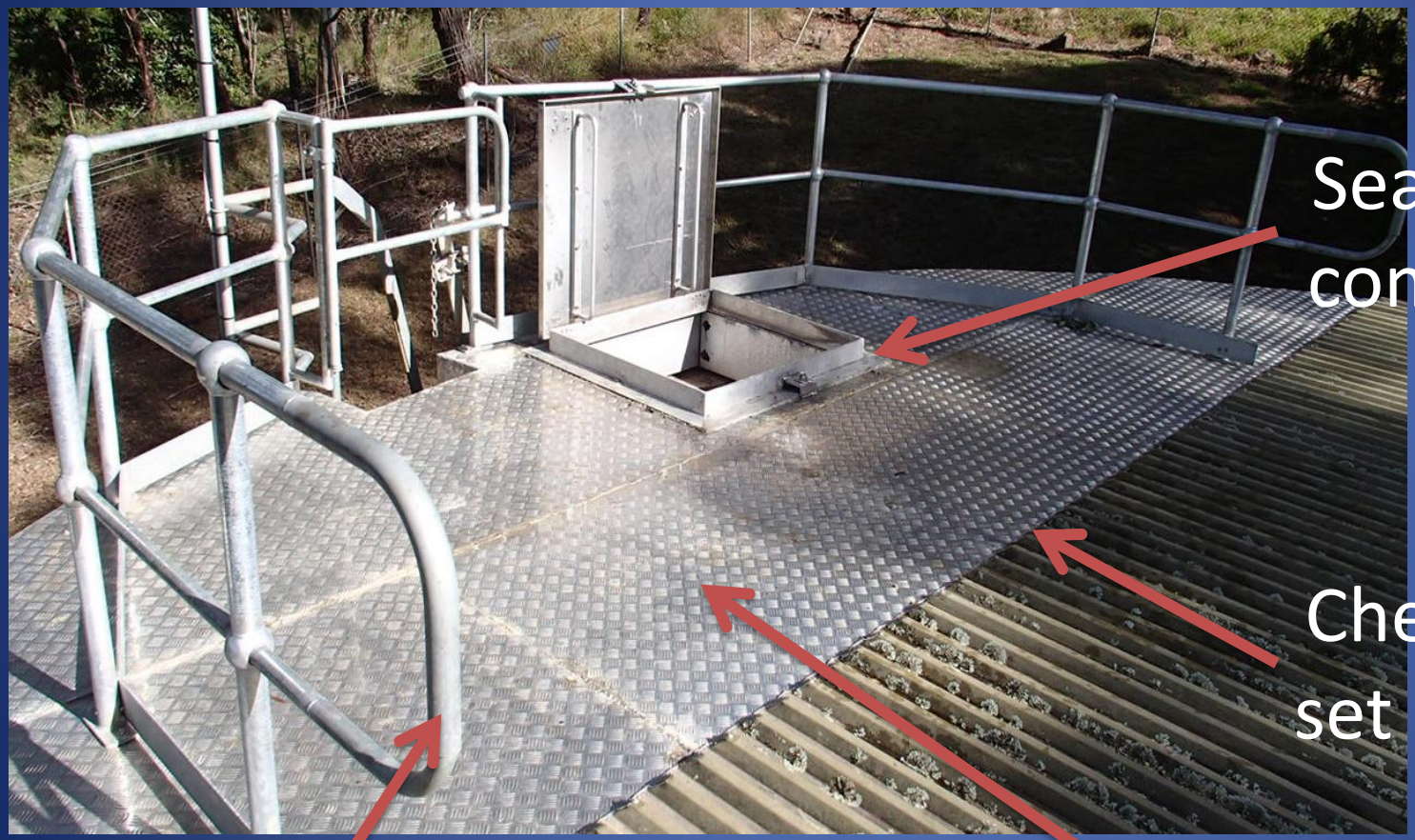
ACCESS – TOO EASY!
All that security wasted!

ACCESS

Key Points to Consider:

- Vehicle access around the reservoir
- Personnel access/security
- Safety now and safety for the future
- Expansion and future growth
- Lifting of equipment

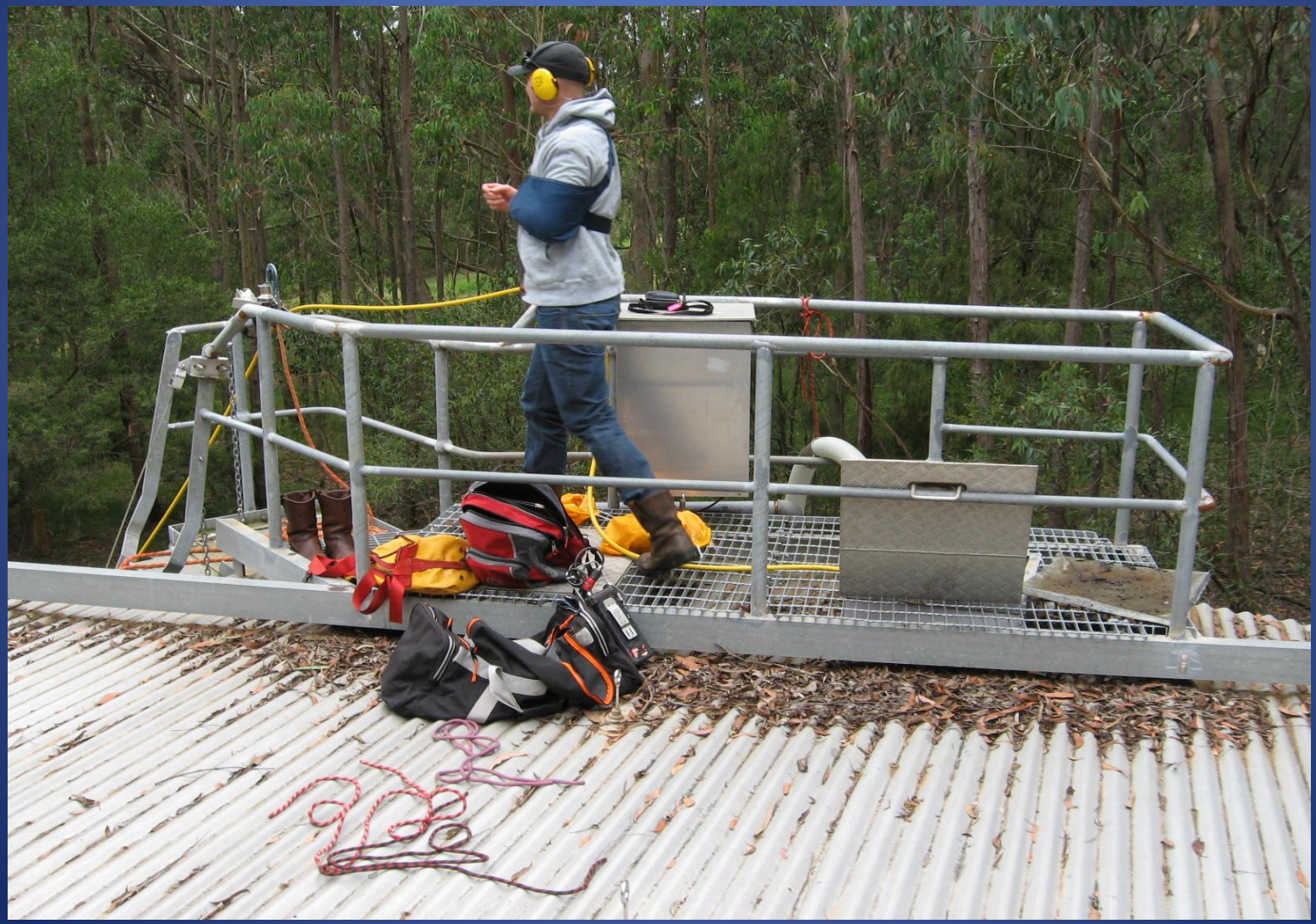
PLATFORMS & HATCHES



PLATFORM – FAIR
kick rails sealed, conventional davit

PLATFORM – FAIR (BELOW) galvanised davit base submerged

PLATFORM – POOR
too small, debris ponds below



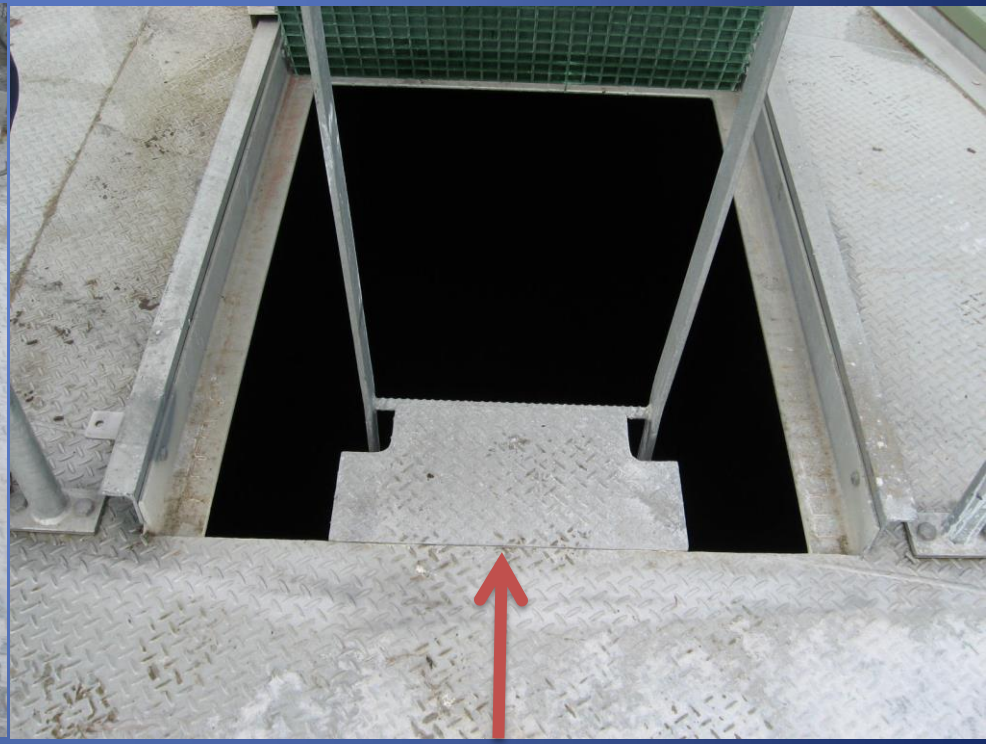
PLATFORM – POOR
should be set under the roof

PLATFORM – PONDING
checker plate on top of roof

PLATFORM – PONDING
sealed kick rails, no slope angle

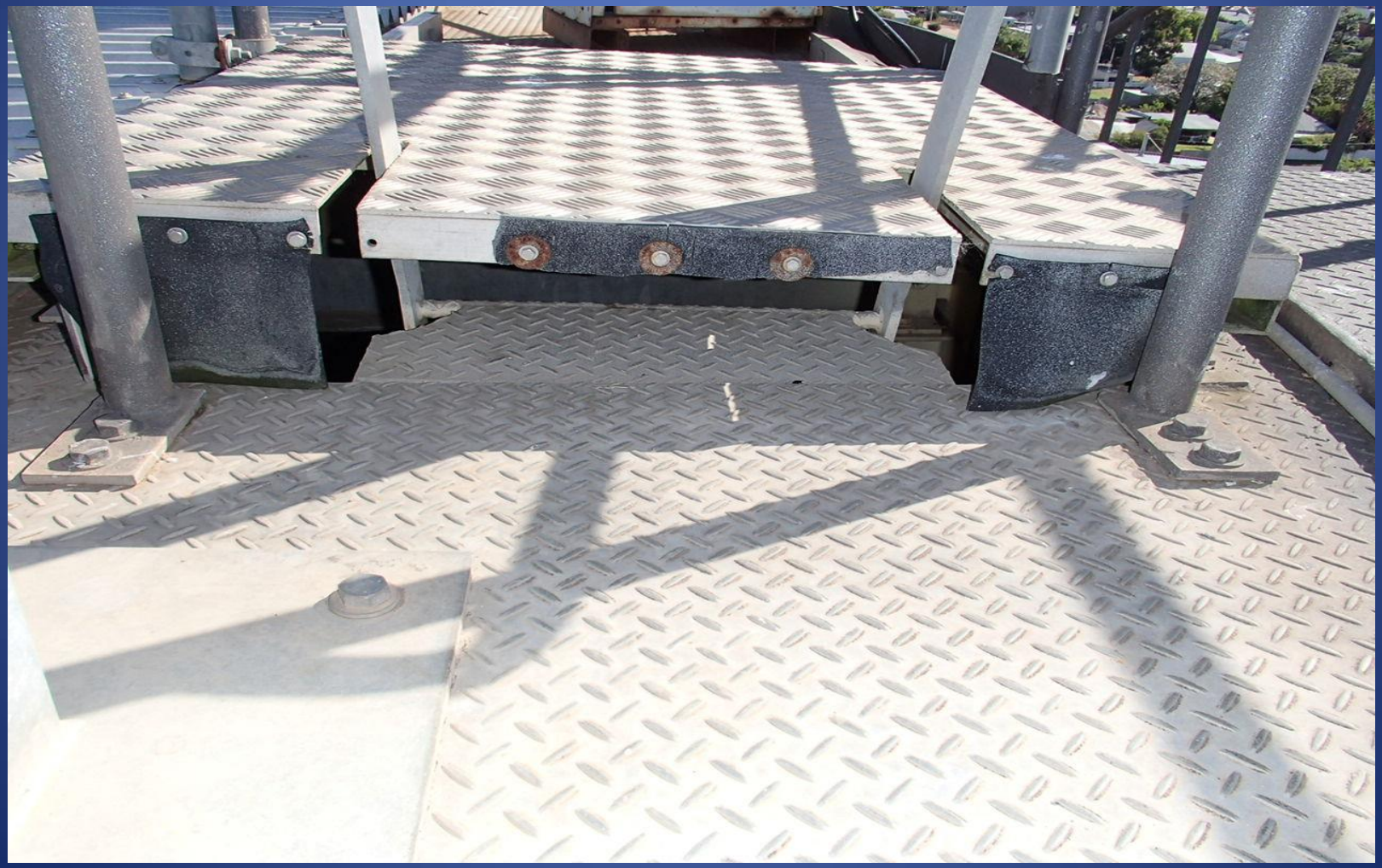
HATCHES - POOR
sliding cover, ladder protruding

Contamination Points



No sealed front edge

ENTRY HATCH – UNSEALED
rubber flaps are NOT the answer



HATCHES – FAILED
faecal material can enter tank

HATCHES – FAILED
faecal material DEFINITELY entering

ENTRY HATCH – POOR POSITIONING
hatch too far off wall, ladder affected

ENTRY HATCH – POOR POSITIONING
ladder set off the wall, too complex

ENTRY HATCH – GOOD
well positioned and sealed

ENTRY HATCH – GOOD
ladder assist on cover underside

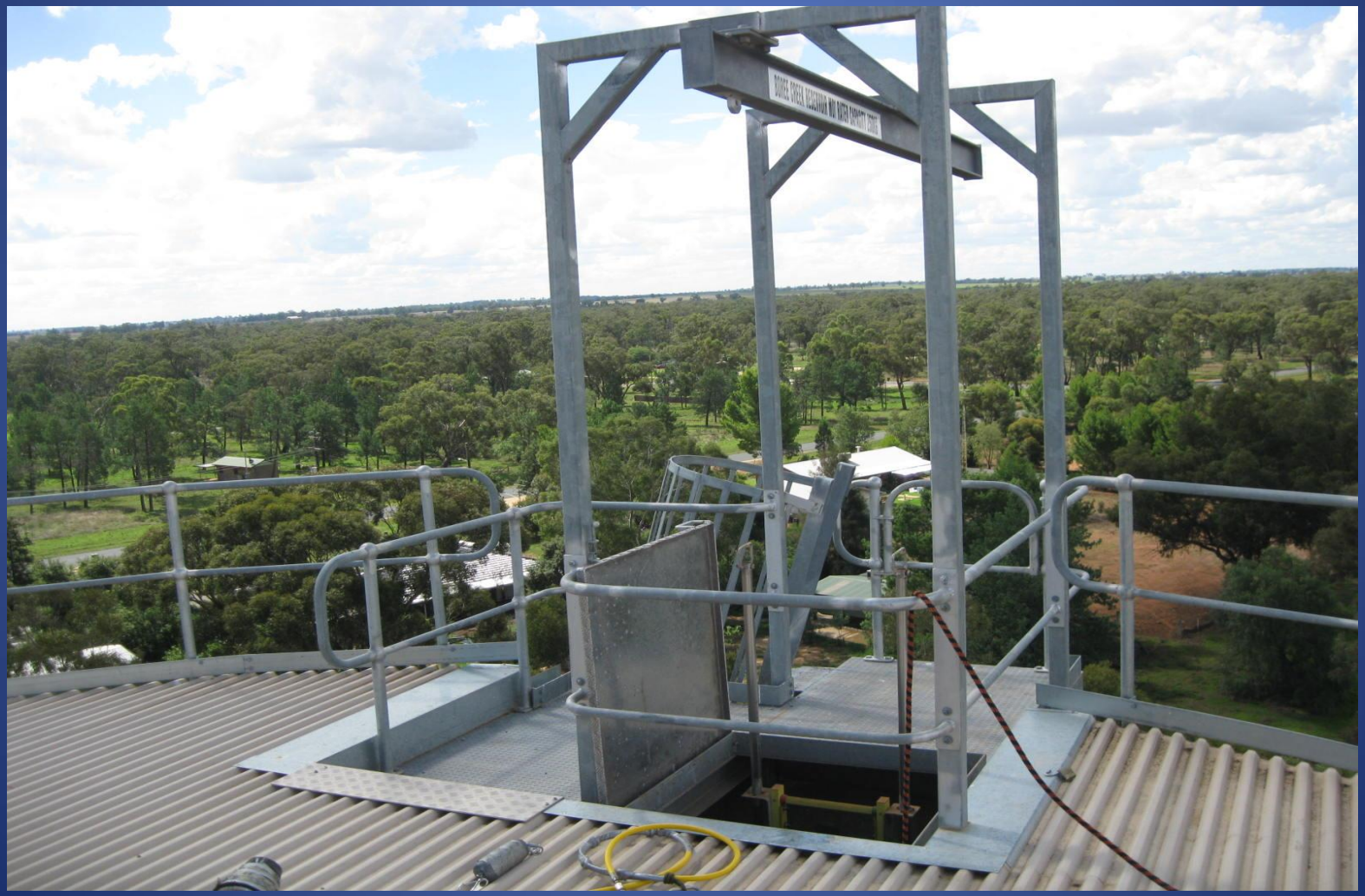
ENTRY HATCH – GOOD
raised frame, overlapping cover

PLATFORMS & HATCHES

Key Items to Consider:

- Platform set under roof sheeting
- Sloped to prevent ponding
- Sealed edges on hatches
- Barricading for fall prevention
- Sufficient working space

RESCUE SYSTEMS – GOOD
practical, solid, but attracts birds



RESCUE SYSTEMS
luffed back for rigging access

RESCUE SYSTEMS
mounted to suit all situations

RESCUE SYSTEMS
luffed forwards, rescue to ground

NO HAND RAIL GATE REQUIRED
rescue lift from front centre point

RESCUE SYSTEMS
folded down, no bird attraction

RESCUE SYSTEMS – LOADED
a sideways anchorage and re-direction

RESCUE SYSTEMS – FAITH!
testing the installation

RESCUE SYSTEMS

Key Items to Consider:

- Be able to fold away to reduce bird roosting
- Can be rigged in a lower position
- More than one point of fixing contact
- Be able to withstand sideways loadings
- Offer multiple positioning for retro-fitting
- All parts external – no submerged sections

ROOF DESIGN

Minimal ridge caps

Self draining

Ventilation

No upstream ponding

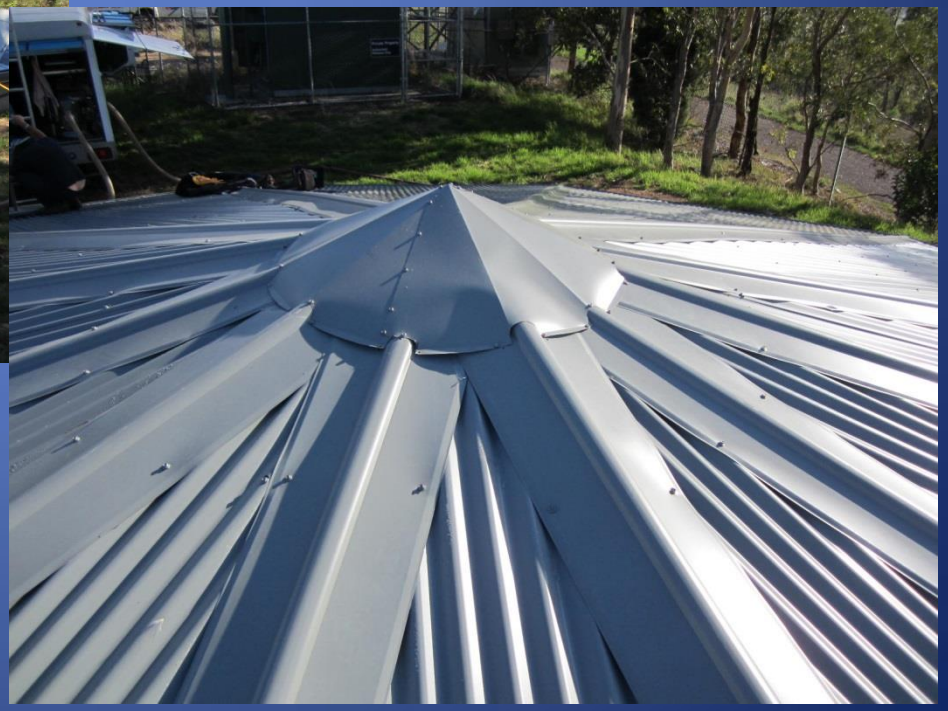
Compatible materials

ROOF – PONDING
needs a checker plate insert section

ROOF GUTTER – POOR
30 m high & not safe to work on

ROOF GUTTER – FAILURE!
No storm water by-pass fitted

ROOF DESIGN – POOR
centre pitched, too many flashings



ROOF FLASHINGS – FAILURE
flashings do not seal effectively

ROOF – BIRD ROOSTING GOOD!
Security should be at ground level

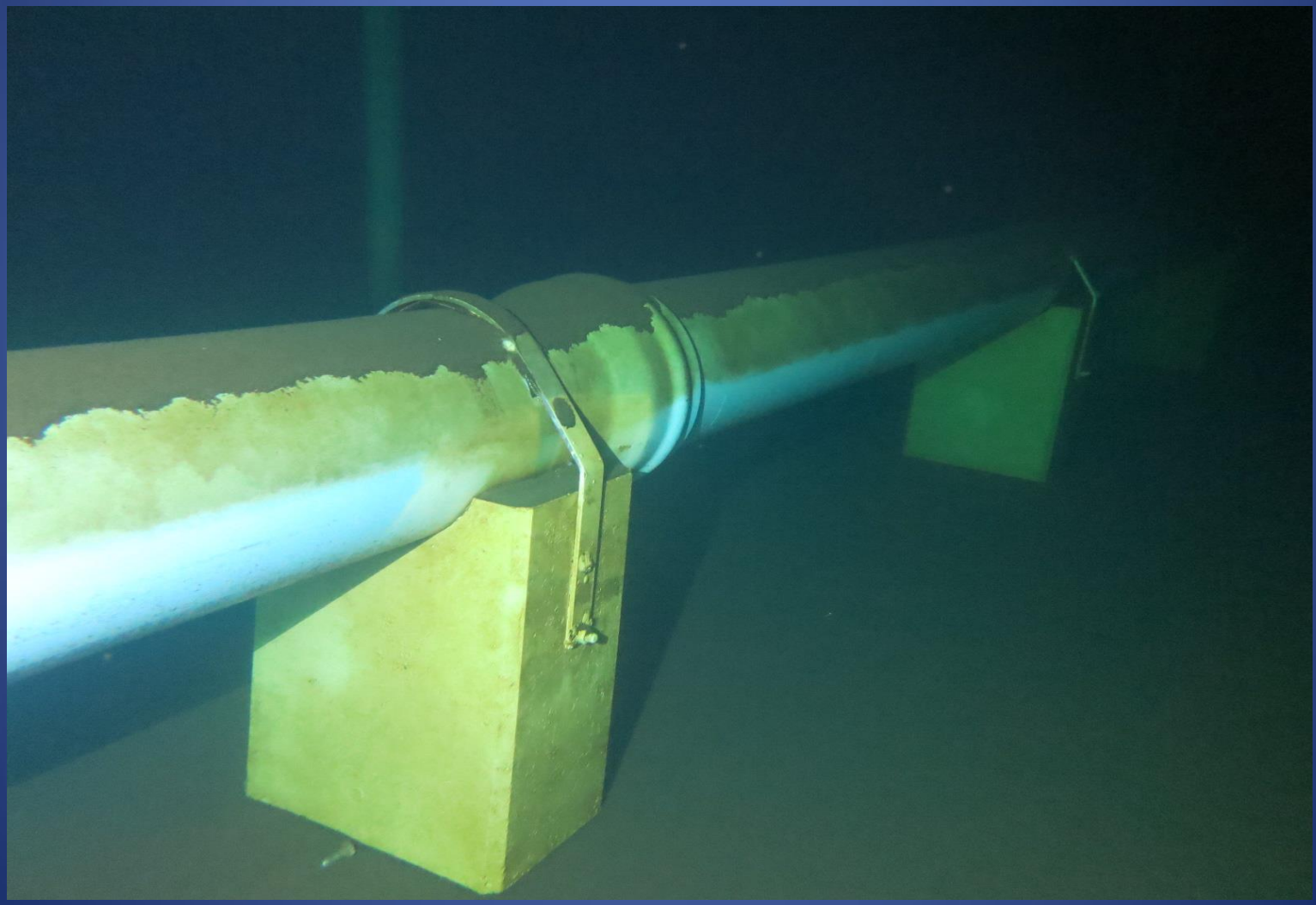
ROOF DESIGN – GOOD
no flashings, simple and effective

ROOF DESIGN

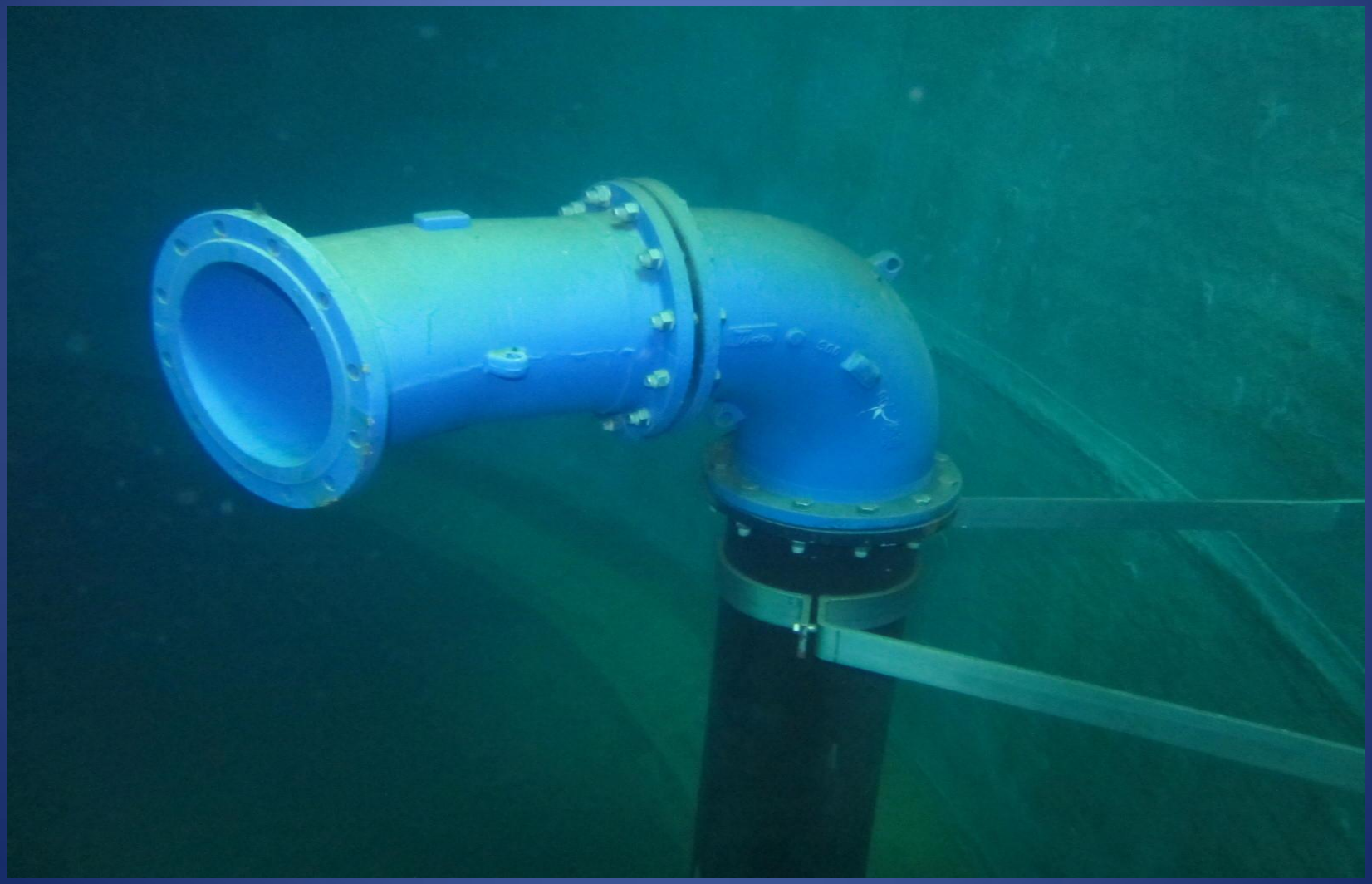
Key Items to Consider

- Keeping it contamination free
- Drainage – no box gutters
- Minimum ridge flashings
- Corrosion free materials
- How the roof is secured
- Maintenance – safe access to all areas

INLET PIPEWORK – POOR
inlet run across the floor to separate



INLET PIPEWORK – POOR
riser does not enhance mixing

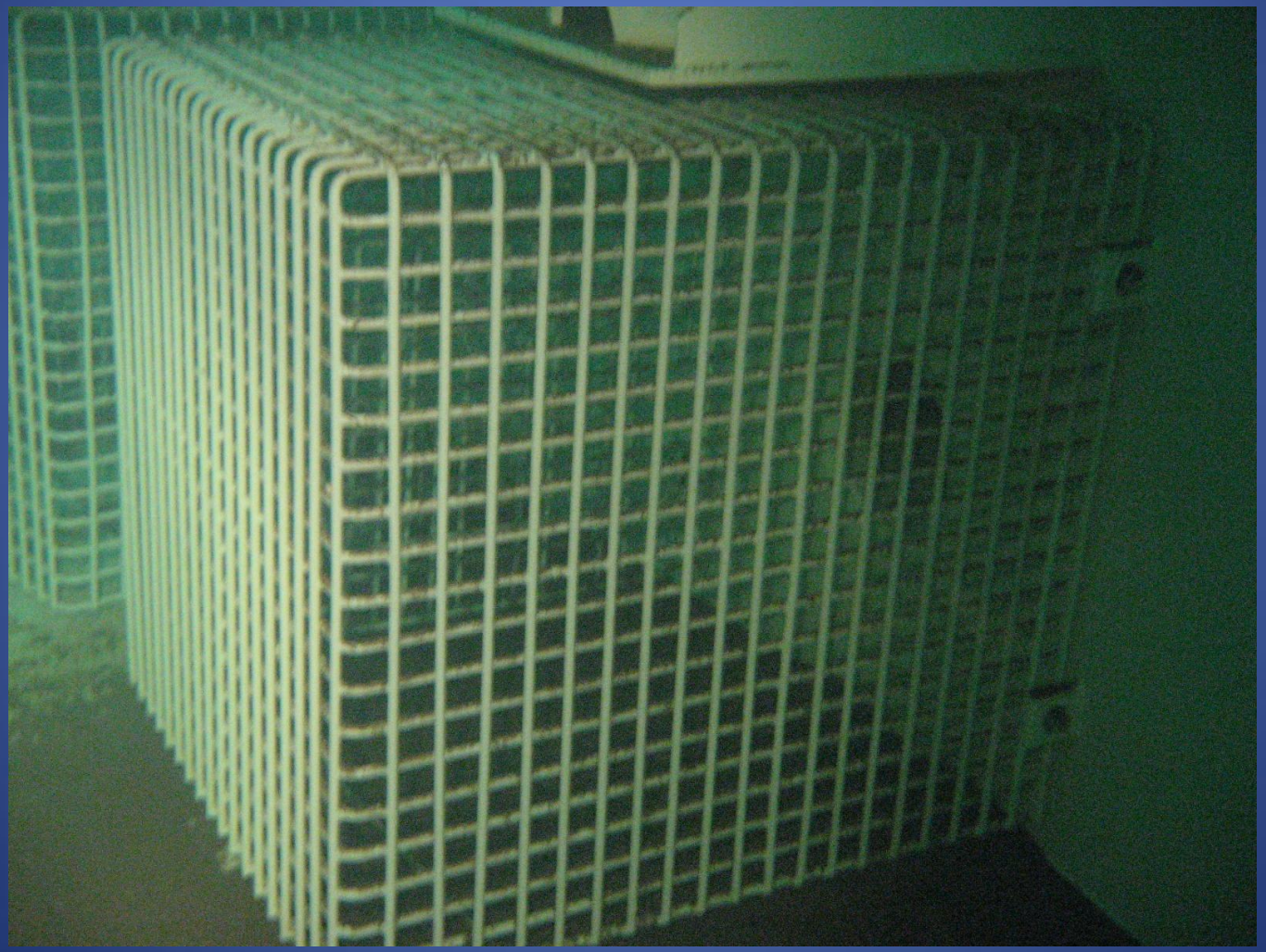


INLET PIPEWORK – GOOD
two way nozzle – simple and effective

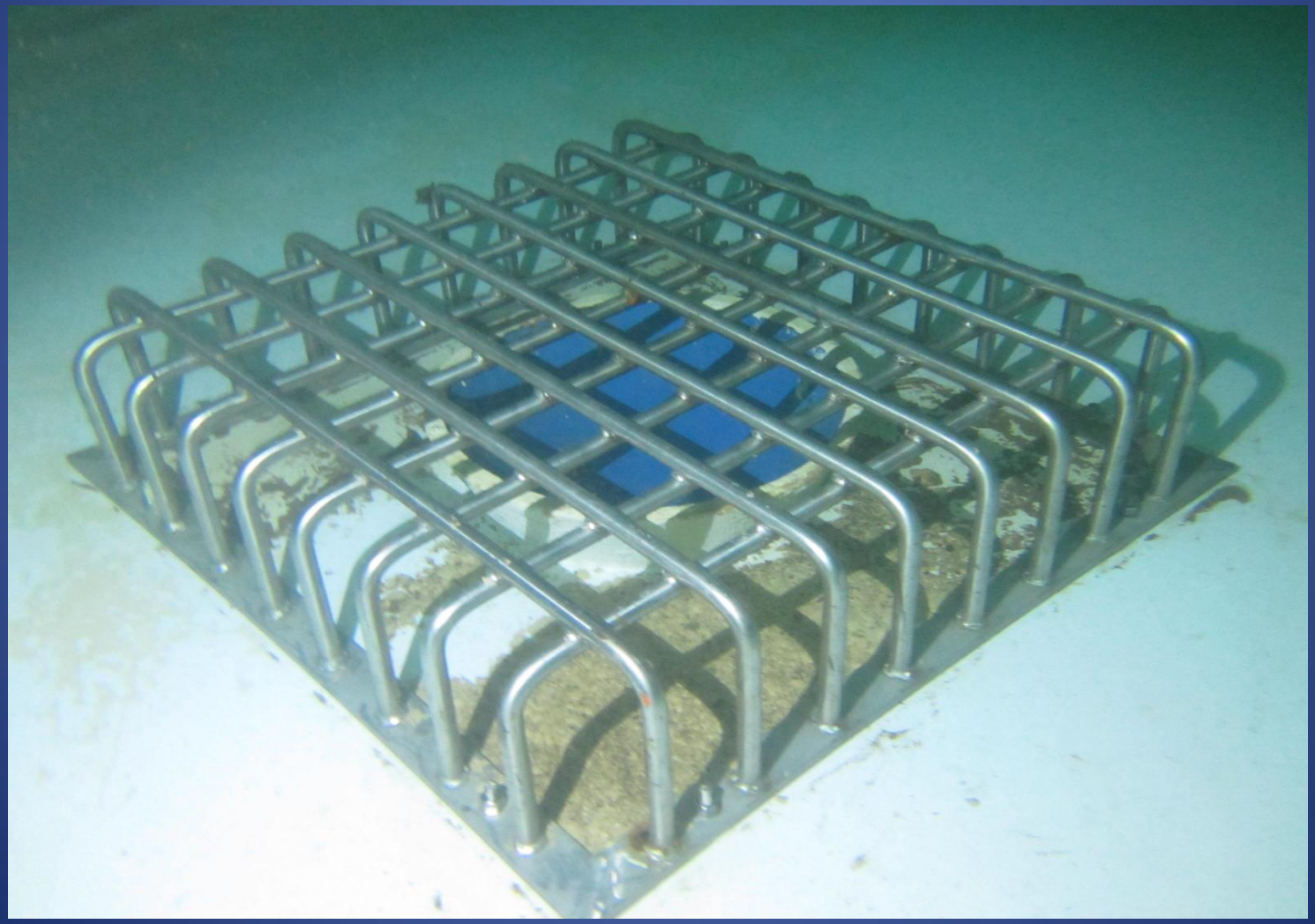
Overflows – good and poor external riser is simple and effective

OUTLET – POOR
penetration should be free-standing

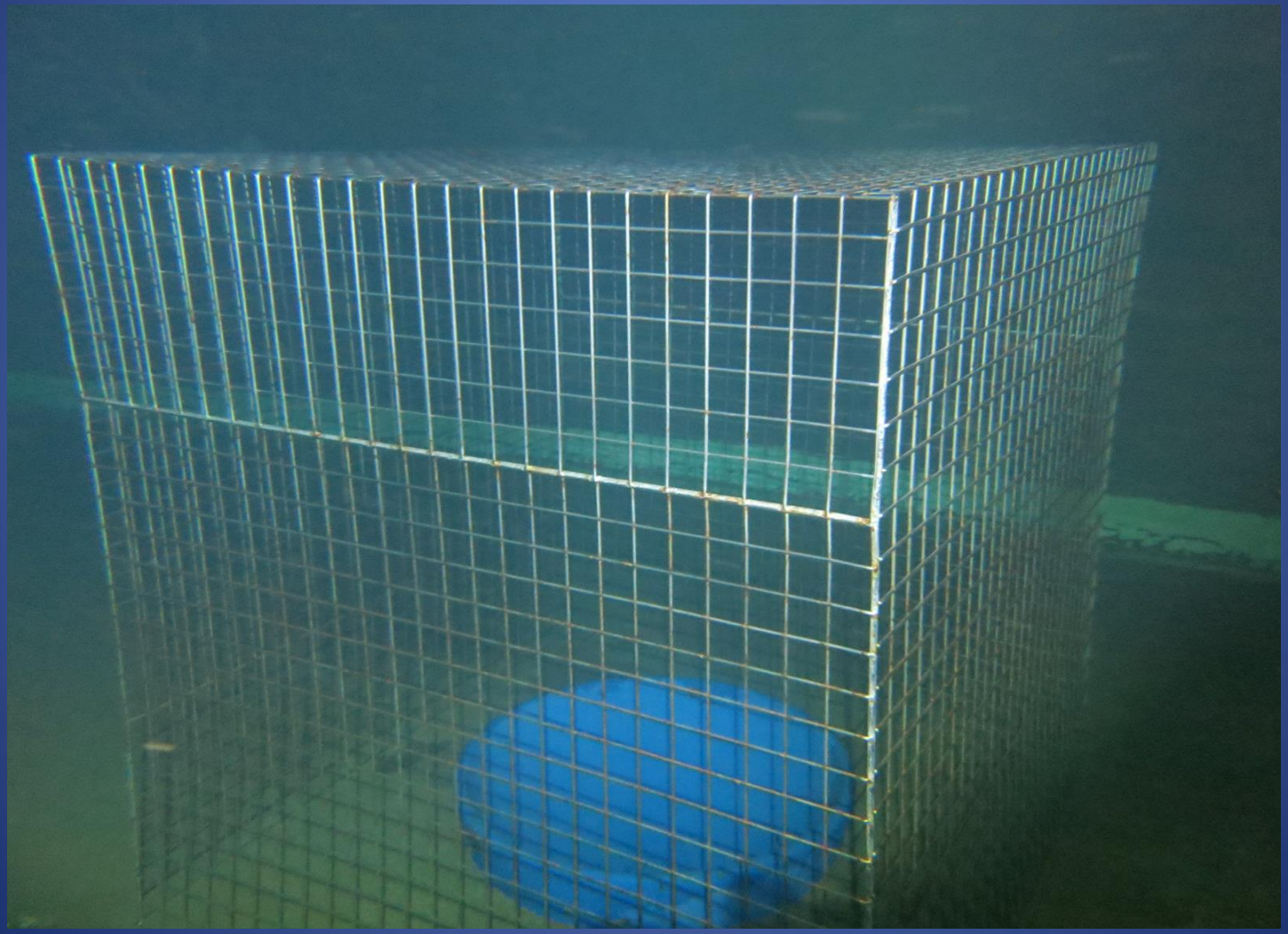
OUTLET SCREEN – POOR
too large and prevents cleaning



OUTLET SCREEN – POOR
sediment cannot be cleaned away

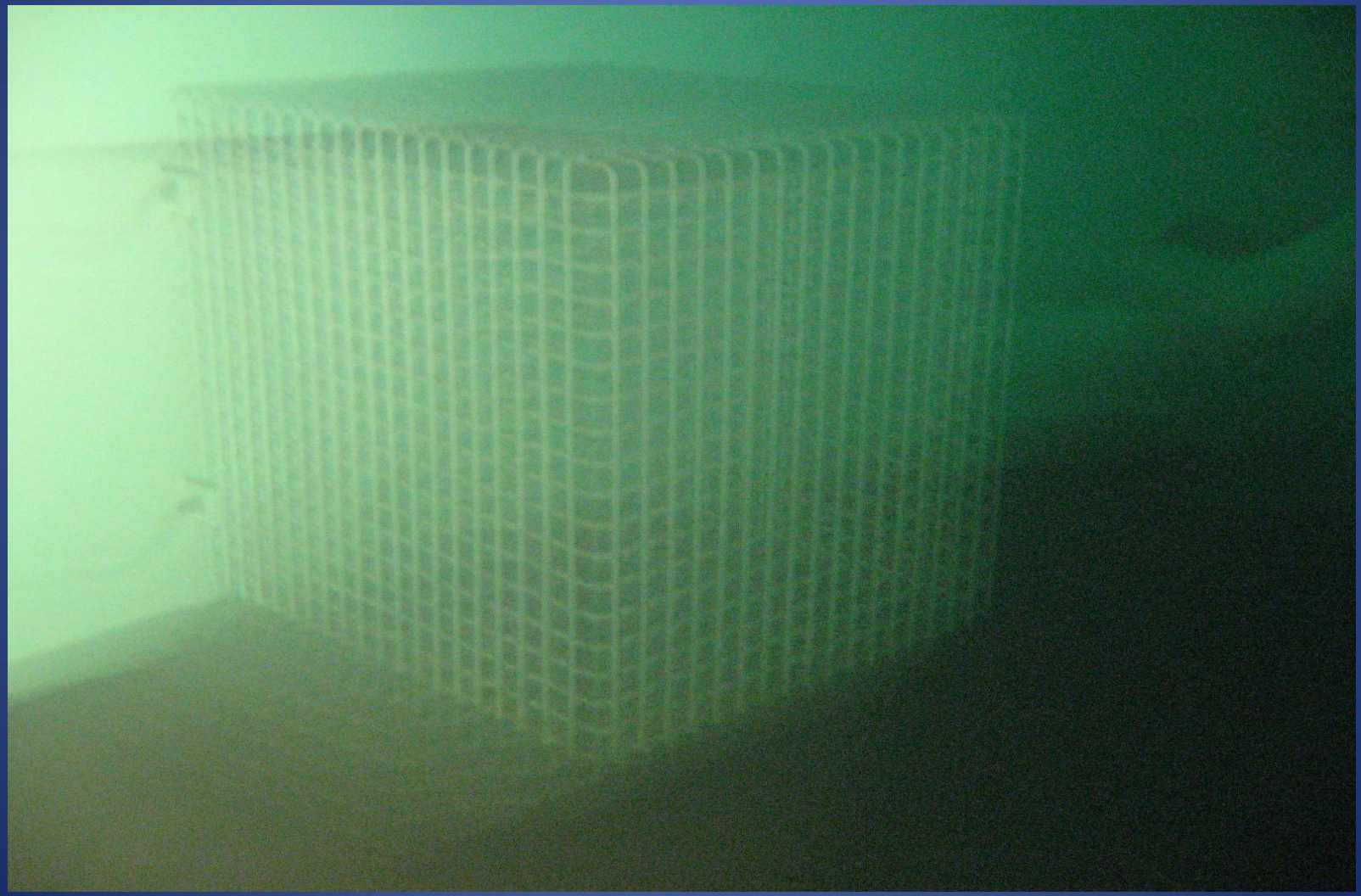


OUTLET SCREEN – WHY BOTHER?
Light weight and too large



OUTLET SCREEN – GOOD
strong & neatly fitted over penetration

SCOUR SCREEN – WHY BOTHER?
Scour cannot be used as designed



PIPEWORK – GOOD
pipework in a building and not buried

PIPEWORK – GOOD
plenty of room to work and expand

PIPEWORK

Key Items to Consider

- Simple pipework
- Outlets above the sediment level
- Screens that allow access for cleaning
- Water movement within the tank
- Allow for future expansion / extension

CORROSION

- The deterioration of a material due to its environment
- Immersion or humidity
- Dissimilar metals
- Reduces chlorine effectiveness

DIRECTLY IMPACTS WATER QUALITY

ROOF MATERIALS – GOOD
galvanised rafters & aluminium purlins

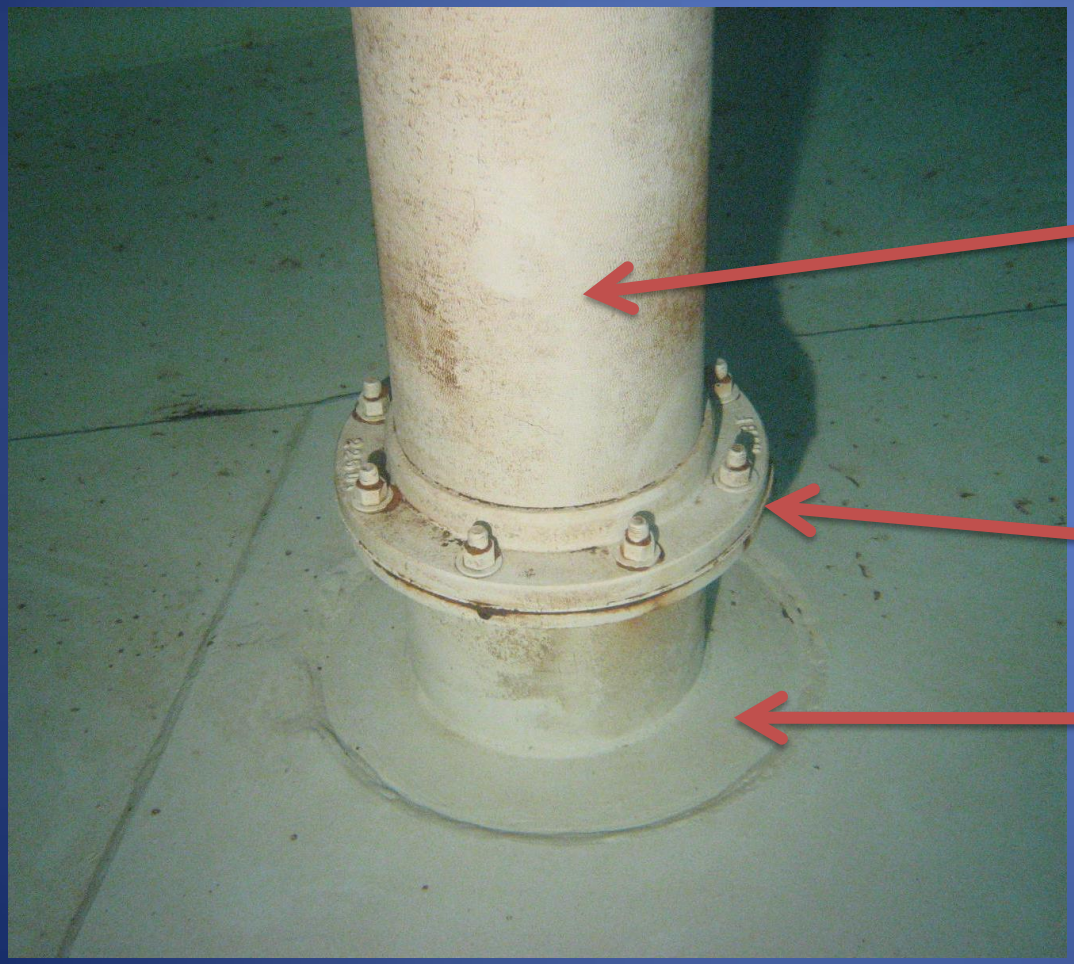
ROOF MATERIALS – FAILURE
7 yo zincalume framing & safety mesh

ROOF MATERIALS – FAILURE
7 yo cheap screws & safety mesh

ROOF MATERIALS – FAILURE
10 yo sheets failed due to meshing

ROOF MATERIALS – FAILURE
6400 m/sq, 10 yo roof to be replaced

PIPEWORK - GOOD



Protected from corrosion

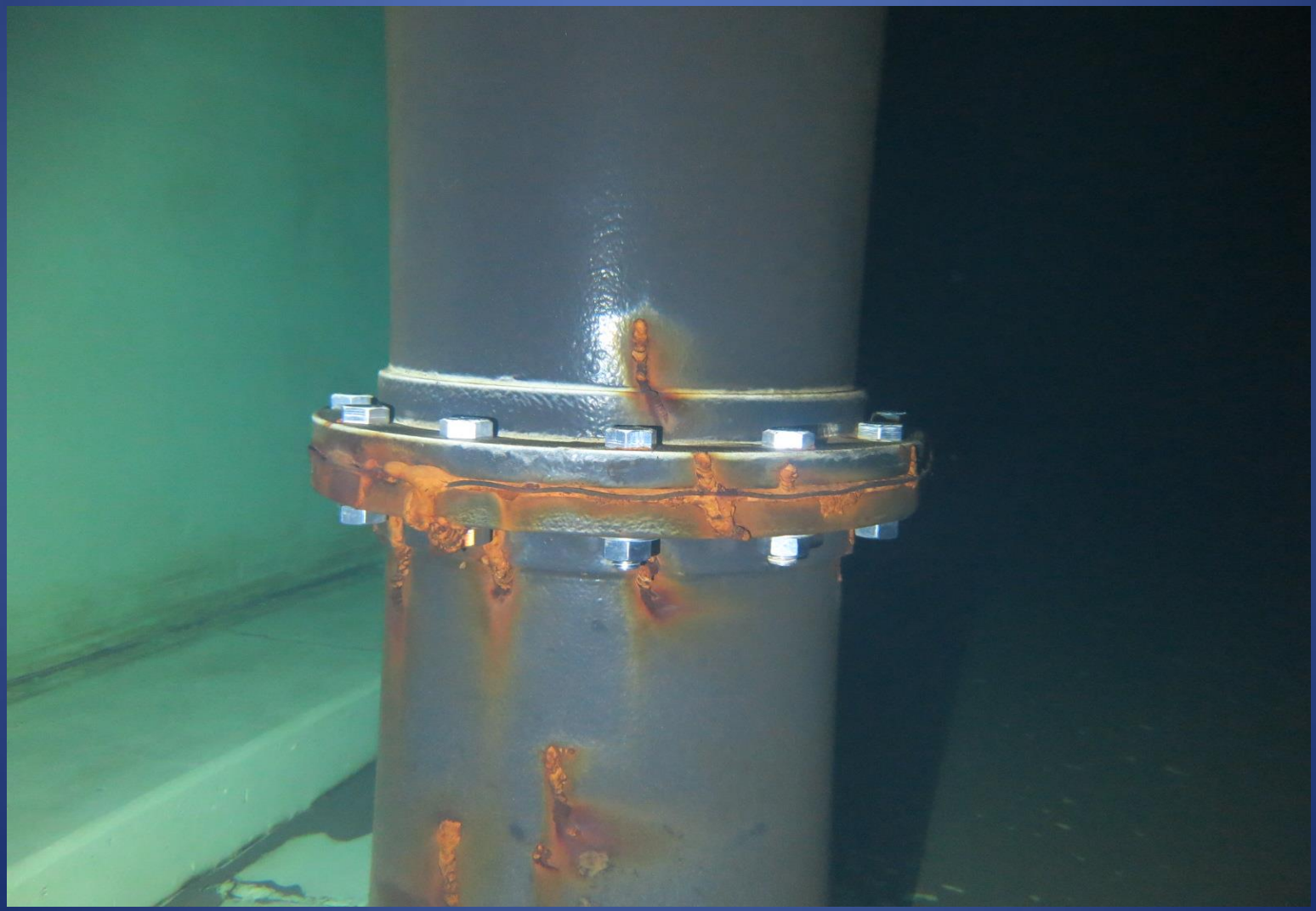
Raised from floor

No step

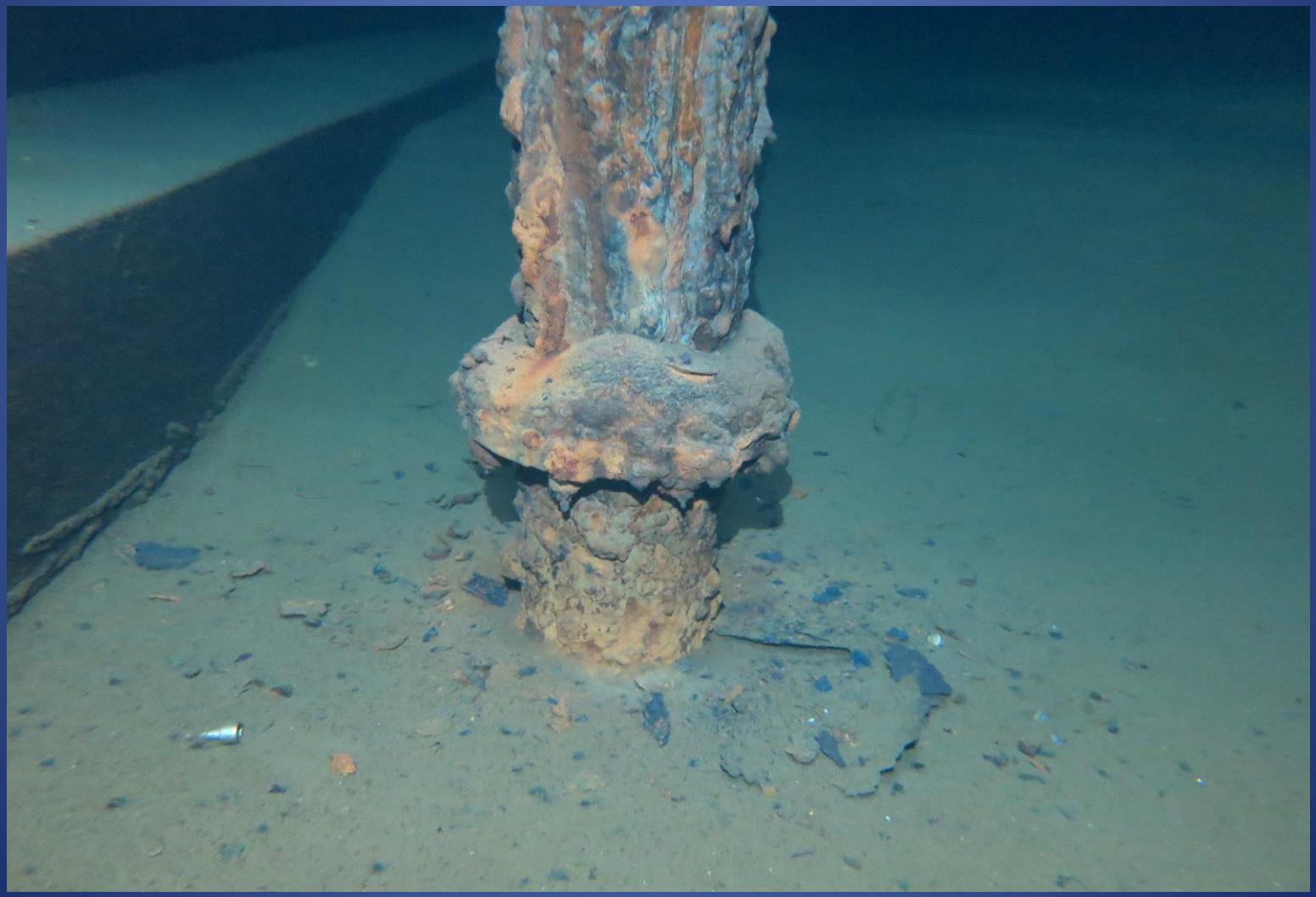
SIMPLICITY

PIPEWORK – FAIR
flange too low, bolts hard to acess

PIPEWORK – POOR
2 yo un-coated overflow

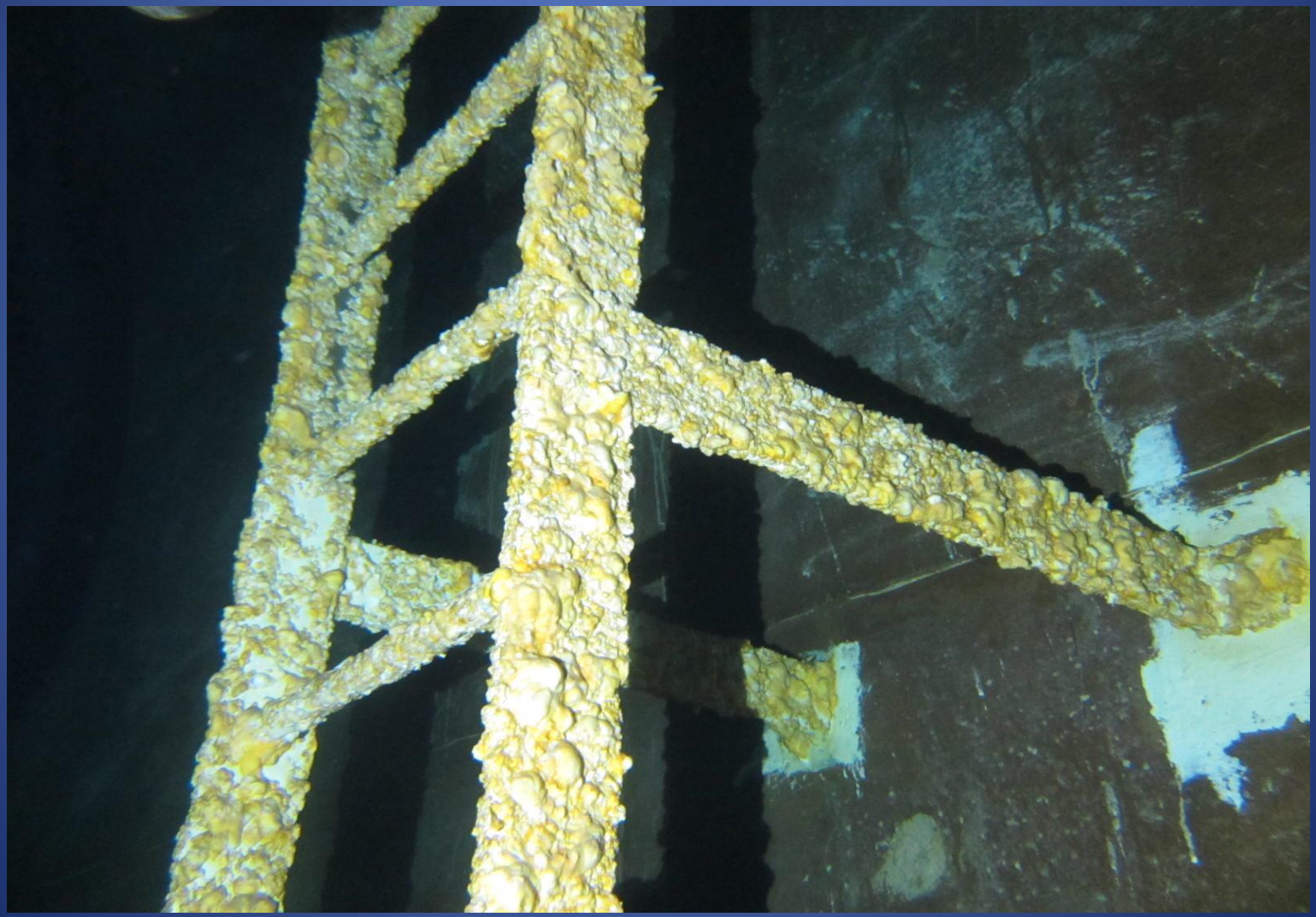


PIPEWORK – FAILURE
typical overflow in concrete tank

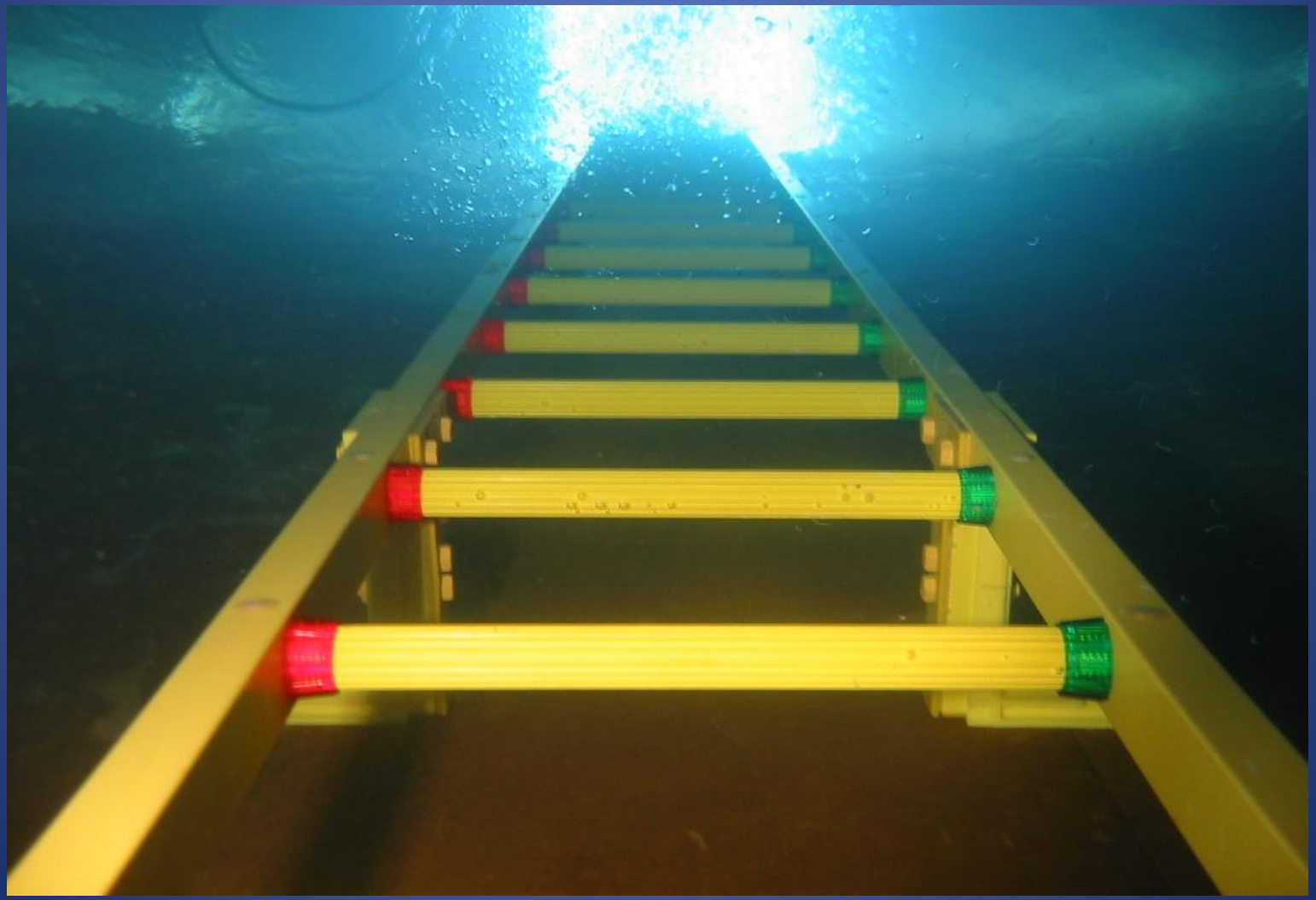


STAINLESS LADDER – POOR different grades of SS used

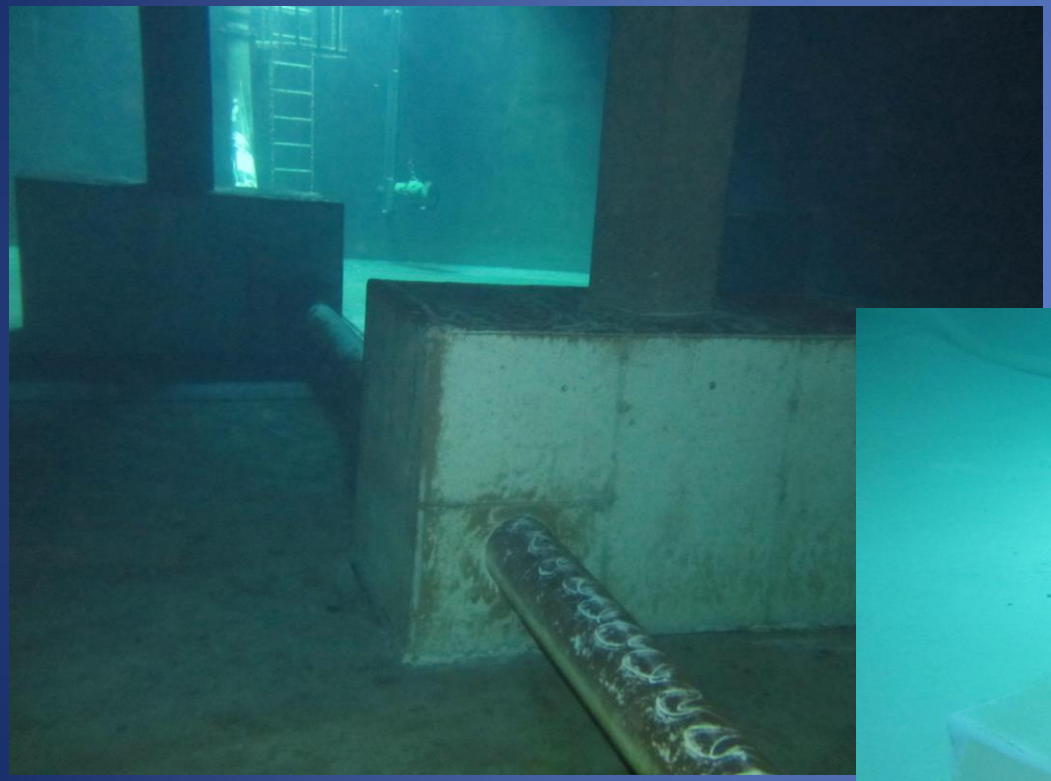
ALUMINIUM LADDER – POOR pH of water drives corrosion

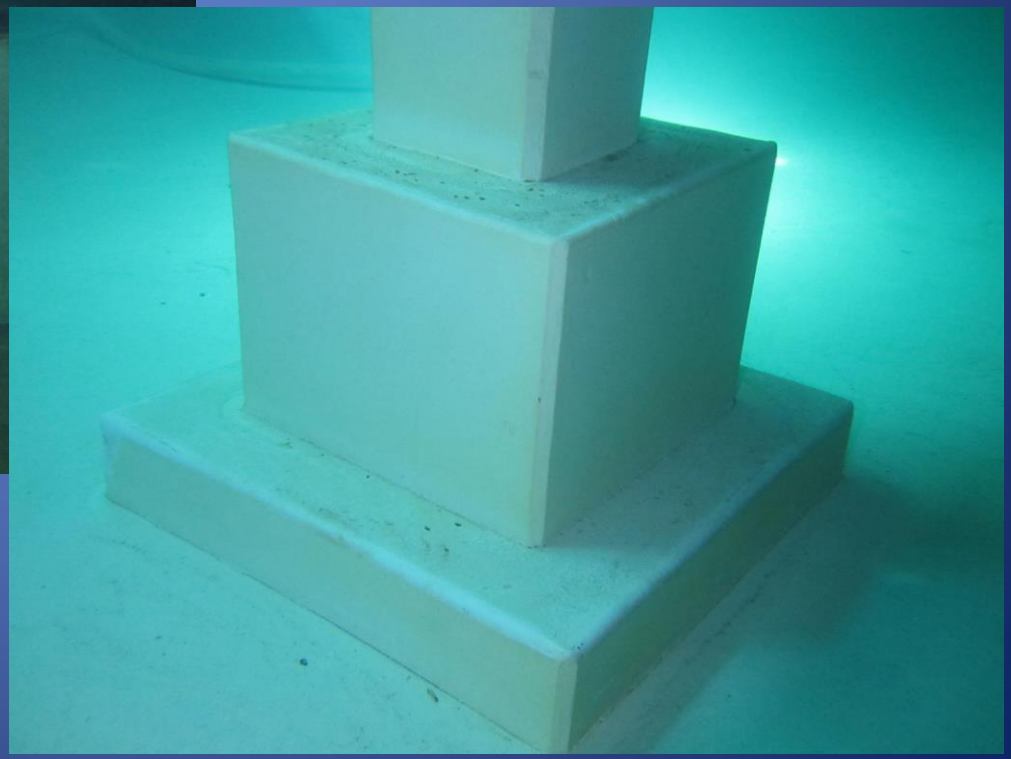


NEXTEP FRP LADDER – GOOD chemical resistant and ergonomic



POOR OLD ROBOT!
No complex post bases





POOR OLD ROBOT
no wall floor steps, rounded is worse

POOR OLD ROBOT
no exposed pipework