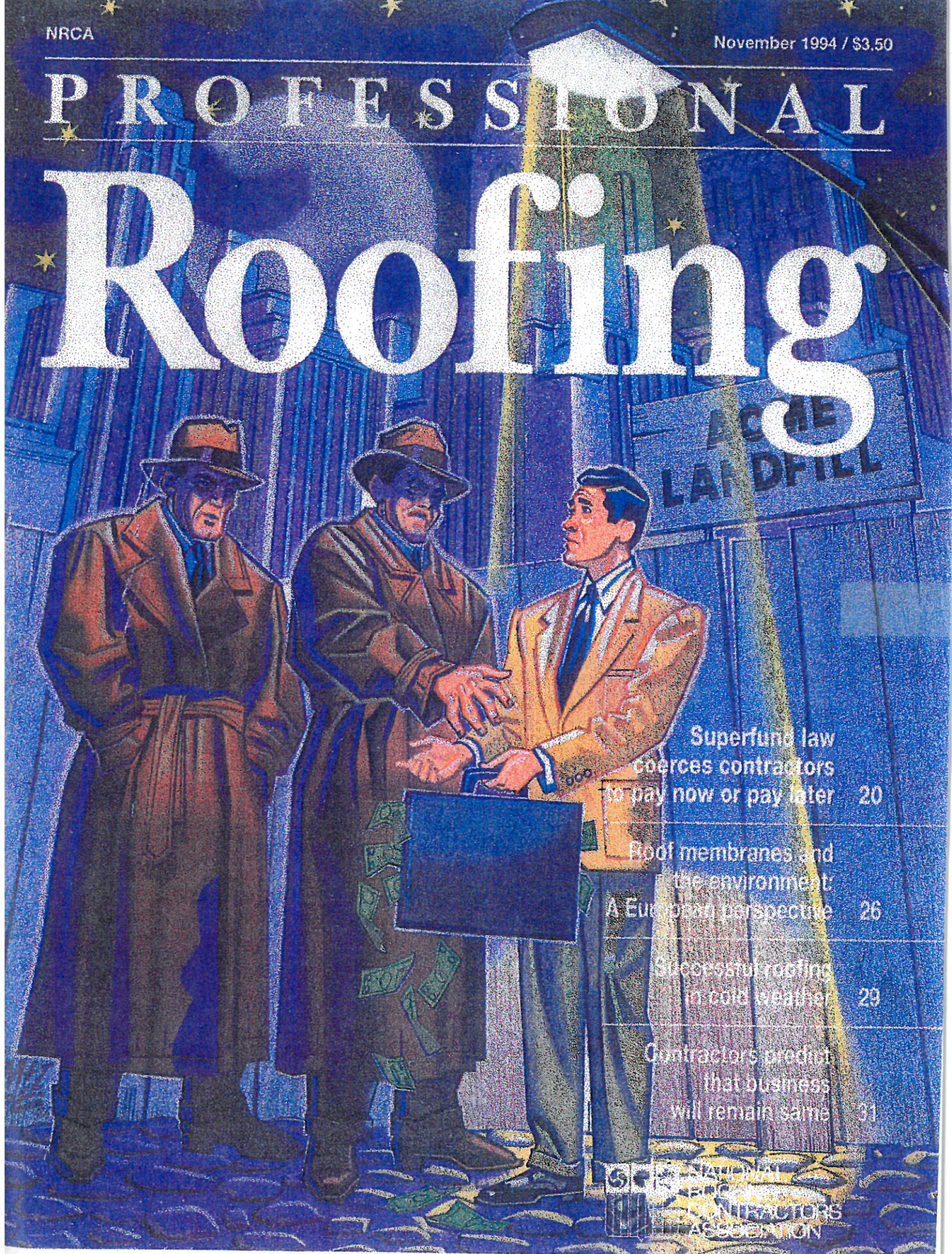
NRCA

November 1994 / $3.50

PROFESSIONAL Roofing



NATIONAL ROOFING CONTRACTORS ASSOCIATION

"ROOFER" program is introduced to the private sector

by Richard Phillips

Dripping ceilings and an occasional flooded classroom are problems of the past at the University of Minnesota, Duluth (UMD), thanks to Army technology that has been introduced to the private sector.

Until 1990, only roofs that leaked or failed at UMD received attention. Unforeseen leaks and roof-section failures were frequent, straining the school's plant services' budget. With many roofs on 47 campus buildings nearing the end of their useful service lives, the plant services department knew that it was imperative to stabilize the roof systems to control costs and avoid en masse emergency replacement.

The ROOFER program

UMD's roof consultant, INSPEC INC., suggested using ROOFER, an Army-developed management program for built-up and single-ply roof systems (see "Tech Transfer," February issue, page 42).

The U.S. Army Corps of Engineers developed ROOFER to establish a procedure for determining priorities and selecting maintenance, repair and replacement plans for the U.S. military's vast inventory of buildings. Users input reference codes for every roof section, based on well-defined deficiencies, yielding results less subjective and more consistent than otherwise possible. The program compares the condition of all roofs in the building owner's inventory, allowing the owner to prioritize maintenance, repairs or replacement and to allocate available funds.

Using ROOFER at UMD

The first step in implementing the ROOFER program at UMD was to take an inventory of the university's roofs, most of which were installed in the 1960s and 1970s, with 1 million square feet (92,900 m²) of all types of roof systems. A file, called the historical record, was established for each roof. The file included general information, such as roof age, system components and insulation thickness, as well as a roof plan. UMD did not have an established historical file; the research was done during the initial survey, which took about three months.

Next, roof conditions were assessed. The evaluation was composed of three separate condition indexes: the flashing condition index (FCI), the membrane condition index (MCI) and the insulation condition index (ICI). These indexes provided a measure of each component's ability to perform its function.

The MCI and FCI were determined by visual inspection and were a function of the type, quantity and severity of problems present on the roof. Technical reports are needed to determine the correct reference codes for deficiencies. *Technical Report M-87/13 Volumes I* and *II* are needed for built-up roof systems, and *Technical Report FM-93/11* is required for single-ply roof systems. These reports provide charts for determining the MCI and FCI, which the ROOFER computer program does automatically, and include color photographs illustrating a variety of flashing and membrane distresses.

The ICI was determined by nondestructive evaluation (NDE)—infrared technology, in this case. INSPEC personnel inspected the roof, using hand-held equipment to locate wet insulation. To compliment the NDE, core cuts and moisture probes were taken to determine the exact quantity of wet material and to verify the roof system's components and their thicknesses.

The MCI, FCI and ICI were combined to obtain a Roof Condition Index (RCI), which ranks the roof condition on a scale of one (worst condition) to 100 (best condition). The program recommends probable roof replacement for RCI scores of 33 or lower. The indexes also are used to develop computer-generated assessment reports.

In addition to using the ROOFER assessment, INSPEC personnel researched historical files to gather any information on the roof systems, and UMD facility personnel were interviewed for their input.

Next, INSPEC personnel used computer-aided drafting (CAD) to generate roof sketches that showed the location of all of the roofs' deficiencies. The sketches provide UMD with a year-to-year, graphic record of deficiencies and repairs. Deficiencies and the locations of attached photos were noted on the drawings to "take the owner up on the roof."

INSPEC inspects UMD's roofs annually, noting current problems and progress made by the previous year's repairs. For example, the 1960-vintage upper roof of UMD's Tweed Hall received a "poor" ranking—42 on the RCI—during the 1992 evaluation. Infrared scanning revealed a large area of wet insulation. The previous year's RCI of 68 for this roof indicated that a leak had developed between the 1991 and 1992 inspections.

At the end of each spring's inspection, UMD receives a detailed report and drawing of each roof, plus a five-year roof replacement schedule and cost estimate. The cover letter documents the date, purpose and scope of the annual roofing review. Furthermore, it introduces the roof replacement schedule and individual roof observation reports.

As a result of implementing ROOFER, UMD is able to replace the worst roofs and repair others, spreading the cost over a period of time. By stressing preventative, as well as emergency repairs, the degeneration curve for functional roofs is being slowed. PR

Richard Phillips is the president of INSPEC INC., Minneapolis, Minn.