



MY THUAN BRIDGE — MEKONG RIVER, VIETNAM

AFTER many years of successful waterproofing of high-risk, challenging commercial structures Radcon #7 is also in high demand for Bridge Deck waterproofing; and for good reasons!

Government authorities, given the massive investment to construct such structures, are anxious to reduce maintenance costs and protect their infrastructure investments - and are now specifying waterproofing to bridge decks and raised highway sections more so than ever before.

MEMBRANES

As a traditional waterproofing method, membranes are a benchmark for many specifiers. That said, it is not the purpose of this article to denigrate membrane products - unfortunately, membranes are inherently problematic.

Membrane materials in high traffic areas require protection, a running surface of asphalt the preferred finish over the top of a bridge deck. This, in turn, creates major problems as membranes can delaminate causing potholes in the newly finished surface.

Membranes (that have failed under asphalt) may have passed all required tests in laboratories, met all other criteria and, even, obtained international certification as being "fit for purpose" as a result of such tests.

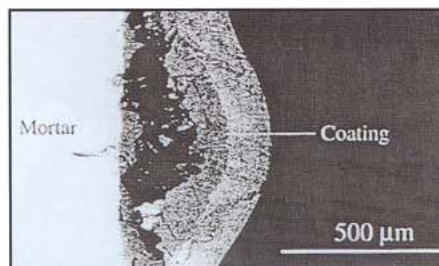
However, membrane applications in the field can lead to totally different outcomes.

SCENARIO (1)

Wet weather has contributed to stalling the programme and pressure

has seen the membrane applied anyway so asphalt and site completion can be achieved.

- The membrane, which exhibited excellent adhesion to concrete and asphalt in the laboratory, is found to be bubbling up and failing on site.



SEM MICROGRAPH SHOWING A BLISTER IN A POLYURETHANE MEMBRANE

- The failure is not a product or application-detailing problem - the membrane was applied to a concrete surface that contained entrapped moisture.

A perfectly sealed membrane is not a breathing surface and so, as the heat from the sun drew vapour to the top of the slab (in effect, sweating), the membrane has been blown off to the point of delamination.

SCENARIO (2)

A second issue is where water is entrapped between the asphalt and the top of the membrane (another common failure with membrane systems): -

- Asphalt is not totally waterproof so water will penetrate through until it reaches the membrane to which it is bonded.
- Membranes often specified for bridge decks are not tanking membranes and, as such, are not designed to be permanently ponded.
- In wet climates, on a flat bridge deck (or with very little camber) combined with hydraulic pressure due to traffic flow, membranes become permanently wet leading to asphalt delamination.

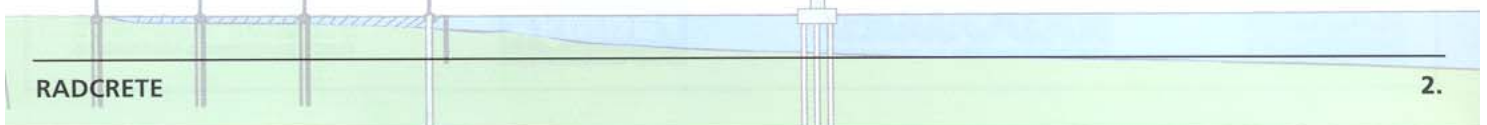
When major public infrastructures suffer membrane failures the 'bad news' can often become 'front page news'.

Authorities, representing public interest (and protecting their investment), must undertake lengthy recourse action which includes obtaining expert reports and, usually, litigious activity that often ends up in court. However, this is somewhat misdirected if the purpose is to gain compensation from the membrane supplier - in most instances the product has met spec and is fit for purpose.

Unfortunately, in efforts to achieve better building practice and reduce maintenance, usually it's the authorities who wear the cost of the remedial work - asphalt removal, membrane removal, repair and re-waterproofing - which is costlier than the original job given the high cost of removing failed membranes.

RADCON #7

As demands for better Bridge Deck waterproofing approaches/ materials grow, Radcon #7, with or without



BRIDGE DECK WATERPROOFING — TECHNICAL FEATURE

asphaltic topping, offers “the” failsafe system solution.

Radcon #7 forms a continuous sub-surface barrier within the concrete surface whilst allowing excellent outgassing.

TESTING/PERFORMANCE OVERVIEW

The proven cyclical performance in the field over the past 26 years has verified Radcon #7 as a lifetime waterproofing technology.

1981-1984 BRIDGE DECK TESTS

20 years ago, the first independent testing on Radcon #7 as a Bridge Deck surface treatment began on behalf of Federal Highway Administration, Washington DC.

Some 110 candidate materials were initially offered for this test programme - and was then reduced to 6 materials based on product manufacturers' own testing and product claims as to suitability.

After preliminary tests were concluded, the three best materials (including Radcon #7) were selected for outdoor exposure and asphaltic



DAKRONG QUANG TRI BRIDGE

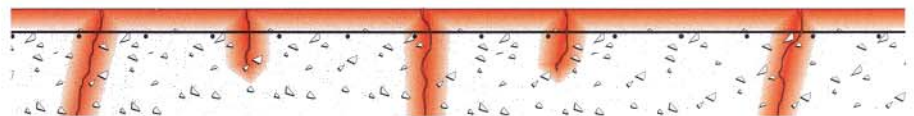
bond testing. It is a matter of record that Radcon #7 proved to be the best performing product overall. Critical aspects in these tests addressed treatment of bridge decks in snowbound areas, freeze/thaw conditions and prevention of chloride ingress by de-icing salts.

Once these tests were completed an asphalt bond test was conducted.

After 12 months of outdoor exposure this test showed that Radcon #7 caused no loss of adhesion.

REACTIVATION

Radcon #7 forms a continuous, sub-surface barrier, totally waterproofing existing cracks - and long-term shrinkage cracks as they form. Radcon #7's ability to reactivate and reseal when water is present prevents any water or salts reaching the first line of reinforcement (confirmed in independent testing by Australia's Federal Government testing laboratory; CSIRO).



RADCON #7 CREATES A SUB-SURFACE MEMBRANE

RESEALING WORKING CRACKS

A critical Radcon #7 performance factor is that it can achieve waterproofing in an existing 1.5mm crack, maintain it as it opens to 1.9mm (a 0.4mm opening) and then close on a cyclical basis without the crack leaking. Whilst Radcon #7 cannot repair structural failures (where volatile cracks are present) the material's ability to handle 0.4mm movement without a waterproofing failure should impress any industry professional.

SURFACE DURABILITY

Another key Radcon #7 feature is that it improves durability of the wearing surface. In 1989, Warnock Hersey tests showed Radcon #7 hardened concrete from 6>8 on Moh's scale.

Aside from waterproofing concrete and consolidating the penetrated zone (15mm average penetration), Radcon #7 delivers a wearing surface as hard as granite - which provides a cost-effective option should an asphaltic topping not be required.

COST ADVANTAGES

There are numerous areas where Radcon #7 delivers significant value and realises substantial savings: -

- The applied cost of Radcon #7 is around 1/4 to 1/3 that of membrane applications.
- Substantial costs are negated as no protective structural topping is required. In turn, this facilitates fast tracking of construction, reduces waterproofing system costs and delivers a lighter structure in weight - leading to potential savings in structural engineering needs.

- Once a bridge structure is Radcon #7 waterproofed, the placement of an asphalt surface can be effected at any future time as budgets become available - even more relevant for rail bridges where ballast is to be placed on Radcon #7 waterproofed sections.
- Applied at a rate of 800 square metres per hour, Radcon #7 allows project managers to fast track stalled or delayed projects - particularly as Radcon #7 is completely trafficable within 6 hours of application.

REFERENCE AND TEST DATA

Radcon #7 waterproofed and protected concrete Bridge Decks can be found across Europe, Asia Pacific and the Middle East.

Bridge designers, engineers and builders should contact Radcrete Pacific's head office in Sydney concerning site references and specific queries regarding tests from leading NATA-WFTAO registered testing authorities.

