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IMPORTANCE OF LUMBER SPECIES AND GRADE IN WOOD SHEAR WALLS

PROBLEM: Use of Hem Fir Pressure-Treated Sill Plates

Structural designs normally assume the sill plate in a shear wall is douglas fir-larch. However, local contractors frequently build shear walls with hem fir pressure-treated sill plates. This substitution of hem fir results in a 18% strength reduction for wood structural panel shear walls. This strength loss occurs due to the weaker holding power of nails in the less dense wood species.

PROBLEM: Existing Sill Plate or Framing is Redwood

Often the structural designer is unaware of the existing lumber species and assumes douglas fir larch construction. Many older existing buildings used redwood for sill plates or general framing. Wood structural panel shear walls constructed with open grain redwood are 35% weaker than equivalent walls framed with douglas fir-larch. Hear walls built with close grain redwood are 18% weaker.

PROBLEM: Unspecified Lumber Grades for Shear Wall Ends Studs

New wood frame construction generally uses various grades of douglas fir-larch for studs in the same wall. Common stud grades include "Stud," "Standard," "Construction," and "No. 2". Unless specified, shear wall ends studs could be any one of these grades. The grade of douglas fir-larch helps determine the allowable tension and compression loads for end studs in shear walls. The lumber species of the sill or sole plate will also determine the allowable load in compression.

Product approvals for holdowns give allowable load values for the lesser of the bolt strength in wood or the strength of the steel connector. These approvals do not determine the proper size and grade of lumber for the tension and compression loads. These tasks are left up to the structural designer and must be verified in plan check and followed in construction and inspection.

REQUIRED ACTIONS:

Structural Plan Check: Engineers shall verify that the structural designer has analyzed the end studs of wood structural panel shear walls with holdowns. Approved plans shall specify the size and grade of holdown end studs and the species (ie. Douglas fir-larch) of all pressure-treated sill plates.

Building and Building-Mechanical Inspection: During shear wall inspection, building and building-mechanical inspectors shall verify the lumber size and grade of holdown end studs and the species of pressure treated sill plates. Pressure-treated douglas fir-larch sill plates are dark green while hem fir sill plates are olive green. Unless otherwise shown on the approved plans, shear wall construction using lumber other than douglas fir-larch shall be referred to the structural designer and structural plan check for resolution.