This portion of the program will address the code requirements for wall framing, although we won't address bracing in this section. The program contains a separate bracing section.
Let's start at the bottom. The default code requirements are that bottom plates be attached to the foundation with bolts. The code addresses minimum bolt diameter, minimum penetration into the foundation, maximum spacing between bolts, and the maximum distance from the end of each piece of plate for the first bolt.
Wall Framing

- Other devices must be approved

In practice, however, we often see other devices. All of those devices are proprietary and there aren't any general statements to make about them except:

1. They aren't specifically recognized by the code and must be accepted under the alternate methods and materials section of the code.

2. In order to insure that these devices provide connection strength comparable to bolts, they must be used in accordance with the manufacturers’ recommendations. Typically users in the field want to space these devices farther apart than what’s required by the manufacturers because they assume that they can be used in the same manner as bolts.
The IRC addresses minimum stud lengths, although the 2000 edition is somewhat confusing. Because Table R602.3.1 addresses stud heights above 10 ft, the implication is that the default maximum stud height is 10 ft. However, the 2000 edition isn't specific. The ‘03 edition has been revised to clarify that the maximum stud height is 10 ft unless the provisions of Table R602.3.1 are followed.

In the ‘00 edition of the IRC there's nothing to address nonbearing stud heights. The ‘03 edition limits nonbearing studs to 20 ft, although there are some other requirements placed on studs that are that high.
Stud spacing is also limited, as we see here in a version of IRC Table R602.3(5). Spacing is limited by loading.
Wall Framing

• UTILITY GRADE STUDS
• IRC Section R602.2
  – Bearing walls can support no more than roof & ceiling (spacing ≤ 16" o.c.)
  – No grade-specific limitations – bearing wall height req’ts same as other grades
  – No limitations on use in nonbearing walls

Utility Grade studs are relatively low-strength members and often look pretty rough. However, the code permits their use under the limitations that you see here.
Wall Framing

GENERAL WALL FRAMING
• 3 studs at each corner
• Double top plate on exterior & bearing walls
  – Overlap corners and intersections
  – Offset end joints
  – Joist/rafter bearing near stud
• Single top plate on interior nonbearing walls
  – Overlap corners and intersections

The general framing provisions for walls are similar to what’s been in the UBC and SBC for a long time. We’ll talk more in a moment about the details.
Here are the requirements for top plates. Notice that the joints in the individual pieces of the top plates must be spaced no closer than is shown. The differences in the spacing requirements contained in the IRC and IBC shouldn’t be a concern. This same difference existed between the Uniform Building Code and Standard Building Code, and there was no evidence of either of these numbers being more correct structurally than the other.

Also notice that where roof/ceiling framing bears on the plate, it must be more-or-less above the studs if they are spaced at 24” o.c..
Wall Framing

CRIPPLE WALLS

• Stud size not less than wall above
• If more than 4’ high, stud size as req’d for an additional story
• If less than 14” high
  – Solid blocking
  – Sheathed one side with WSP
• If more than 14” bracing req’d

Cripple walls are addressed in some detail in the IRC, maybe more so than they were in the older codes. Because cripple walls often act like another story, details of their construction are important, particularly in high-seismic areas.
The IRC contains pre-calculated headers tables. Users of the UBC will remember that it was pretty vague about headers. The SBC contained header tables, but they were different than what’s contained in the IRC.
Wall Framing

HEADER TABLES

• Tabulated header spans
  – 4 main species
  – Based on
    • Ground snow load
    • Building width
  – Jack studs addressed

• Wood structural box header
• Header not req’d in nonbearing walls

There are pre-calculated header tables in the IRC. These also appear in the IBC.
Cutting of studs is probably one of the most common code violations.
We'll see some examples of both code requirements and common violations in a moment.

Although the code says that holes aren't allowed in the same section as notches, it doesn't explain what's meant by "same section." Keep in mind that the intent is to preserve as much continuous wood fiber as possible to transfer forces, while still permitting some limited cutting of the fiber. Holes and notches placed so close to each other that they effectively destroy most of the fiber would be in violation of this requirement.
Here are illustrations of what the code permits.
One of the functions of the top plate is transfer lateral forces in the wall and help prevent racking (more on this in the bracing section). For that reason it’s important that continuity of the plate be maintained if it’s necessary to cut it. The code requirement is for

1. The metal splice plate to be of a minimum thickness and width, and
2. The nails on either side of the cut (6 req’d in the 2000 edition & 8 req’d in the 2003 edition)

What it doesn’t say is how those go together. This illustration is similar to what’s in the code. Putting so many nails so close together may split the wood. It might be better if the strap were wide enough to span the cut in both levels of the top plate and the nails distributed in a wider fashion. Or if the steel plate were longer and the nails a greater distance from each other.

Wood structural panels nailed across the cut would accomplish the same thing.

Also not addressed is whether the top plate can be completely cut and how to compensate for that situation.
Wall Framing

Here's an example of notching and boring of studs in compliance with the code.

A point to make here is that the straps that you see on the face of the studs don't do anything to compensate for over-cutting. They simply provide protection of the pipes from nail puncture. There are, however, proprietary products that are intended to reinforce the stud if it's over-cut.
Here's an example of a violation – the holes are too near the face of the stud.
At first glance, this appears to be in compliance with the code. However, it might be that these two pipes have effectively destroyed the continuity of the wood fiber in the stud by cutting out most of the wood fiber in one section of the stud. And it looks as if the black pipe may be too near the back face of the stud. Again, the strap doesn't compensate for those problems.
Since most violations occur as a result of trying to put pipes into a wall, here’s a good solution: a double-stud wall.
Here’s another solution when accommodating large pipes – using wider studs. However, in this example because of the angle of the pipe the hole is larger than allowed, and it may be too close to the face of the stud.
Wall Framing

And when wider studs are used it’s important that they rest completely on a plate. The code requires for the plate to be at least as wide as the studs.
And important consideration in the IRC’s wall requirements is bracing. We have a complete section on that subject.
Wall Framing

QUESTIONS?