

U.S. Department of Housing and Urban Development

UNIFORM PHYSICAL CONDITION STANDARD (UPCS)

PROTOCOL AND INSPECTION SOFTWARE TESTING

(VERSION 2.3)

FEBRUARY/MARCH 2000

1. EXECUTIVE SUMMARY

The system for assessing the physical condition of HUD associated housing, including PHA properties, was developed by HUD after several months of intensive research and extensive consultation with industry, engineers, and housing experts. Our findings and conclusions were ultimately codified into an assessment system of physical inspection protocols and definitions of deficiencies. This system has been used to inspect more than 40,000 properties over the past 2 years.

Throughout the development cycle, HUD has made numerous refinements to the protocols and changes to the definitions based on industry input, internal testing, and quality assurance.

The most extensive set of changes were adopted after numerous meeting with industry during the late fall and winter of 1999. The changes included the following:

- 65% of the definitions were modified – 151 in all.
- There were over 100 modifications to the dictionary of deficiencies, including reducing the severity of 20 deficiencies, eliminating or combining over 20 defects, and deleting severity levels for almost 50 defects by raising the threshold levels.
- The concept of “proportionality” was introduced into the inspection protocols to ensure that observed deficiencies are proportionate with their frequency, relative to the total area being measured.

Testing Objective:

The goal of the current testing cycle was to ensure that:

- The revised deficiency definitions and severity reclassifications were properly transferred to the inspection software in the DCD (data collection device),
- The software and scoring algorithms properly reflect the amended protocol,
- The revised deficiency definitions reflect an accurate and fair inspection protocol, and
- Demonstrate objective language which facilitates consistent deficiency definitions.

Testing Approach and Methodology:

HUD adopted a four tier approach for testing the software and its application:

- Tier I testing involved in-house system tests of the inspection software to ensure that all programming worked correctly.
- Tier II and Tier III, and Tier IV testing involved on-site field inspections at PHAs around the country.
- Tier II testing consisted of demonstrating how deficiencies under the current version of the inspection software (v 2.1) and the revised software (v 2.3) are captured using side-by-side comparison of DCDs with each software version. These tests involved only specific deficiencies – those that changed between v 2.1 and v 2.3 – and did not include full property inspections.
- The Tier III tests were full property inspections (1 -2 developments), including a complete sample size and all applicable inspectable areas using both the current and revised software.
- Tier IV tests involved full inspection of all properties at an individual PHA using both the current and revised software.
- The tests did not involve comparisons to scores from previous inspections because properties conditions may have changed over time (previous deficiencies repaired, new deficiencies identified, etc.).

Demonstration sites were selected to test the software across a diverse range according to the following parameters: development size, geography, PHA size, and development condition as measured by previous inspection scores. Ultimately REAC tested the software at 23 development in 15 cities across the nation. Of the 23 developments, test scores were generated for 19 developments:

- Five developments in 4 cities received the Tier II inspections. Two test scores were generated.
- Seven developments in 5 cities received Tier III inspections. Six test scores were generated.
- Eleven developments in 6 cities received Tier IV inspections. Eleven test scores were generated.
- Of these 15 cities, 6 represented full PHA inspections.

Four teams of REAC Quality Assurance Inspectors conducted the inspections. These REAC-certified Inspectors average more than 20 years of engineering or inspection experience, and none has less than 10 years of relevant experience.

Test Results:

- The “bench-testing” of the software during the Tier I tests confirmed that all definitional and severity changes were correctly incorporated into the software.
- The Tier II field-testing confirmed that the software properly captured the deficiencies identified through the Inspectors’ field observations.
- The Tier III and Tier IV testing confirmed that the software properly captured the deficiencies and scored the results at both the individual property level and PHA level.
- Overall, scores increased in 14 of the 17 properties that received a full inspection using the new software (v 2.3) relative to the score that property would receive using the current version (v 2.1). The average increase was close to 10%, or about 5 points on a 100-point scale. However, the magnitude of increase will vary from property to property depending upon the number and nature of deficiencies identified at the particular property.
- Incorporating “proportionality” into the inspection protocol and scoring accounted for a significant portion of this increase; i.e. the percentage of cracks in the sidewalk prior to reaching the deficiency threshold, etc.

Conclusions and Next Steps:

HUD incorporated all of the agreed definitional and severity changes into the DCD software. After a thorough program of in-house and field testing, the software performs precisely as intended.

Prior to the inspection program proceeding, the following steps must be completed:

- Training and certifying inspectors for using the revised v 2.3 software.
- Release the v 2.3 software to the contract inspector firms at the same time. The software will be available on REAC website for downloading into the DCDs.
- Train PHAs and HUD field staff on the new inspection protocols through training seminars at key sites around the country.
- Make the revised software available to the public through compact discs or downloads from the REAC web site.

To ensure uniform application of the inspection protocols, REAC has enhanced its Quality Control and Quality Assurance processes, to reflect incorporation of the new 2.3 software and its application and revised inspector training protocol. This was accomplished by revising the Quality Assurance process to include more contractor audits and reinforced training and qualification validation.