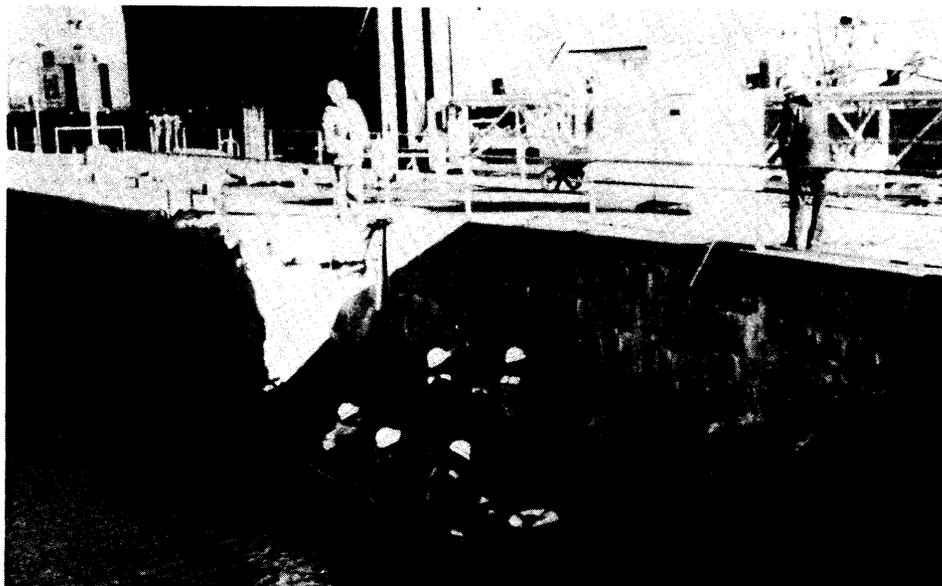




REMR TECHNICAL NOTE OM-CI-1.1
 RATING SYSTEM FOR CONCRETE IN A
 NAVIGATION LOCK



Rating a concrete lock wall, Lock #20 MS River

PURPOSE: To describe a system for quantitatively rating the condition of concrete in a navigation lock.

APPLICATION: The rating can be used to provide a condition index (CI) value for concrete in navigation lock monoliths.

ADVANTAGES: The CI of concrete is expressed as a numerical value between 0 and 100. This value is an assessment primarily of the structural integrity of concrete and secondarily of its serviceability. Since the CI is determined by visual inspection, limited equipment is required. The rating scale established for this system will be used in other rating systems being developed under the REMR Research Program. This rating system is a basic part of an Engineered Management System that will use deduct values for concrete deficiencies to calculate the CI and will track distress data for concrete. The accumulation of such data gives managers a quantitative means of comparing the condition of concrete in one structure with that in another. In time this accumulation of data can be charted to show rates of concrete deterioration in lock walls.

LIMITATIONS: The CI derived from this rating system applies only to the concrete in the navigation lock. Other factors, such as foundation deterioration which may also affect the safety of a lock monolith, are not accounted for in this system. Other elements, such as gates and machinery, require a separate rating system. Under no circumstances should the CI of the concrete in a lock be taken as the overall CI of the lock.

DESCRIPTION: The rating procedure assigns specific deduct values to defects in the following distress categories: cracking (checking, D-cracking,

pattern, horizontal, vertical and transverse, vertical and longitudinal, diagonal, random, and longitudinal floor), volume loss (abrasion, cavitation, honeycomb, pop-outs, scaling, spalling, and disintegration), steel deterioration (corrosion stains, exposed reinforcing, corrosion of prestressing, and damaged armor), and leakage and deposits. The deduct values are subtracted from 100 to establish the CI. Primary deduct values were determined with the intent of obtaining a CI of zero when deterioration of a concrete monolith caused the safety of that monolith to become critical. Nominal deduct values were assigned for defects in serviceability. Deduct values for distress categories that tend to result in loss of concrete from the lock monolith (volume), and thus reduces the effective weight and cross section, were assigned by making approximations concerning safety and assuming (a) all sections were cracked so that no tension or cohesion existed at the section and (b) the total force tending to produce sliding or total moment tending to produce overturning was constant.

The condition index values are grouped in three zones that are related to engineering and management actions. An expanded investigation, including engineering evaluations, should be made when the CI is 39 or below.

<u>Zone</u>	<u>CI Range</u>	<u>Action</u>
1	70 - 100	Immediate action is not required.
2	40 - 69	Economic analysis of repair alternatives is recommended to determine appropriate maintenance action.
3	0 - 39	Detailed evaluation is required to determine the need for repair, rehabilitation, or reconstruction.

The CI should be determined on all gate monoliths, on at least one of each of the remaining types of monoliths, and on the more distressed monoliths. It is recommended that a minimum of 10 percent of the monoliths be rated.

REFERENCES:

- a. Bullock, Rupert E. 1989. "A Rating System for the Concrete in Navigation Lock Monoliths," Technical Report REMR-OM-4, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
- b. Markow, Michael J., McNeil, Sue, Acharya, Dharma, Brown, Mark. (In preparation.) "Network Level REMR Management System for Civil Works Structures: Concept Demonstration on Inland Waterways Locks," Technical Report REMR-OM-6, US Army Construction Engineering Research Laboratory, Champaign, IL.