



BUILDING CODE COMMISSION

IN THE MATTER OF Subsection 24(1) of the *Building Code Act*, S.O. 1992, c. 23, as amended.

AND IN THE MATTER OF Parts 5 and 9 of Regulation 403, as amended, (the Building Code).

AND IN THE MATTER OF an application by Mika Jantunen, homeowner, for resolution of a dispute with Michael Diver, Chief Building Official, Township of Oro-Medonte to determine whether the proposed insulation system and wall assembly, composed of compressed, stacked straw bales, provides sufficiency of compliance with Parts 5 and 9 of the Building Code at 5745 3rd Line N, Township of Oro-Medonte, Ontario.

APPLICANT	Mika Jantunen Homeowner Barrie, Ontario
RESPONDENT	Michael Diver Chief Building Official Township of Oro-Medonte
PANEL	Tony Chow, Chair Gerry Egberts Neal Barkhurst
PLACE	Toronto, Ontario
DATE OF HEARING	June 7, 2007
DATE OF RULING	June 7, 2007
APPEARANCES	Mika Jantunen Homeowner Barrie, Ontario The Applicant
	Michael Diver Chief Building Official Township of Oro-Medonte The Respondent

RULING

1. Particulars of Dispute

The Applicant has applied for a permit under the *Building Code Act, 1992*, to construct a two storey residential dwelling at 5745 3rd Line N, Township of Oro-Medonte, Ontario.

The subject dwelling, will have a building area of approximately 130 m², and will be constructed using combustible material. The floor of the first storey of the structure will be supported by slab on grade, as the dwelling will not include a basement level. The floor plan shows the dwelling to be rectangular in shape with the first storey containing the main living area, including kitchen, bathroom, living room and a bedroom. The second storey, containing an open concept loft, is only partially finished with the remainder of the area being open to the storey below. The roof of the dwelling projects 1.8 m beyond the north and south walls and 1.2 m beyond the gable ends (east and west walls) of the subject dwelling.

The dwelling will be framed using post and beam members for the structural integrity of the building. The exterior walls of the dwelling are proposed to be “filled in” with compressed, stacked straw bales between the structural post and beam members.

The proposed wall assembly will be constructed using compressed, stacked straw bales with a plastic polypropylene mesh installed on both the interior and exterior surface. The plastic mesh will be stitched to the straw bales using polypropylene twine. Three layers of stucco, a base coat, a scratch coat and a finish coat, will be applied directly to the plastic mesh on both the interior and exterior surfaces of the straw bales. The outermost coat will be smoothed to a finished texture. A coat of water based casein paint will be applied to the interior walls whereas the exterior surface of the straw bale assembly will include a water repellent paint on top of the three layers of stucco.

The issue at dispute between the parties involves whether the Applicant’s proposal to use a compressed, stacked straw bale wall assembly in the construction of a new two storey, Group C – residential dwelling provides sufficiency of compliance with the Building Code. In particular, whether the proposed straw bale wall system will sufficiently comply with the provisions pertaining to environmental separators, such as thermal insulation, dampproofing, flashing, air barriers, vapour barriers and interior and exterior finishes.

2. Provisions of the Building Code in Dispute

Part 5 - Wind, Water and Vapour Protection

(Please see Part 5 of the Building Code)

Part 9 - Housing and Small Buildings

(Please see Part 9 of the Building Code)

3. Applicant’s Position

At the commencement of the hearing, the Applicant submitted that he was unclear as to the technical provisions of the Code that were in dispute by the municipality. He claimed that his building permit has not been approved because the Chief Building Official is “not comfortable with straw bale construction”. He further claimed that the municipality would only permit him to

construct a one storey building using straw bale construction provided that he complied with the conditions listed in a previous Building Code Commission ruling, issued in 1999 for a property in Mississauga. He maintained that he is unclear as to why the Chief Building Official would permit the use of straw bale as in-fill insulation in the construction of a one storey dwelling but not a two storey dwelling.

The Applicant stated that he has tried to address what he believes may be the provisions of the Code that are in dispute. He agreed that, as the use of straw bales is not prescribed by the Building Code, the building is required to be designed to Part 4 of the Code. He advised that he has engaged a professional engineer for the structural design of the building and therefore he believes that the building will be in conformance with Part 4 of the Building Code. He submitted that he believes that all other building systems and components will be in compliance with the respective provisions of Part 9 of the Code. He indicated that it is his assumption that the main areas of concern regarding his proposed construction pertain to wind, water and vapour protection.

In this regard, the Applicant, with the assistance of his consultants, addressed the areas of Code pertaining to thermal insulation, dampproofing, flashing, air barriers, vapour barriers, exterior finishes and interior finishes.

The Applicant submitted that Section 9.13. of the Code outlines the provisions for dampproofing, however, he suggested that, as set out in Article 9.13.1.1., these provisions only apply to foundation walls below ground level of buildings. He further suggested that, since the proposed dwelling does not include a basement, dampproofing is not an issue. Similarly, he advised that the flashing installed on the subject dwelling will comply with Subsection 9.27.3. of the Code.

With respect to thermal insulation, the Applicant argued that, since the municipality would approve the use of straw bales as in-fill insulation for a one storey building, there is no difference in the thermal resistance value of straw bales used as insulation for a second storey. Further, he reported that the thermal resistance value attributed to compressed straw bales exceeds the minimum values required by the Building Code. He elaborated by saying that Table 9.25.2.1. of the Code requires a minimum thermal resistance of 3.00 RSI (R17) for the exterior walls of the subject dwelling. He declared that compressed straw bales provide a thermal resistance between 6.16 RSI (R35) and 7.04 RSI (R40), which not only exceeds the minimum requirements of the 1997 Building Code but also exceeds the minimum required by the 2006 Building Code.

The Applicant and his consultants addressed the Code requirements pertaining to air barriers, vapour barriers, exterior finishes and interior finishes. He maintained that a straw bale wall assembly, while not the same as a conventional wall assembly, provides an equivalent level of performance. He stated that layers of stucco and paint applied to the straw bales serve to provide the requisite air and vapour control outlined in the Building Code. He stressed that straw bale walls allow for a significant amount of safe moisture storage within the assembly.

It was the submission of the Applicant that the composition of the straw bale wall assembly, with the various finishes as described, meets the intent of the Building Code. He added that the roof projection of the dwelling provides additional protection for the exterior walls and will assist in preventing water from entering the wall assembly from the outside.

In summary, the Applicant reiterated that it is his belief that the proposed straw bale wall assembly will sufficiently comply with the intent of the prescriptive Part 9 requirements of the Building Code.

4. Respondent's Position

The Respondent submitted that straw bale construction, such as is proposed by the Applicant, is not prescribed in the Building Code. He further submitted that in reviewing the proposal he looked to a previous ruling of the Building Code Commission for guidance. As such, he indicated that he advised the Applicant that he would accept the proposed construction provided that the Applicant adhered to all of the conditions listed in the previous ruling. He pointed out that the subject proposal contemplates construction of a two storey dwelling and that the previous BCC ruling included a condition that limited the construction to a one storey building.

In response to questions regarding which specific provisions of the Building Code were in dispute, the Respondent advised that the issues in dispute pertained to environmental separators. He confirmed that there was no issue regarding structural integrity of the building as the structure has been designed by a professional engineer in accordance with Part 4 of the Building Code.

The Respondent indicated that the Building Code does not address the use of straw bale construction and he was unable to accept the proposal as providing an equivalent level of performance as would be achieved by complying with the prescriptive requirements of the Code. He stressed that he is particularly concerned with protection against wind, water and vapour especially for the second storey of the dwelling.

In summation, the Respondent reiterated that as the Code does not address straw bale construction, he looked to the previous ruling of the Commission for guidance. He indicated that, as the Applicant would not agree to abide by the conditions associated with the previous ruling, he was unable to accept the proposal as, in his opinion, the proposal does not comply with the Building Code.

5. Commission Ruling

It is the Decision of the Building Code Commission that the proposed insulation system and wall assembly composed of compressed, stacked straw bales provides sufficiency of compliance with Parts 5 and 9 of the Building Code at 5745 3rd Line N., Township of Oro-Medonte, Ontario, on condition that:

- a) A professional engineer, registered in the Province of Ontario, who has expertise in building science and in straw bale construction, shall provide his or her professional stamp on the drawings and details provided to the municipality and he or she shall oversee the construction of the subject building.
- b) The stucco finish applied to the exterior of the subject building shall be not less than 200 mm ($7\frac{7}{8}$ inches) above finished ground level.
- c) The flashing installed for the subject building shall comply with the requirements outlined in Subsection 9.27.3. of the Building Code.
- d) The caulking provided for the subject building shall comply with requirements outlined in Subsection 9.27.4. of the Building Code.
- e) The stucco used for the subject building shall comply with the requirements outlined in Subsection 9.28. of the Building Code, with the exception of Article 9.28.4.1., whereby, a 44 x 49 mm plastic polypropylene mesh (known as Cintoflex C) may be used as stucco lath for the subject building.

6. Reasons

- i) The proposed straw bale wall assembly is being used as an insulation system only. The straw bale wall assembly is not being used to structurally support the subject building. Furthermore, the Commission heard evidence at the hearing that the municipality did not have an issue with respect to structural adequacy of the subject building as the drawings submitted had been stamped by a professional engineer licensed in the Province of Ontario.
- ii) Based on evidence presented at the hearing and the condition requiring a review by a professional engineer having expertise in building science, the Commission is satisfied that sufficiency of compliance with the requirements outlined in Part 5 of the Building Code will be achieved.
- iii) The Commission notes that the municipality would have accepted the proposed use of straw bale construction based upon a previous ruling and conditions issued by the Building Code Commission. However, in this instance the Applicant's proposal included, among other things, using straw bale construction of a second storey and using an alternative to wire mesh as stucco lath. Based on the evidence heard by the Commission regarding the design of the proposed building on the subjects of thermal insulation, dampproofing, flashing, air barriers, vapour barriers, interior and exterior finishes, the Commission is satisfied that the construction proposed will meet the intent of the Building Code in respect to these requirements.
- iv) The Commission heard evidence indicating that the thermal resistance values attributed to the compressed straw bales exceed the minimum thermal resistance values outlined in the Building Code.
- v) In the opinion of the Commission, the roof projection of the subject dwelling provides sufficient overhang so as to provide protection to the first and second storeys of the dwelling.

Dated at Toronto this **7th** day in the month of **June** in the year **2007** for application number **2007-13**.

Tony Chow, Chair

Gerry Egberts

Neal Barkhurst