



2019 Construction Conference  
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## **Oregon and Washington Demystifying Construction Claims in the Pacific Northwest**

### **Introduction**

The devil is in the details. This course focuses on the design plans and the importance of understanding the design component of a construction defect claim, which is especially relevant in the Pacific Northwest where proper exterior wall system design and then the proper implementation of same is critical to a structure's performance. Understanding design and implementation helps to identify causes of resultant damage, risk transfer opportunities, claim defense, and claim exposure.

#### **I. The design and construction process for a typical single-family home**

**In anyone, average sized, single family home, there may be over 10,000 different and individual components:**

- Foundation: rebar, wire ties, mechanical anchors, vapor barrier, rigid insulation, fluid applied waterproofing.
- Framing: capillary breaks, sole plate, trimmers, headers, top plates, floor diaphragm, nails, screws, glue, hurricane hardware, steel moment frames.
- Mechanical systems: fans, termination covers, ducts, return plenums, dampeners, air handlers, condensers, evaporator coils, line sets.
- Electrical systems: lighting, wiring, receptacles, switches, breakers, disconnects.
- Plumbing systems: supply lines, drain and vent pipes, nail plates, mineral wool, fire caulking, air leakage blocks, valves, connections.
- Roof assemblies: trusses, fascia, underlayment, shingles or tile, flashing, sealants, mortar, foam.
- Exterior: WRB, air barrier, drainage plane, flexible and rigid flashings, tapes, sealants, lath, mortar, finish coatings, paints, plant-on.

- Site: subgrade drainage, grass, trees and bushes, walkways, patios, driveway, irrigation.

**In designing and building this same house there are typically over 100 people involved:**

- Land acquisition and feasibility: Zoning, planning, requirements for density, roads, schools, infrastructure.
- Developer: Financial advisors, investment group, mortgage bankers, real estate brokers, accountants, cost engineers, attorneys, and underwriters.
- Architect and his team: Concept artists and draftsman.
- Engineers: Survey, geotechnical, civil, structural, mechanical, electrical, and plumbing engineers.
- Municipality: Plans examiners, permit processors, building inspectors, and fire protection inspectors / fire marshal.
- Contractor: Estimators, project managers, superintendents, project engineers, safety coordinator, and warranty personnel.
- Skilled tradesman: Concrete workers, masons, carpenters, electricians, plumbers, ironworkers, roofers, and HVAC technicians.

Just to name a few!

**Forces a residential structure is built to withstand:**

1. Rain
2. Wind – Pressure and suction a building experiences
3. Wind pressure: uplift or suction
4. Ground pressure: including hydrostatic pressure that can push against foundations
5. Dead load and anticipated live loads
6. Wind driven rain
7. Sun - Summer sun is higher in the sky than winter sun
8. Snow - loading
9. Seismic activity
10. Storms
11. Natural disasters (as much as possible)

### **The Four Ds:**

1. Deflection – Deflect rainwater (sky and ground).
2. Drainage – Capacity of the structure or assembly to drain incidental water (also, applies to building site).
3. Drying – Capacity of the assembly to dry through diffusion and ventilation.
4. Durability – The durability of the building components (chemically preserved wood, stone, etc. versus spruce, pine, or fir).

### **There are various industry standards that designers and builders must comply with during the construction of residential structures.**

The following is an example of the organizations that set and/or govern the minimum standards for the industry:

- International Code Council (ICC) – Sets mandates for construction. The building Code is the law.
- American Society for Testing and Materials (ASTM) – Sets minimum standards for virtually every industry in the world.
- American Architectural Manufacturers Association (AAMA) - Sets minimum performance standards of rated fenestration products.
- American Concrete institute (ACI) - Leading authority for the development and distribution of consensus-based standards relating to concrete.
- The Engineered Wood Association (APA) – Sets minimum performance standards of rated wood products.

### **What exactly does it mean to set minimum standards or govern construction?**

An example:

1. APA – Ratings are stamped onto the structural wood panels used in construction.

Some building inspectors will inspect these panels for proper fastening and span ratings.

32/16 = 32" o.c. for roof trusses and 16" o.c. for joists or studs

Another example:

1. AAMA – Window ratings (product type, performance class and grade) are placed on stickers adhered to the new window assemblies.
- *HS-R20 = Horizontal slider with a commercial grade of Residential 20*
  - *MFGR Code = IW-2 = International Window (Northern California manufacturer)*

Also displays: Air, water, and structural specification identification.

These ratings need to match what has been specified in the project documents.

Many AAMA certified windows defer to AAMA installation instructions.

It is important to identify the applicability of the specific standards being used during the construction of a particular project.

- Building codes are typically updated every three years by the ICC
  - These codes may have changed the requirements on a project requiring new or additional mandates for the building of residential structures.
- Other considerations:
  - What code was a project designed and permitted under?
  - Were there multiple phases in a project that went through code transitions?

**Common Terms and Definitions that you will hear during this presentation:**

- **Rebar:** Reinforcing Bar (Reinforcing steel) – Measured in 8ths. #3 rebar is 3/8” thick.
- **WWM:** Welded Wire Mesh. Concrete reinforcing similar to rebar.
- **Post-Tension Slab:** A method of pre-stressing concrete to enable higher strength and longer spans.
  - Tendons are placed in a tight grid pattern in the concrete form
  - Concrete is poured
  - When the concrete is ~ 75% cured, the tendons are tightened to ~ 25,000 pounds PSI and the concrete is allowed to fully cure.
- **Hold-Down:** Steel device or hardware installed to provide uplift resistance to the overturning moment imposed on the wall.
- **Concealed Barrier:** WRB and flashing components hidden behind the exterior cladding. Can function as part of air barrier and/or drainage plane.
- **WRB:** Weather Resistant Barrier (Building paper or Tyvek) – Sheet good installed being the exterior cladding. Drainage plane. Air barrier.
- **Flashing:** Flexible (peel and stick) or rigid (metal or PVC) – provides continuity with WRB. Enables drainage and provides protection from rain.
- **Waterproofing:** Describes the applied components in an assembly that creates varying levels of water resistance depending on the application.

- **Underlayment:** Sheet good used to separate the roof deck and the shingles or tile. Secondary weather barrier.
- **Composition Shingle:** Typically: asphalt, felt, and fiberglass with colored granules applied to the topside of the shingle.
- **Concrete Tile:** Flat, low, or high-profile concrete tiles. Comes in many shapes and sizes as well as various colors.
- **Weep Screed:** Metal or vinyl stucco accessory that provides a drained stop at horizontal terminations. Base or wall or window head.
- **Z- Bar:** Metal or vinyl stucco accessory that provides a stop at horizontal terminations. Top of wall at roof eave.
- **Head Wall:** The interface between the sloped roof and a wall.
- **Confined Rake:** Roof-to-wall interface that follows the pitch of the roof and terminates at the roof edge. The confined rake is created when the roof plane transitions to a vertical surface (such as a wall).