

Inspecting the Structure System

Presented by Joel S Lunger, PE
President, JSL Engineering, Inc.

ASHI-NE 6th Annual Conference
September 21, 2010



About Me – Joel S. Lunger, P.E.

- Licensed in Massachusetts
- 30 Years of Engineering Experience
- Design/Constructed Several Homes
- Extensive Work with Contractors
- Historic Structures
- Boston Society of Civil Engineers
- FEMA Urban Search and Rescue
- Amateur Furniture Craftsman



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Presentation Handouts

- Go to my website:

www.jslengineeringinc.com

Click on "File Resources" Tab



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What Were They Thinking?



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What Were They Thinking?



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What Were They Thinking?



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MA Standards of Practice

- 6.04 (1) Roofing
 - Chimney (Brick Condition)
- 6.04 (2) Exterior
 - Wall Cladding (Brick, Stone Condition)
 - Deck or Balcony
 - Retaining Walls

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MA Standards of Practice

- 6.04 (3) Structural Components
 - Foundation
 - Basement Floor (Concrete)
 - Basement/Crawl Superstructure
 - Girders, Sills, Joists, Headers, Subfloor, Columns, Posts
 - Roof
 - Rafters, Collar Ties, Sheathing, Ceiling Joists

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Outline of Presentation

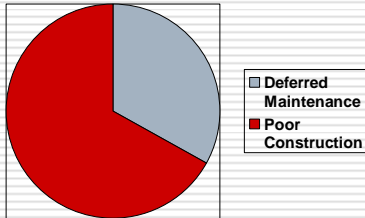
- Overview of Structural Problems
- Common Problems and Solutions:
 - Concrete
 - Wood Framing
 - Brick
 - Retaining Walls

60 Minute Presentation then Q&A

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Sources of Structural Problems



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Sources of Structural Problems

- Poor Supervision and Training
- Hack Attack
- Lack of Attention to Details
- Poor Planning
- Uncorrected Mistakes
- The "I will get back to it syndrome"

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Sources of Structural Problems

"The building inspector is not God!"

"They don't make things the way they used to (Thank God!)"

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Structural Forensics

- Full access to building, all floors
- Sometimes better during daylight
- Follow load path
- Clues:
 - Bulges in plaster (hidden cracks)
 - Gaps at baseboards
 - Large sags in floor, especially at walls
 - Other construction irregularities
- Total Picture → Problem → Solution

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Foundation and Concrete Problems

- Inadequate Preparation of Soils, Founding on Unsuitable Materials
- Non-granular materials, depth of foundation and heave
- Lack of footings (columns on slabs)
- Footings too small

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Foundation and Concrete Problems

- Poor planning, discontinuous concrete placements
- Improper Curing Techniques
 - Placement in hot or cold weather
 - Too much vibrating
- Backfilling before installation of floor diaphragm

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Concrete Problems - Curing



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Concrete Problems



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Concrete Problems - Planning



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Concrete Problems - Settlement

Is it active or inactive?



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Foundation Problems



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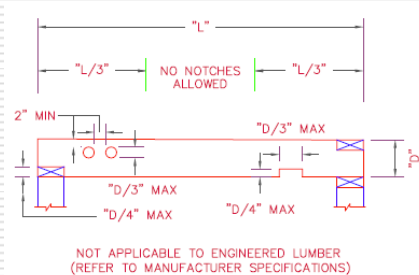
Framing Problems

- Swiss Cheese Framing
- Moisture/Decay Impacts to Capacity
- Inadequate Load Path
- Overloading
- Improper Repairs/Renovation
- Excessive Shrinkage Cracking

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Allowable Lumber Notching



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Framing Problems

- Allowed but Lazy. Are there other issues?



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Framing Problems

- Yes there are! Add another beam...



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Framing Problems



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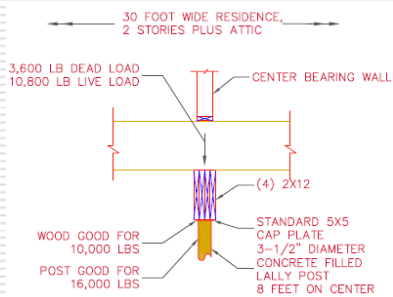
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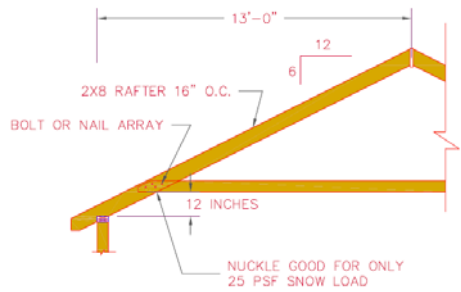
SNOW LOAD (HORIZONTAL PROJECTION)
25 PSF (NANTUCKET) TO 50 PSF (NORTH ADAMS)



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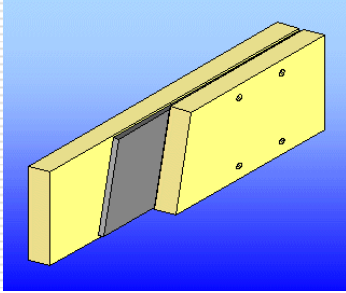
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Framing Problems

- Do not try this at home....
 - Eliminating sag in beams
 - Reducing settlement deflection

Better to fix the problem so that it does not get worse, and leave the 'charm' of an older home.

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Framing Problems



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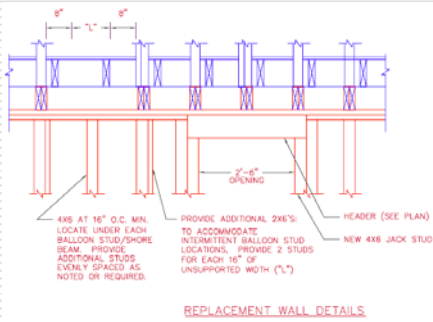
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Brick Problems

- Inadequate Sealants and Flashing
- Improper Application of Coatings
- Water – Freeze Thaw
- Rusting Lintels
- Deferred Roof Maintenance
- Deferred Re-pointing (Maintenance)

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Brick Problems



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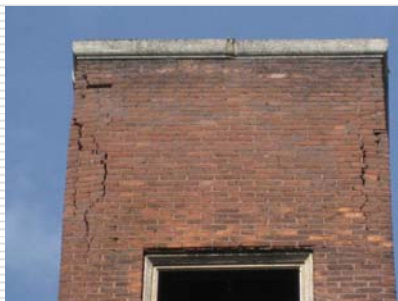
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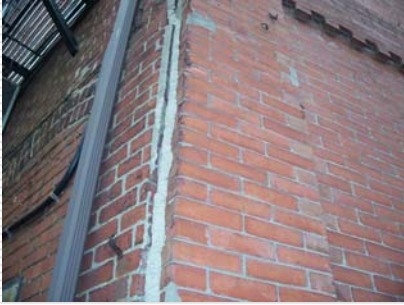
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Brick Problems



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Retaining Wall Problems

- Poor sub-grade drainage
- Poor surface grading
- Inadequate mass to resist overload
- "Landscape Wall Syndrome"
- Internal Instability

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Retaining Walls



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ANY QUESTIONS?

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