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ACCEPTANCE CRITERIA FOR QUALITY CONTROL REQUIREMENTS FOR SURPLUS CONCRETE USED TO CONSTRUCT RETAINING WALL BLOCKS

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PREFACE

Evaluation reports issued by ICBO Evaluation Service, Inc. (ICBO ES), are based upon performance features of the Uniform family of codes and the International family of codes. Section 104.2.8 of the *Uniform Building Code*™ (UBC), Section 104.11 of the *International Building Code*® (IBC) and Section R104.11 of the *International Residential Code*™ (IRC) are the primary charging sections upon which evaluation reports are issued. Section 104.2.8 of the UBC reads as follows:

The provisions of this code are not intended to prevent the use of any material, alternate design or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.

The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with the provisions of this code and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.

The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency.

Similar provisions are contained in Sections 104.11 and R104.11 of the IBC and IRC, respectively.

The attached acceptance criteria has been issued to provide all interested parties with guidelines on implementing performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the Evaluation Committee and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from a previous edition, solid vertical lines (■) in the outer margin within the criteria indicate a technical change or addition from the previous edition. Deletion indicators (◆) are provided in the outer margins where a paragraph or item has been deleted if the deletion resulted from a technical change. This criteria may be further revised as the need dictates.

ICBO ES may consider alternate criteria, provided the proponent submits valid data demonstrating that the alternate criteria are at least equivalent to the attached criteria and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a material, type or method of construction, or equipment, meets the attached acceptance criteria, or that it can be demonstrated that valid alternate criteria are equivalent and otherwise meet the applicable performance requirements of the codes, if the material, product, system or equipment is such that either unusual care in its installation or use must be exercised for satisfactory performance, or malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use thereof, ICBO ES retains the right to refuse to issue or renew an evaluation report.

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1.0 SCOPE AND PURPOSE

This criteria establishes the minimum requirements for a quality control program for the issuance of ICBO ES evaluation reports, under the 1997 *Uniform Building Code*™ (UBC), on gravity retaining wall block systems, with the exposure limitations set forth in Section 3.4 of this criteria. These retaining wall systems are created by using massive solid blocks (weighing 2 tons or more) manufactured from surplus concrete supplied by ready-mixed concrete producers.

2.0 DEFINITIONS

Surplus Concrete: Surplus concrete is defined as excess and rejected concrete from jobsites, that conforms with ASTM C 94-96 (Standard Specification for Ready-Mixed Concrete), except for items 6 (Tolerances in Slump), 16 (Sampling and Testing Fresh Concrete), 17 (Strength) (with modifications in Section 4.0 of this criteria), and 18 (Failure to Meet Strength Requirements) of the standard.

3.0 MINIMUM QUALITY CONTROL PROCEDURES

The fabricator of retaining wall blocks made from surplus concrete shall maintain a quality control program that covers the following manufacturing procedures:

3.1 Employee Training: Employees in charge of quality control testing procedures in accordance with Section 4.0 of this criteria must be American Concrete Institute (ACI) Certified Field Testing Technicians, Grade I. Certified technicians shall also be trained to identify the slump of the concrete by visual inspection; to visually inspect hardened concrete during the setting and curing time of the concrete blocks; and to identify physical defects such as shrinkage, shrinkage cracks, chipped or cracked blocks and any irregularities or abnormalities.

3.2 Surplus Concrete Material Acceptance: The surplus concrete blocks must have a specified compressive strength of not less than 2,000 psi. An approved quality control agency shall verify ongoing strength of surplus concrete in accordance with the provisions of an approved quality control testing and procedures manual. The ready-mix supplier shall provide the block fabricator with a delivery (batch) ticket and related concrete mix design data for each concrete batch, to verify the minimum design strength of 2,000 psi prior to placement in the block form work.

3.3 Form Preparation: All interior concrete forming contact surfaces shall be scraped clean of any residual hardened concrete from previous castings, allowing for a smooth, uniform precast surface. This procedure shall be performed between each and every casting.

3.4 Special Exposure Limitations for Blocks Made with Surplus Concrete: Due to the inconsistent nature of surplus concrete, the engineer of record for projects using the fabricated blocks shall not rely on the blocks to provide protection against freezing and thawing and de-icing chemical exposures, as provided for in UBC Section 1904.2, or for exposures in excess of the "Negligible" range for sulfates as provided in UBC Section 1904.3, unless testing and acceptance criteria are in conformance with all the provisions of UBC Chapter 19.

3.5 Pouring and Casting: All block units shall be monolithically poured, in a single lift. These units are not permitted to have any seams or cold joints from two separate pours.

3.6 Concrete Consolidation: Once concrete has been placed into the block form, the consolidation of the concrete

shall be achieved with either a pneumatic or an electric vibrator.

3.7 Set Time: Forms shall stay in place and not be released until the concrete has set for a minimum time period determined by the manufacturer, as documented in the approved quality control manual. Concrete blocks shall not be moved for a minimum set time as determined by the manufacturer and specified in the approved quality control manual. Based on the condition and type of concrete received, the minimum set time shall be determined, such that it will not reduce the quality of the concrete.

4.0 QUALITY CONTROL TESTING PROCEDURES

The approved quality control manual shall specify the minimum inspections and testing as follows:

4.1 Visual Inspection: During the casting operation, an ACI certified field testing technician shall identify the unacceptable concrete as outlined in Section 3.0 of this criteria, prior to any castings. Concrete that appears to have a slump of 7 inches or greater shall not be used. During the setting and curing time of the concrete, the certified technician shall also visually inspect physical defects of the poured blocks, identifying shrinkage, shrinkage cracks, chipped or cracked blocks, and any irregularities or abnormalities.

4.2 Testing for Concrete Strength: The strength of each block shall be determined by nondestructive testing in accordance with ASTM C 805, Test Method for Rebound Number with Hardened Concrete, as provided in the quality control and testing procedures manual, prior to shipment from the fabrication plant. Concrete strength from the rebound number obtained from ASTM C 805 shall be determined by the rebound hammer calibration, which establishes the correlation between the rebound numbers and strengths of tested concrete samples prepared and cured in accordance with ASTM C 31. The rebound hammer calibration shall be performed at least on an annual basis, and documented. Whenever their proper operation is in question, the rebound hammers shall be serviced and verified semiannually.

4.2.1 The strengths, obtained from the rebound hammer calibration, are then noted, recorded electronically, and stored in a database for evaluation. A reduction factor of 0.8 shall be applied to each strength obtained from the correlation data. For example, if the strength of a particular block is 3,000 psi, then the block will be evaluated as if it were 2,400 psi.

4.2.2 All recordings shall be archived for review by an ICBO ES recognized independent quality control agency.

5.0 ACCEPTABLE CONCRETE RETAINING WALL BLOCKS

Acceptable strength of retaining wall blocks shall be minimum average of 2,500 psi when the blocks are tested in accordance with the quality control test procedures specified in Section 4.0 of this acceptance criteria. These blocks must be segregated and clearly identified, away from a stockpile of blocks not meeting this criterion. Blocks not meeting this criterion must not be used for projects requiring ICBO ES approval.

Unacceptable blocks also include those containing typical cold joint casting and blocks that are cast from concrete having a slump of 7 inches and above.

6.0 QUALITY ASSURANCE

The manufacture of the concrete blocks shall be under a quality assurance program with periodic inspections by an independent

agency accredited by ICBO ES. The manufacturing program shall be documented in a manual that is in compliance with the ICBO ES Acceptance Criteria for Quality Control Manuals (AC10).

The quality control inspection agency shall review plant records recorded since the last inspection to verify that the required records are being maintained in a complete and accurate fashion, and that each concrete block has been tested and complies with the established quality control requirements. While at the plant, the inspector shall witness quality control testing and verify com-

pliance with the approved quality control manual.

7.0 IDENTIFICATION AND MARKING

Each concrete block shall be identified by a permanent legible marking or label. The identification shall include the following:

1. Quality control agency listing number.
2. Name of fabricator, location of fabrication facility, and the evaluation report number for the concrete block.
3. Month and year of fabrication.