CHAPTER

3

Installation

During the design phases of a building construction project, one must give attention to general plumbing code requirements that will apply to the type of occupancy and use of the structure, as well as the type of preferred or mandated materials that are to be used for installation purposes. Chapter 3 of this publication, "Installation," addresses items such as general requirements, protection of plumbing systems, materials and standards, and water/sewer requirements.

WATER AND SEWER REQUIRED

International Plumbing Code® (IPC®) Chapter 4 establishes the minimum number of required plumbing fixtures for the various group occupancies described in the IBC. This will be discussed in further detail later in the following chapter. The *International Residential Code*® (IRC®) requires each dwelling unit in detached one- and two-family dwellings and townhouses to be provided with sanitary and bathing facilities as well as kitchen facilities. The point here is that where plumbing fixtures are mandated, an approved means of waste discharge is required to which the fixtures shall be connected. Sanitary drainage systems shall be connected to a public sewer. Where a public sewer is not available, sanitary drainage shall be connected to a private sewage disposal system. In most cases, both public sewer utilities and private sewage disposal systems are regulated by state or local authorities. Where such regulations do not exist, the provisions of the *International Private Sewage Disposal Code*® (IPSDC®) will apply where adopted locally. There is an exception that allows waste water from bathing and laundry facilities to discharge to a subsurface landscape irrigation system or to an on-site nonpotable water reuse system. In both cases, you will want to verify that these options, although included in the code, are acceptable to local health regulations. On-site nonpotable water reuse systems will be addressed in Chapter 10 of this book and Chapter 13 of the IPC.

Wastes that are dangerous or damaging to the building drainage system or to the public or private sewage disposal system shall not be discharged into such systems. While some of those items that can be detrimental or dangerous are identified in the code, it is good to coordinate with the authority having jurisdiction for the public or private sewage disposal system, as well as for the handling and disposal of hazardous materials and fluids, should there be any questions. Certain wastes can be removed or captured by means of interceptors and separators, such as greases, oils and sand, lint, hair and some chemical wastes can be further diluted prior to entry into the drainage system.

Plumbing fixtures, devices and appliances that require the use of water for proper operation are required to be connected to the water distribution system of the structure, which is then connected to an approved source of water, either a public or private source. Generally, approved water sources will be by means of a public water utility. However, where a potable public water supply is not available,

You Should Know

The code official should work with the local authority overseeing public sewers and on-site sewage disposal systems, such as a public utility or a health department, when it comes to identifying discharges that may be detrimental to the disposal systems. Such agencies may also control hazardous waste disposal operations. ●

Code Essentials

The *International Private Sewage Disposal Code* contains provisions for on-site sewage disposal systems, and Chapter 14 of the *International Plumbing Code* (IPC) contains provisions on graywater discharge to subsurface irrigation use. Always verify local regulations that may apply. ●

You Should Know

Definitions for consideration (see Glossary):

- Third-party certified
- Third-party certification agency ●

individual sources of potable water shall be used. Quite often an individual source of potable water is a private or community well. It is common for both public and private, or independent, potable water sources to be regulated by agencies or departments outside of the typical building department. For instance, many state and local health departments oversee potable water sources for properties and construction. These regulations will often include mandatory supply and storage volumes for private or independent potable water sources. Although the plumbing inspector may have no authority over potable water sources, it is imperative that an approved potable water source is properly identified for the intended use before granting approval for construction. [Ref. IPC 301.3, 301.4, 302, 602.3, 701.2 & IRC R2601.2, R2602.1]

MATERIALS AND STANDARDS

Adherence to the IPC will result in a plumbing installation of good quality. But, quality goes beyond the skill of the installer. Quality construction depends also on materials of good quality. Both the IPC and the IRC include a chapter that lists the various product standards for plumbing materials that are identified in the code, and that chapter includes a reference to the code section(s) where the use and installation of such materials are addressed. Additionally, it is important to note that many code sections also include the applicable product or material standards. This provides a quick and easy means for identifying the appropriate standard for products and materials.

How can you know for sure that the materials used conform to the applicable standard identified in the code? Here is where the third-party certification comes into play. Such identification is what is most commonly referred to as a listing, that the product or material is listed, thus providing confirmation that the product or material has been evaluated by a third-party certification agency. To better explain what a third-party certification agency is, let's consider the ICC Evaluation Services (ICC-ES PMG) program, which is one such agency since it pertains to plumbing, mechanical and gas materials and products (Figure 3-1). The PMG listing mark indicates that the product complies with applicable standards and codes, and that ongoing inspections at the manufacturer's site are conducted to ensure that the quality of the product remains consistent.

Figure 3-1 ICC-ES PMG mark.

It is equally important that the product or material be installed in accordance with the manufacturer's instructions and the code. Keep in mind that there may be rare occasions where a conflict exists between the manufacturer's installation instructions and the code. The code specifically states that where conflicts occur between the code and the manufacturer's installation instructions, the more restrictive provisions shall apply. As an example, consider temperature-actuated, flow reduction (TARF) devices that conform to the ASSE 1062 product standard, which is an approved standard recognized by the code. Such devices can be an effective means for reducing the possibility of injury due to exposure to hot water discharge in excess of 120°F. However, the code clearly states that such valves are not to be used alone as a substitute for balanced-pressure, thermostatic or combination shower valves. In this case, the code prevails regardless of what might be indicated in the manufacturer's installation instructions. [Ref. IPC 301.7, 303, 412.3, 412.7, Chapter 15 & IRC P2701.1, P2724.2, Chapter 44]

Code Essentials

Where there are conflicts between the code, manufacturer's installation instructions, referenced standards or other regulations:

- The minimum provisions of the code apply over requirements in referenced standards and manufacturer's instructions. [IPC 102.8.1 & 303.2]
- The provisions of the code are not deemed to nullify any provisions of local, state or federal law. [IPC 102.10] ●

PROTECTION OF THE PLUMBING SYSTEM AND STRUCTURE

During the installation of the plumbing system, attention must be given to protecting both the plumbing system itself as well as the structure. In this section we will cover some specific code requirements that address this. We will first consider protection of the structural integrity of the building during the plumbing installation, and then we will look at requirements for protection of the plumbing components.

The code states that plumbing is to be installed with due regard to protecting the structural integrity of the structural members. Proper installation of the plumbing fixtures themselves is also necessary for protection of floor and wall surfaces. For now, let's focus on the structural integrity, primarily the foundation and the framing members.

One item that can undermine the foundation is the placement of piping underground near the structural foundation, especially when the excavation and piping are installed parallel to the foundation. Trenches that are parallel and next to the foundation cannot extend below the 45-degree bearing plane of the footing wall (Figure 3-2).

You should know

For plastic sewer piping, an insulated copper tracer wire or other approved conductor shall be installed adjacent to and over the full length of the piping. Access shall be provided to the tracer wire or the tracer wire shall terminate at the cleanout between the building drain and building sewer. The tracer wire size shall be not less than 14 AWG and the insulation type shall be listed for direct burial. [IPC 306.2.4] ●

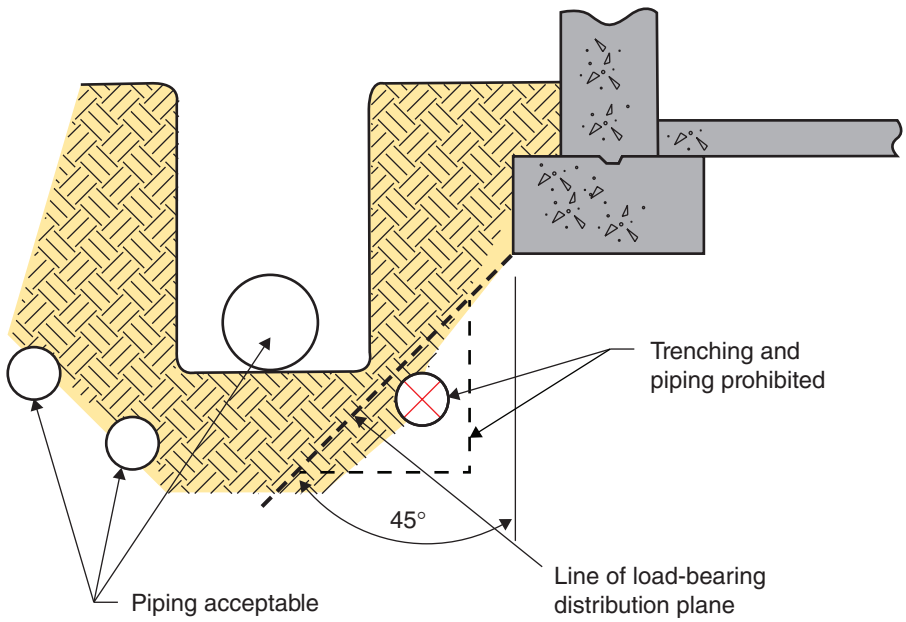

Figure 3-2 Excavation in relation to footing.

Attention must also be given to the necessary boring and notching of framing members, such as vertical studs and horizontal joists. For the benefit of the plumbing installer, the IPC includes an appendix (Appendix C) which details the location and maximum allowances for cutting, notching and boring of wood framing members as required in the IBC and IRC (Figures 3-3 through 3-5 and Table 3-1). Boring, cutting or notching of trusses and other engineered wood products is prohibited except as specifically permitted by the manufacturer. Otherwise, a registered design professional must consider any alterations in the design of the engineered component. Wherever piping penetrates floors, ceilings or walls that are required to have fire-resistance rating, such penetrations must be protected in accordance with the IBC in order to maintain the fire-resistance rating. Even where fire-resistance rating is not required, approved sealing or caulking of the annular space between the pipe and the sides of the opening are needed in order to prevent the entrance of rodents, which can be damaging to both the structure and the plumbing system, besides being a health hazard.

Consideration must also be given to protection of the piping system itself. This mainly involves providing proper support of the piping and installing safeguards to protect the piping from damage once it is installed. Let's first address support and protection of piping buried below grade.

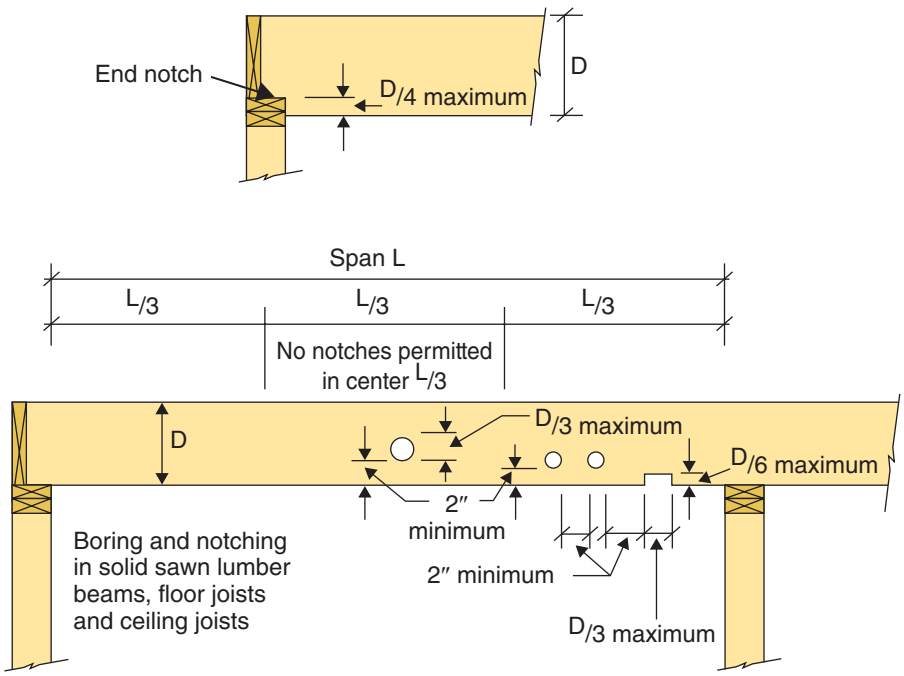

Figure 3-3 Boring and notching in solid sawn beams, floor joists and ceiling joists.

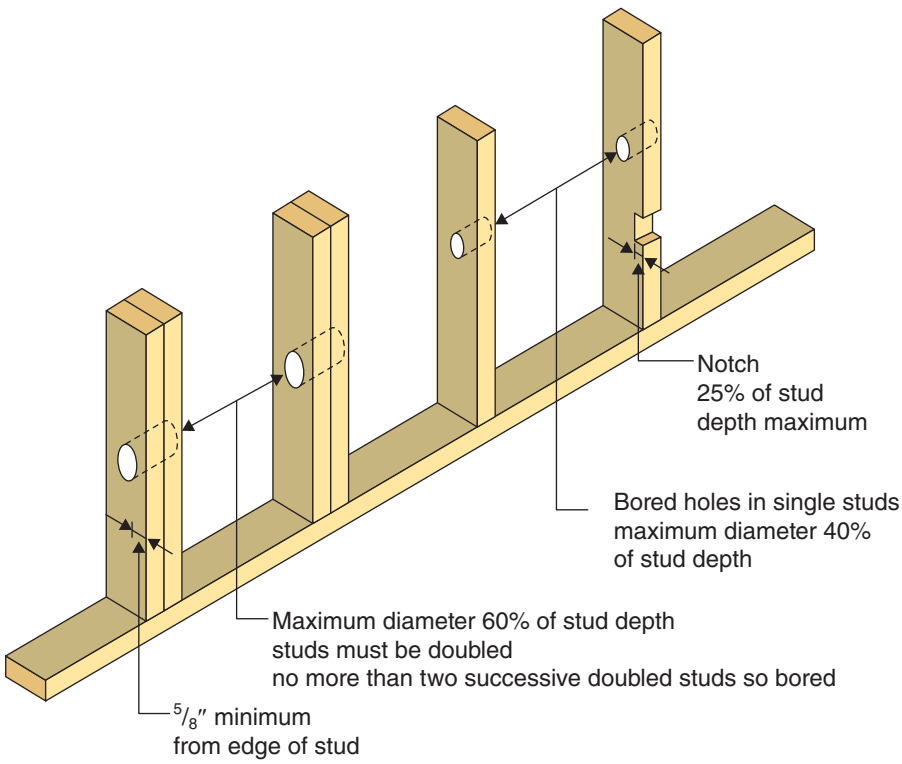

Figure 3-4 Boring and notching of studs in exterior wall or bearing interior wall.

Code Essentials

Appendix C in the IPC contains provisions regarding notching, boring and cutting wood framing members which are consistent with the *International Building Code* (IBC) and the IRC and are provided to the user of the IPC for a matter of convenience. One must look to the IBC and IRC for notching, boring and cutting limitations as they apply to other materials, such as cold-formed steel and engineered wood products.

Note: The provisions of Appendix C are not mandatory unless specifically adopted by ordinance. ●