STRUCTURAL INTEGRITY
Engineering Group, Inc.

April 25, 2012

Mr. Jacques Lucchesi
12 Williams St.
Newton, MA 02464

Regarding: 76 Boston St., Somerville

Dear Mr. Lucchesi:

I am writing to report to you the findings of my structural engineering review of the 3rd floor deck construction at the above-referenced address. On April 17, 2012 I personally visited the site to make observations, measurements, and photographs of visible and accessible structural conditions. At the time of my visit, no destructive explorations through finish surfaces were made, and no physical testing of building materials was undertaken. This report is strictly limited to issues of structural engineering; no representations are made about waterproofing of the building envelope. The remarks herein are necessarily conditioned upon these limitations.

General Description

The building under study is a two-family house having a conventional gable roof with a shallow-sloping low roof area at the rear. According to public records, the house was constructed about 1900. It has a total habitable area of 2228 square feet. A rooftop deck, measuring approximately 11 ft. by 17 ft., exists over the low-slope roof at the back of the house. It is accessible only from the third floor, a finished attic space.

Reason for the Review

The property is presently being offered for sale. A check of building department records by a potential purchaser did not produce full permit documentation for the renovation done in 2006-2007 that included the construction of the roof deck. According to the owner, the renovation at that time also involved strengthening the flat roof at the third floor level and re-covering the gable roof with new asphalt-cement shingles.

A professional opinion about the code conformance of the existing work is therefore sought by the sellers.

Observations at the Site

The framing of the deck was observed from above. It consists of 2x8 pressure-treated joists spaced at a maximum of 24" on center. The joists connect with galvanized hangers either to a ledger board on the face of the house or to a continuous 2x10 pressure-treated beam spanning about 5'-10" between posts. The 4x4 posts appear to bear over exterior walls below the roofing membrane. The deck has 42" high balustrades on all sides, except where the gable wall occurs. 1X6 pressure-treated decking boards serve at the walking surface. This surface occurs about a foot above the level of the interior third floor.

The ledger board at the face of the gable wall is a pressure-treated 2x8 nailed intermittently. Other work was concealed by finishes at the time of the visit.

Review of Documents

The Massachusetts State Building Code has undergone two major revisions since the period in which the work was done. The 6th edition code was in effect at that time. The 8th edition residential code/2009 IRC is now the governing regulation for a 2-family house. Engineering analysis was performed using the present requirements for loading.

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Analysis and Comment

The following loadings were considered on the deck structure, in addition to dead loads:

- Ground snow load= 40 psf (additional snow loading for drifting from the high roof was considered, per ASCE 7-05)
- Exterior porch/deck live load= 40 psf (same as interior occupancy served)
- Railing loads 200 lb. concentrated in any direction on top rail

Structural analysis of the joists and beams indicates that they can safely support the required loadings for this application. I find however, that the ledger board at the face of the gable wall requires better fastening to the main structure of the house. I therefore recommend that two "Ledger-lok" screws should be driven through the ledger into each stud of the gable wall, at approximately 16" on center.

The 2006 work strengthening the roof below the deck was not visible, but in fact the deck relieves this low roof of much of its snow load, as it generally spans from wall to wall. The re-shingling of the existing gable roof would today be governed (for structural purposes) by IRC§R907.2, which requires that "the roof components shall be capable of supporting the roof covering system and equipment loads that will be encountered during installation of the roof covering system." No alteration to the gable roof structure that would induce snow drifting was made.

Conclusions and Recommendations

1. In my professional opinion, the construction of the exterior wood deck at the third floor level can safely support the loads required by the Massachusetts State Building Code, 8th edition (residential), except as noted below.
2. The attachment of the existing wood ledger to the face of the gable wall needs to be supplemented with 2 new "Ledger-Lok" screws engaging each stud.

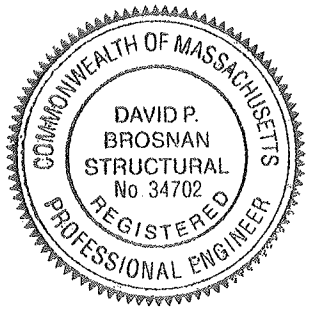
Please accept my sincere thanks for choosing Structural Integrity Engineering Group, Inc. to assist you in this matter. Should you have any questions or comments, do not hesitate to contact me at 781-391-3022. I am attaching a catalog page for the fasteners recommended above.

Very truly yours,

STRUCTURAL INTEGRITY
ENGINEERING GROUP, INC.

David P. Brosnan

David P. Brosnan, P.E.
President



LedgerLok
LEDGER BOARD FASTENER

INSTALLATION PROCEDURE

LedgerLok should be installed using a high torque, ½" variable speed drill (at least 18V if cordless). Choose the proper length LedgerLok so that threads fully engage the main member (i.e., rim joist). Bring washer flush to side member – do not countersink.

Lateral Design Values (in pounds per Fastener) for single shear connections loaded perpendicular to grain

Wood	Specific Gravity**	FastenMaster LedgerLok	Nails		Lags	
			16D	20D	⅜"	½"
Red Oak	0.67	373	184	222	160	280
Southern Pine	0.55	290	154	185	140	230
Doug. Fir-L, SCL*	0.50	255	141	170	130	200
Doug. Fir-S	0.46	233	131	157	120	190
Hem. Fir	0.43	216	122	147	120	180
E. Spruce, W. Cedar	0.36	179	104	126	100	150

* SCL=Structural Composite Lumber (LVL,PSL and LSL)

** Wood species identified typically have average specific gravity similar to the values shown on this table.

All design values based on 1½" side member thickness and penetration into main member as follows: LedgerLok 2", Nails 10x diameter, Lags 8x diameter. Design values may be subject to adjustment factors (section 10.3 in NDS) based on conditions existing during installation as well as those expected during service life.

The lag screw and nail design values included in these tables are compiled directly from the 2005 National Design Specification for Wood Construction (2005 NDS).

For correct fastening patterns and complete installation procedures when attaching the deck ledger to rim joist, consult our Deck Ledger to Rim Joist Technical Bulletin at www.FastenMaster.com. In some ledger board connections, LedgerLok may not be a one-to-one replacement for ½" lag screw patterns.

For use of LedgerLok in non-ledger applications, please consult a design professional for designing all connections, which include the number and location of all fasteners to meet the national and local code requirements.

Ledger Board Attachment Comparative Data
The statement *"Faster, Easier, Stronger than ½" lag screws"* refers to the comparison of LedgerLok design values in ICC-ES Report #1078 and ½" lag screws as published in the current NDS.

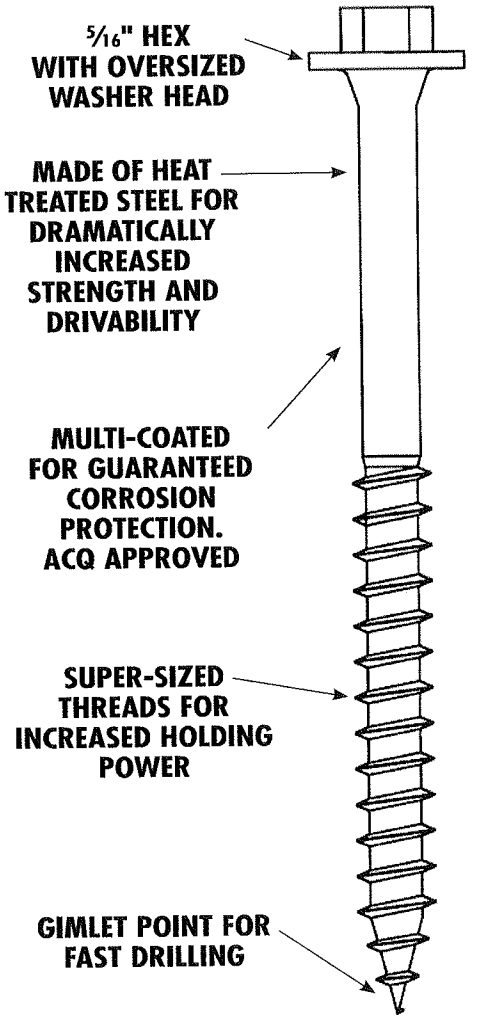
For complete design values and engineering data, available through ICC-ES, see report ESR #1078 at www.icc-es.org.

For technical assistance or questions regarding proper use of this fastener, please contact FastenMaster Technical Support at 800-518-3569 or visit www.FastenMaster.com.

Item #	Screw Length	Quantity per Pack
FMLL358-12	3⅝"	12
FMLL005-12	5"	12
FMLL358-50	3⅝"	50
FMLL005-50	5"	50
FMLL358-250	3⅝"	250
FMLL005-250	5"	250

FMLLSHEET (0211)

PRODUCT FEATURES



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