CODE

COMMENTARY

periodic inspection program. At the end of a specified time period, further strength evaluation is required if the structure is to remain in service. With the agreement of all concerned parties, procedures may be devised for periodic testing that do not necessarily conform to the loading and acceptance criteria specified within this chapter.

27.2.5 If the structure under investigation does not satisfy conditions or criteria of 27.3, 27.5, or 27.6, the structure shall be permitted for use at a lower load rating, based on the results of the load test or analysis, and if approved by the building official.

R27.2.5 Except for load tested members that have failed under a test (refer to 27.4.5), the building official may permit the use of a structure or member at a lower load rating that is judged to be safe and appropriate on the basis of the strength evaluation.

27.3—Analytical strength evaluation

27.3.1 *Verification of as-built condition*

R27.3—Analytical strength evaluation

R27.3.1 *Verification of as-built condition*

27.3.1.1 As-built dimensions of members shall be field-verified at critical sections.

R27.3.1.1 As-built dimensions at critical locations requiring field verification are those dimensions necessary to quantify the performance at those sections. Critical sections for different load effects, such as moment, shear force, and axial force, are locations where stresses caused by such effects reach their maximum value and as further defined for various member types in the Code. Additionally, critical sections may be defined by specific conditions in the structure being evaluated, such as localized member deterioration.

27.3.1.2 Locations and sizes of reinforcement shall be determined by measurement. It shall be permitted to base reinforcement locations on available drawings if field-verified at representative locations to confirm the information on the drawings.

R27.3.1.2 If investigating individual members, the amount, size, arrangement, and location of reinforcement designed to resist applied load should be determined at the critical sections. Nondestructive investigation methods are generally acceptable. In structures with many critical sections, the frequency of measurements may be reduced if the field measurements are consistent.

27.3.1.3 If required, an estimated equivalent f_c' shall be based on analysis of results of cylinder tests from the original construction, tests of cores removed from the structure, or both sets of data. Original cylinder data and core test data shall be representative of the area of concern.

R27.3.1.3 Guidance on estimating equivalent f_c' from original cylinder data can be found in Bartlett (2012).

ACI Committee 214 has developed two methods for determining an equivalent f_c' from cores taken from an existing structure. These methods are described in ACI 214.4R and rely on statistical analysis techniques. The procedures described are only appropriate where the determination of an equivalent f_c' is necessary for the strength evaluation of an existing structure and should not be used to investigate low cylinder strength test results in new construction, which is considered in 26.12.4. The number of core tests may depend on the size of the structure and the sensitivity of structural safety to concrete strength.

27.3.1.4 The method for obtaining and testing cores shall be in accordance with ASTM C42.

27.3.1.5 The properties of reinforcement are permitted to be based on tensile tests of representative samples of the material in the structure.

R27.3.1.5 The number of tests required depends on the uniformity of the material within the structure and should be