



Construction Services Memorandum

April 27, 2006

To: MSHA Design and Construction Partners
From: Construction Services

Subject: MSHA's *Green Build Standards* - Amendment #1

As a result of the ongoing implementation and utilization of MSHA's *Green Building Standards* on current projects, further clarification and/or modification related to specifics of the standards is necessary.

This **Amendment #1** clarifies and/or modifies MSHA's *Green Building Standards* dated August 2005 as follows:

Amendment 1.1, General:

Requests for clarification and/or modification of MSHA's *Green Building Standards* shall be submitted to MSHA in writing to the attention of the Construction Services Manager. In making a request, the concerned party shall provide specific standard references, restate the standard in question, and provide a detailed explanation of the proposed request as related to the standard. Any necessary backup information such as hard copy literature, web sites, engineering data, etc. shall also be provided and referenced as an integral part of any requests. MSHA's Construction Services Manager will, in a timely manner, respond to all requests and, to the extent necessary, shall issue an amendment which documents and implements any proposed clarifications and/or modifications to the standards.

Amendment 1.2, MSHA *Green Building Standards*, SECTION 3 R2 ENERGY EFFICIENCY – BUILDING ENVELOPE:

In reference to the table provided, specifically "Floor R Value," the R 30* notation in both zones which reads "*Or insulation sufficient to fill cavity with R19 a minimum" is clarified and modified as follows:

The "Floor R Value" portion of the Table is meant to be used when a floor system is constructed over a cold space, i.e., a crawl space, parking garage, etc., as it is very important to thermally isolate and insulate the floor system from the cold beneath. Confusion has resulted from the Table and Note when the floor system is constructed of wood framing that does not have sufficient depth to accommodate conventional R30 fiberglass or other loose fill or spray applied insulations. The Note referenced with the * further suggests that in instances where R30 can not be readily accomplished due to framing constraints, a lesser R value down to a minimum of R19 will be acceptable. Because floor systems are so crucial to the user comfort and the thermal efficiency of a building here in Maine, we feel it is critical to assure that a minimum R30 be provided for ALL floor systems understanding that this can readily be achieved in various

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ways and, therefore, should not be reduced for any reasons. Therefore, the Table and *Note are changed as follows:

Table: The R Value requirements for both zones are to remain at 30. Delete the * notation.

*Note: Delete the *Note in its entirety.

Amendment 1.3, MSHA *Green Building Standards*, SECTION 3 R2 ENERGY EFFICIENCY – BUILDING ENVELOPE:

In reference to the table provided, specifically “Slab R Value & Depth,” the 4ft requirement is clarified as follows:

Traditionally, slabs-on-grade and frost wall foundations have been insulated either with horizontal insulation under the slab edge or vertical insulation on the inside face of the frost walls at a minimum. The “4ft” “Depth” requirement in the Table applies to either of these methods - horizontal or vertical.

Please note also that in addition to the minimum requirements contained in the *Green Building Standards*, MSHA has a Construction Standard for Thermal and Moisture Protection (see Construction Services’ Design and Construction Handbook) that requires a minimum of R5 closed cell rigid insulation beneath the entire floor slab area.

Amendment 1.4, MSHA *Green Building Standards*, SECTION 3 R2 ENERGY EFFICIENCY – BUILDING ENVELOPE:

In reference to the table provided, the Wood Frame R-Values are further clarified as follows:

Understanding that steel framing is a viable alternative to wood framing, please be advised that Table 402.2.4 of the International Energy Conservation Code, 2004 Supplement edition, provides for insulation equivalents to the minimum wood framing requirements for steel stud framing. Please note that due to the thermal “short circuiting” of steel studs continuous insulation over such framing is generally required as an integral part of the equivalency to the wood framing requirements.

Amendment 1.5, MSHA *Green Building Standards*, SECTION 3 R3 ENERGY EFFICIENCY – BUILDING ENVELOPE:

In reference to the Requirements section for Windows, the “ratings” are modified as follows:

Item “b. Solar Heat Gain Coefficient (SHGC) of .45 or higher” shall be changed to read: “b. Solar Heat Gain Coefficient (SHGC) of .35 or higher.

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Amendment 1.6, MSHA *Green Building Standards*, SECTION 3 R3 ENERGY EFFICIENCY – BUILDING ENVELOPE:

In reference to the Requirements section for advanced framing, part “2. For advanced framing:” is clarified as follows:

As stated in the “Standard” statement, either energy efficient windows or some form of “advanced framing techniques” (i.e., more energy efficient systems) shall be provided. To clarify, any one of the “advanced framing techniques” (OVE or ICF or SIPS) can be utilized to meet the standard. Further, if for example Optimum Value Framing (OVE) is proposed, it shall be utilized throughout the entire building or project and the more energy efficient windows would then not be required. If, however, Structural Insulated Panel Systems (SIPS) were proposed for a roof system only, with the wall systems designed as conventionally framed, we would expect that energy efficient windows would also be provided in order to meet the intent of the R3 requirement. Therefore, it is important that both the alternative selected be effective and that the extent of the impact be fully understood in determining compliance with the R3 requirements. Of course, providing energy efficient windows and advance framing techniques provided the best of all possibilities.

Amendment 1.7, MSHA *Green Building Standards*, SECTION 5 R1 ENERGY EFFICIENCY – INTERIOR LIGHTING FIXTURES:

In reference to the “Standard” which states: “Lighting lamps and fixtures shall be Energy Star rated” we offer the following clarification:

The term “rated” shall mean that the lamp or fixture is recognized, tested, and certified by Energy Star as evidenced by their legal endorsement of the subject product.

Amendment 1.8, MSHA *Green Building Standards*, SECTION 6 R2 INSPECTION/COMMISSIONING:

In reference to the “Requirement” which states: “1 Blower Door test conducted with calibrated equipment operated by a trained and qualified technician to be performed before the drywall is installed if polyethylene is the air barrier & after installation if airtight drywall approach (ADA)” is clarified and modified as follows:

Commentary:

Blower door testing is not a perfect science. For example, in a multi-unit building, blower door testing of individual units and testing to confirm if the air sealing of the units was effective could be reasonably assumed that, if a statistically acceptable percentage of units were air sealed properly, they all were properly done. However, air sealing individual units may have no real bearing on building envelope heat loss if the building shell is leaky. Therefore, MSHA requires building shell air sealing from design through to construction completion.

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A blower door very precisely measures the amount of “hole” in a single continuous surface - imagine the six sides of a large closed cardboard box. A blower door test then tells you how much air will move through the total surface area under any given pressure. If you place several smaller closed boxes inside the larger one and then try to test the individual boxes, you will get a number for each but it is relatively meaningless because the blower door can't - without multiple doors &/or a lot of complicated "sub-tests," isolate the small box surface leakage from the surrounding big box surface leakage.

Generally speaking, testing individual units in a large building will reveal the air leaks - you can feel the air coming in - but if you can't see the path, it won't tell you if the air is coming from the outside, from the basement &/or attic or from another unit. We care because exterior air has to be heated while basement/attic or adjoining unit air may be contaminated with something.

Another issue in large buildings is shell leakage. It is quite possible for the units to have very little leakage while the shell leaks considerably. Blower door testing of individual units - without some detective work - likely won't define shell leakage. We care because the heating system is sized by exterior wall & ceiling surface. If the shell is leaky, all the interior walls are "washed" in exterior air, making them radiate heat at the same rate as the exterior walls and this vastly increases the building heat load.

It is highly unlikely that units constructed within a MSHA project will expect to accomplish “air sealing” utilizing only polyethylene. It is more likely that through the diligent use of caulking at wall plates and door and window installations; attention to tightly sealing any and all penetrations in framing members, including top and bottom plates of walls; and assuring a continuous and tight drywall installation, including air sealing above ceilings, in party walls, in and around cabinetry; that blower door testing will most effectively be conducted after the completion of the drywall work. As to “verification” the intent is to test and investigate how effective the air sealing measures have been executed by performing blower door testing. Such “verification” is not intended to be quantitative - it is meant to be more qualitative, i.e., by looking for and identifying “leaks” in the air seal utilizing equipment (infrared camera), visual, and/or other “telltale” (smoke, powder) methods. It is further important to understand that once leaks are identified, they must be corrected. This may prove to be difficult or impossible based on the type of construction.

MSHA's Construction Services is in the process of analyzing and establishing quantitative data and criteria to establish what will be considered industry standard “acceptable” blower door test results. Such standards and/or criteria will be provided and implemented at a later date.

Signed: Donald R. McGilvery, Construction Services Manager

END OF AMENDMENT #1