Creating the Perfect House

Discussion is limited to North Carolina counties with 90 and 100 mph wind designs. Assumes clay soil with 2000 psf bearing capacity.

Below is a discussion on creating the perfect house. Numerous clients are trying to get A PERFECT HOUSE built using house plans designed to meet the N.C. residential building code. The N.C. residential building code was designed to specify a **minimum** design requirements for houses, not a PERFECT HOUSE.

Home builders construct numerous houses every year. They have developed a level of Expectations from their clients. They are NOT prepared for a client who desires a PERFECT HOUSE.

Clients looking for a PERFECT HOUSE need to inform the designer and the home builder that their expectations are much higher than the general public.

The house plans need to take into account your higher expectations than the residential building code specifications.

TO GET A PERFECT HOUSE
– IT IS GOING TO COST YOU MORE MONEY!

Residential Design

- Typically, house plans are drawn by someone who operates a CAD system. Some home designers have very little training.

- Typically, houses are not designed by licensed Architects and Engineers.

- Large houses should have an Architect involved.

Footings and Foundations

- 18″ deep by 24″ wide footings with rebar (unless on a hill, then the foundation needs to be much deeper)

- Foundation elevation transitions (change of grade) require rebar

Garage Floor System

- Tie into foundation walls greater than 12″ tall.
- Concrete cracks during and after the curing process. Cracks can be controlled by installing saw cut joints to force the location of the cracks into the joint.

Compacted Fill

- try to avoid compacted fill situations, contractors do not want to install 6″ of fill and compact it. To fill a 10 foot fill, would take 20 fills and 20 compactions. Contractors do not see the need for it.

  Even 57 stone fill should be installed in 12″ lifts and have some compaction.

Floor Systems

- recommend Southern Yellow Pine (SYP) Pressure Treated (PT) dropped girders, there is nothing wrong with flush girders.

- recommend running floor joist extend past dropped girders by 18 inches

- recommend wood I-joists, but other products can be used too.

- recommend 23/32″ thick Advantech plywood tongue and groove

- recommend deflection criteria of LL/600 ** extremely important. NC Residential Code book allows LL/240 deflection requirement.

- Hardwood floors are required to be placed perpendicular to the floor joist (Even if ¾″ T&G floor sheathing is used)

- Marble and granite floors require special floor framing and floor sheathing. The floor joists need to limit deflection to LL/600. The floor sheathing needs to be two layers of ¾″T&G , with an over lapped 48″ to prevent cracking the granite/marble finished floor.

Crawl Space

- DCSPE now believes in conditioned crawl spaces and sealed crawl spaces.

Concrete Slabs

- Slab on grades can use fiber reinforcement, but in N.C. the saw cut joints have to be 10' o.c.
- For rebar mats, do not use rolled rebar mats, use the flat sheets.

Roof Systems

- recommend hurricane clips on ends of rafters or trusses

- If you have an attic, have the entire house designed for the required 40 psf Live Load in the attic (even if you do not finish it off now)
- Best to use "H" clips to correctly gap the plywood
- Hire a home inspector to check roof nailing before the roof sheathing is covered with felt.

Slate Roofs

- Slate is very heavy, the designer must know that the roof will be covered with slate.

Cedar Shakes

- Cedar shakes should not be used in N.C. The climate is not right for cedar shakes, their durability is reduced compared to durability in the Western states.
-

Steel Lintels

- Lintels are designed to support brick walls over garage doors and large windows. The lintels cannot deflect more than L/600 or a maximum of 0.3"
- Steel lintels longer than 6' should have a bearing length of 8" minimum to prevent rotation.

Brick Ties

- Brick ties are required by code. The taller the brick wall, the closer spaced the ties should be on the bottom portion of the wall
- Renovations – assume that an existing brick wall has no brick ties, if adding to the height of the wall.

Walls

- install 7/16″ thick plywood around the entire house

- install a vapor barrier on the outside of the plywood

Heating and Air Conditioning and Insulation

- hire a Mechanical engineer to design the duct system and locate the vents.
- roof and floor insulation
- hire someone to follow behind the installation to examine the duct runs and the connections to the vents.

Gutters Down Spouts and Drain lines

- recommend Leaf Guard gutters with the 6″x4″ down spouts
- drain lines should be placed by a professional
- ensure water flows away from the house foundation

Masonry Chimney Footing

- there has a problem with rotating masonry chimney foundations because the code book provided a rule of thumb estimate on the size of the footing.
- Currently the NC Residential Building code requires a 12″ project around the chimney.
- For chimney's taller than 35′ – recommend hiring a structural engineer to design the footing foundation to prevent settling and rotation.
- Direct any surface water away from the chimney foundation, including water from HVAC condensate lines.

Attic Ventilation

- Ridge vents and soffit vents work just fine (provided the insulation does not cover the soffit vents)
- Power vents can actually cause problems. DCSPE has seen power vents close to the ridge, that sucked air from outside, though the ridge vent and back out.
- DCSPE measured 100% moisture in an attic with a power vent. Pressing on the plywood roof sheathing, we were able to squeeze out drops of water.
- Gable end vents are sometime acceptable.