

# Guide to Porch and Deck Design and Construction

Volume 1 of 2



City of Chicago  
Richard M. Daley, Mayor

---

## Contents

---

<u>Page(s)</u>	<u>Description</u>
1	Letter from the Mayor
2	Introduction
4	Step One: Can I Use This Guide?
5	Step Two: How Many Units Wide Is the Building?
5	Step Three: Specify Building Construction Type
6 to 10	Porch Configurations (Types A, B, C, and D)
A.1 to A.5	Appendix A: Glossary of Terms
B.1 to B.7	Appendix B: Materials for Construction
C.1	Appendix C: Structural Design Issues
D.1 to D.5	Appendix D: Unacceptable Details

**IMPORTANT NOTE:** As of January 1, 2004, the chemicals used as preservatives in pressure treated wood have been changed for environmental reasons. Unfortunately, the new chemicals have proven to be corrosive to commonly galvanized metal connectors. Therefore, this Guide requires the use of connectors that have undergone a more rigorous galvanized process. See page B.6 in this Volume for more details.



### A Message from Mayor Daley

Porches and decks reveal as much about the history of Chicago housing as do the brick cornices, high-reaching archways and decorative facades found on many older two and three-flat buildings. Originally intended as a secondary exit for tenants in case of an emergency, the use of porches began to expand when milkmen and dry ice providers used the back porch as a means to deliver their goods and laundry was hung there to dry.

Today, the use of porches and decks continues to evolve. Homeowners and tenants use porches as an extension to their home or apartment by adding potted plants and deck furniture. The popularity of decks has grown as city dwellers have begun to view them as a place to host occasional parties. However you choose to enjoy your porch or deck, it's essential that it is designed properly, built in accordance with the Chicago Building Code and maintained on a regular basis so that in the case of an emergency, all the building's occupants can exit safely.

For homeowners who intend to replace their deck or porch system, the City has developed a step-by-step guide to porch and deck design and construction. Whether you are building the porch or deck yourself or have hired a contractor to do the work for you, this Guide will provide you with the information you need to ensure that your porch or deck is built correctly. It contains several standardized porch designs that comply with the Chicago Building Code. It also includes instructions on construction methods and describes the process for obtaining a building permit once the design has been selected.

The safety of all Chicagoans is our first and foremost priority. If you have doubts about the safety of your porch or deck or if you are unsure if it should be replaced, call 311.

Sincerely,

Richard M. Daley  
Mayor

---

## Introduction

---

The Chicago Building Code defines a porch as “an unheated roofed portion of a building, generally containing a stair used for ingress (entering) and egress (exiting) and a floor area, and separated from the principal portion of the building by a fire rated wall and unrated doors and windows.” A deck is defined as “an open, unroofed structure used in conjunction with a principal building or installed on the roof of a building. A deck other than a rooftop deck may be classified as attached or detached depending upon its relationship to the principal building.” Simply said, a porch has a roof and stairs, whereas a deck does not have a roof but may have stairs. Regardless of whether a porch or a deck, both are designed and built in a similar manner and serve many of the same functions.

The purpose of this **Guide to Porch and Deck Design and Construction** is to provide the homeowner with the “tools” he or she needs to build a porch or deck that meets the requirements of the Chicago Building Code. If you own the building you live in, the building is three stories high or less and the building has no more than six units, you can likely use this **Guide** to get your building permit and you won’t need a design professional to prepare your plans. Whether you build it yourself or hire a contractor, the **Guide** is a step-by-step handbook to properly design, permit and build your porch or deck. Inside, you will find:

- the terms used to define the components of a porch and deck
- how to select the proper materials
- how to select the proper size components
- how the elements of a porch and deck go together
- how to obtain a building permit
- how to have your porch or deck inspected during construction
- how to maintain your porch or deck after it is built

If you don’t want to follow these plans, or if you own multiple buildings or buildings greater than three stories in height or with more than six units, you must hire a State of Illinois Licensed Architect or Structural Engineer to prepare your plans so that you may obtain a building permit.

The best porch or deck designs mean nothing if they are not properly built and maintained. Your safety, and the safety of those who use your porch or deck, is entirely dependent on good construction, proper maintenance and common sense. Please note the following important points:

- When contracting for work, insist on a written contract with a fixed cost that includes these plans initialed by you and your contractor.
- Only use new materials from reputable suppliers; reusing old materials jeopardizes porch and deck safety.
- Frequently check on your work and insist on quality workmanship – whether performed by you or your contractor – and remove and replace all work of inferior quality.
- Insist on inspections at key points of the project to insure compliance with the Chicago Building Code.
- Check your porch or deck annually and replace deteriorated members and components.
- Properly treat and waterproof the wooden members of your porch or deck to extend their life.
- Educate those who use your porch or deck on proper use and control the number of people who use it.

By following these simple guidelines, your porch or deck will serve you, your friends, and your guests for many years.

If you have questions concerning this **Guide**, call the City of Chicago's Department of Construction and Permits at (312) 744-7328 between 8:30 AM and 4:30 PM, Monday through Friday, or e-mail us at [DCAPhelp@cityofchicago.org](mailto:DCAPhelp@cityofchicago.org).

---

## Step One: Can I Use This Guide?

---

Before progressing any further, you need to determine if you are eligible to obtain a permit for your porch or deck project through the use of this **Guide**. Check the boxes next to each of the following statements that apply to you:

1. You are the owner and you live in this building.
2. You are replacing an existing porch or deck.
3. The building is either one or two units wide.
4. The building has three stories or less above ground level.
5. The story height, as measured from finished floor to finished floor, is 12 feet or less for each level.
6. The total area for all units above ground level combined is less than 6,250 square feet (not including basement floor space).

If you checked the boxes for all of the above statements, you may use this **Guide** to acquire a permit for your porch or deck project and you should continue to Step Two. If you could not check all of the boxes, you will be required to hire a licensed architect or structural engineer to assist you with the design and permitting of your porch or deck project.



---

## Porch Configurations

---

Based on whether you have a building that is one unit wide or two units wide, and whether your building is frame construction or masonry construction, you will be able to determine which of the four following configurations of porch or deck you will be able to construct.

These configurations are:

Type A: For one unit wide buildings of frame construction

Type B: For one unit wide buildings of masonry construction

Type C: For two unit wide buildings of frame construction

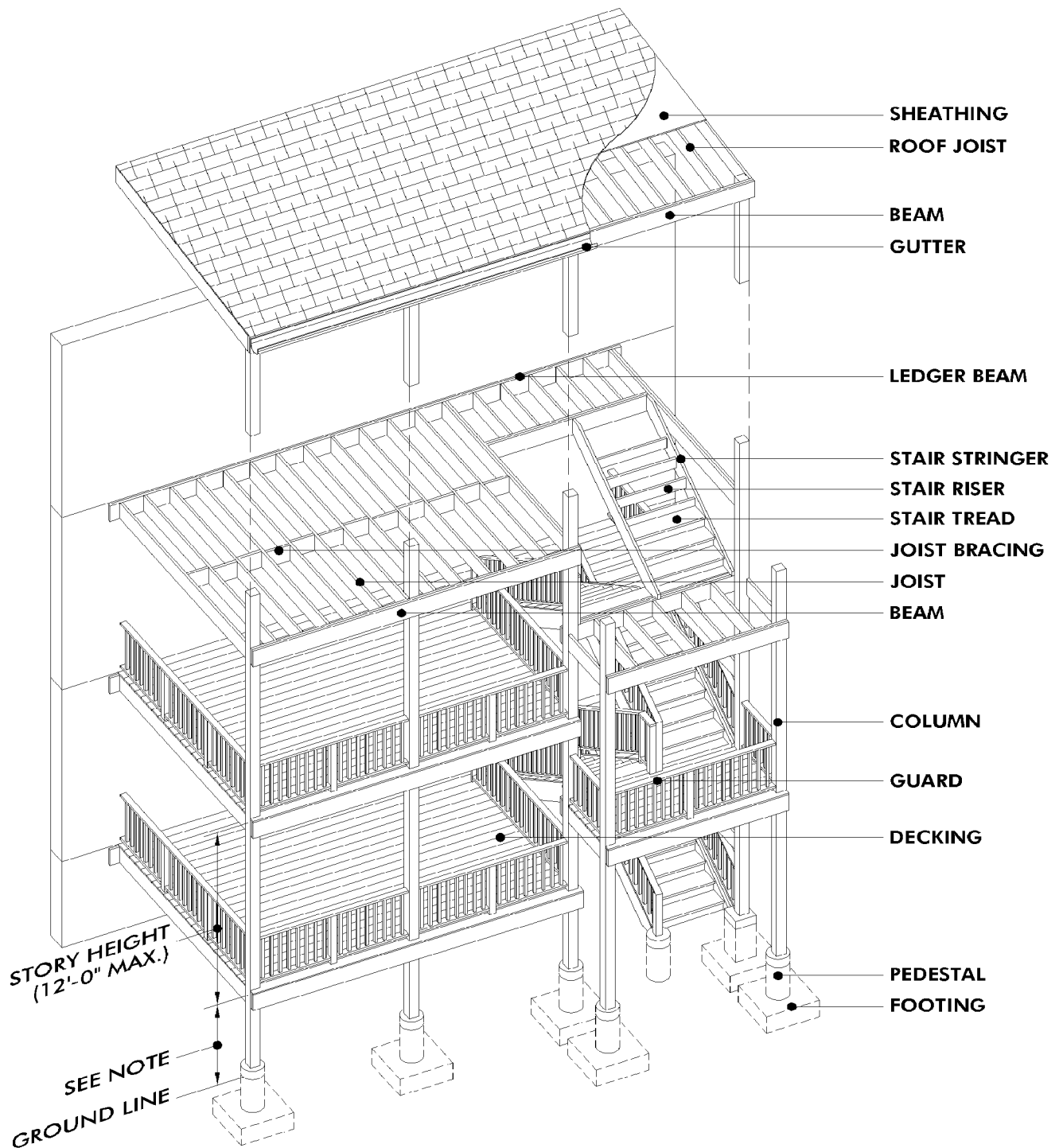
Type D: For two unit wide buildings of masonry construction

Three dimensional views of these four configurations can be found on pages 7 through 10. It is important to note that these views show three-story porches with stairs and the optional roof included. If you have a one-story or two-story building and/or do not desire a roof and/or do not require stairs (if you are building a deck rather than a porch), then the depictions shown will still generally apply.

Now that you have determined which type of porch or deck you will be building, you must complete and submit the appropriate Volume 2 of this **Guide** as your permit application. If you are building a Type A porch or deck, you must complete Volume 2A. If you are building a Type B porch or deck you must complete Volume 2B. If you are building a Type C porch or deck, you must complete Volume 2C. If you are building a Type D porch or deck, you must complete Volume 2D.

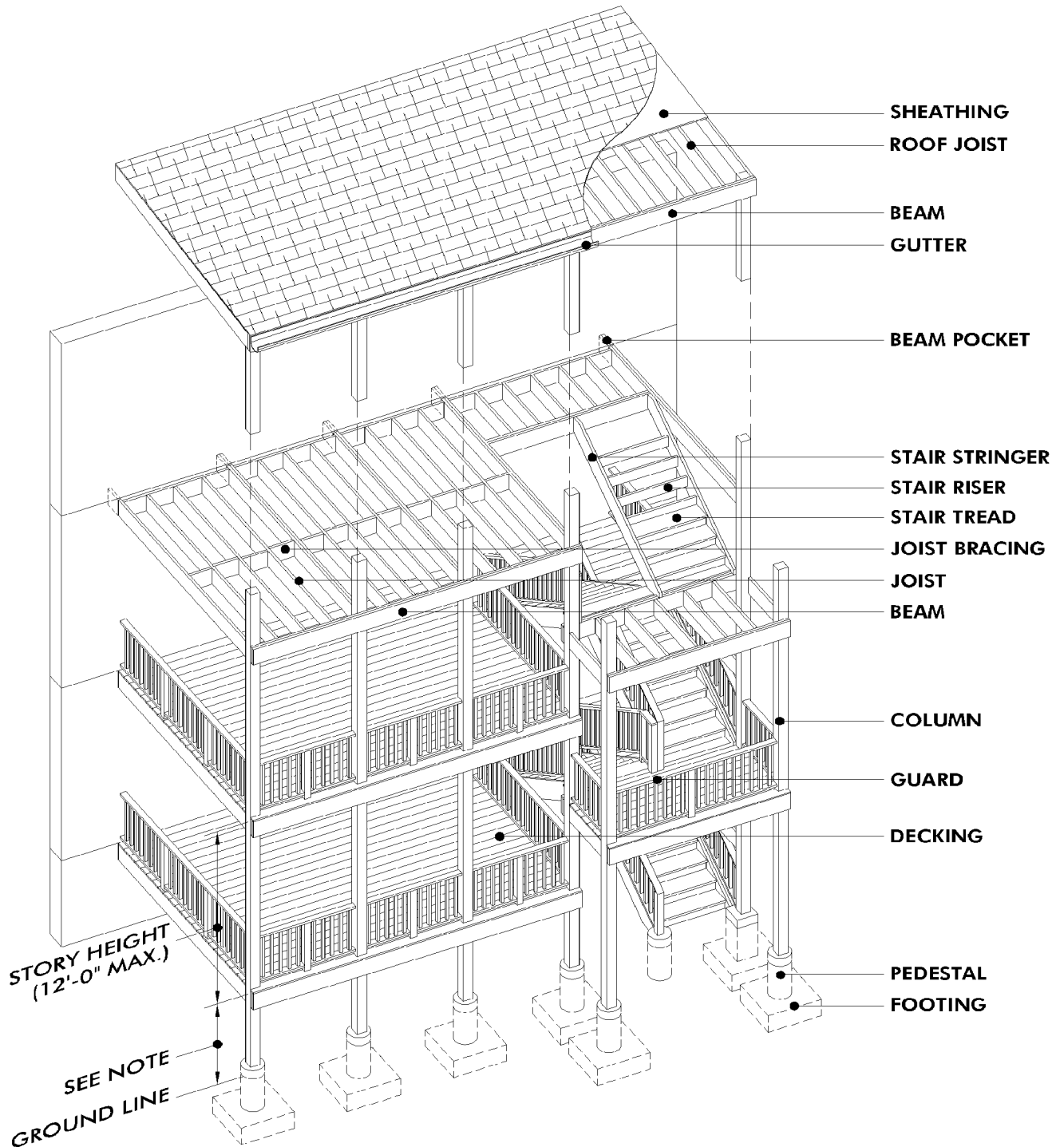
If you wish to build a deck without stairs, you must have at least two existing exit routes to ground level other than via the new deck. If you don't have two other exit routes to ground level, you must build a deck or porch with a stair system.

Note: Stairs to a rooftop deck are not allowed with these designs.



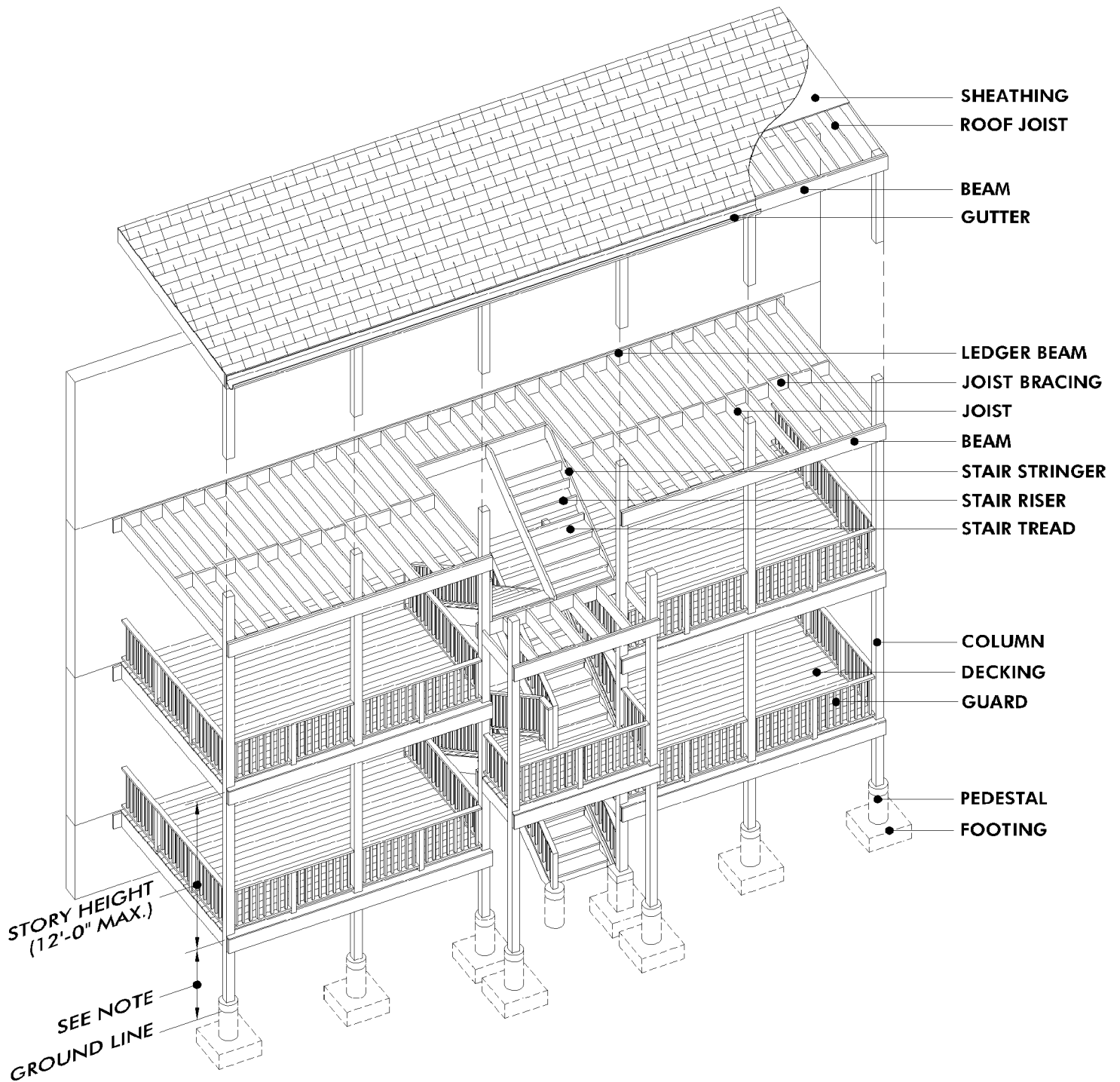
NOTE - IF A PORCH OR DECK HAS THREE STORIES, THE VERTICAL DIMENSION FROM EXISTING GROUND LINE TO THE FIRST STORY OF THE PORCH OR DECK MUST NOT EXCEED 6'-0".

**TYPE A—ONE-UNIT WIDE BUILDING—FRAME CONSTRUCTION**



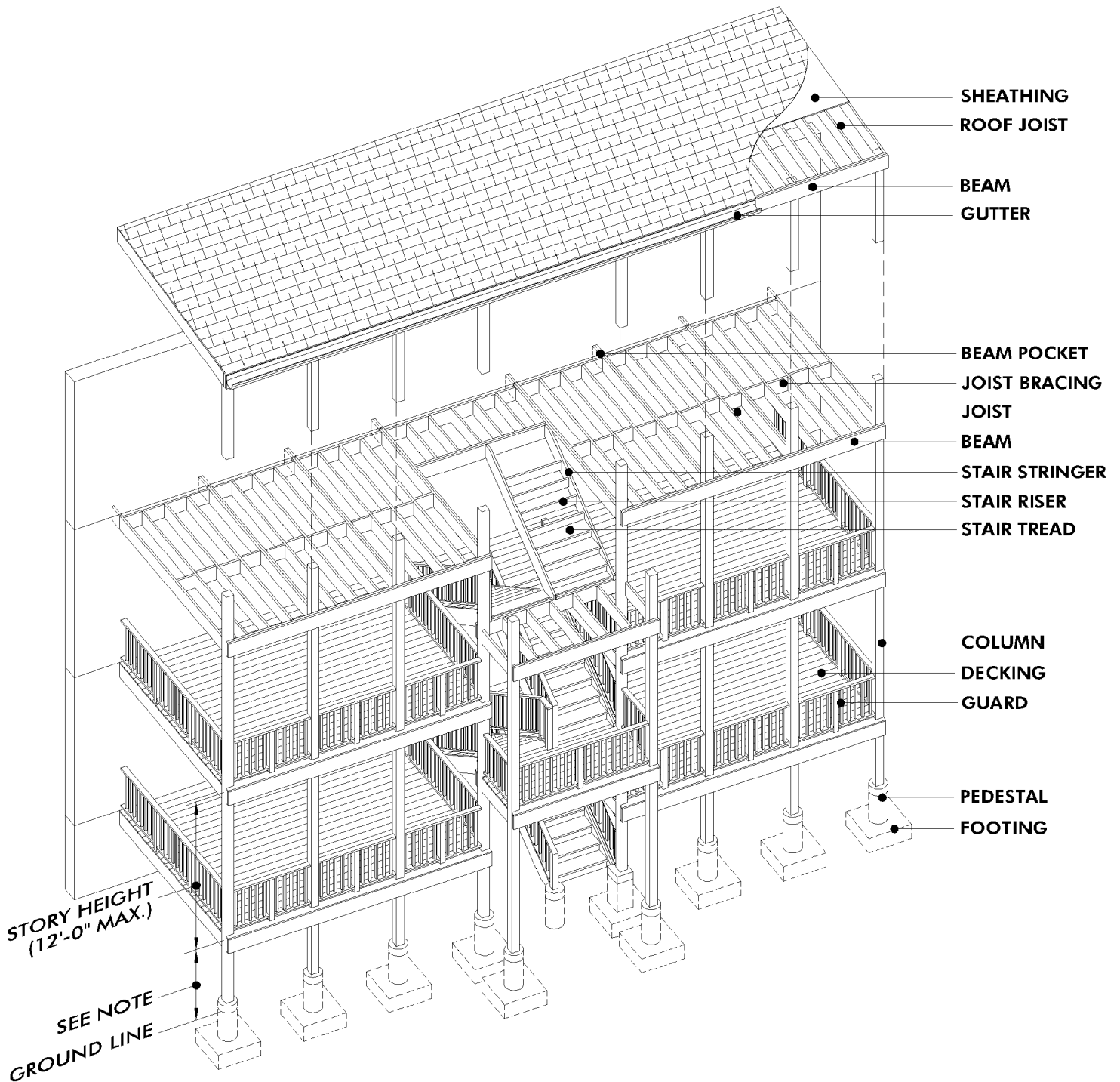
NOTE - IF A PORCH OR DECK HAS THREE STORIES, THE VERTICAL DIMENSION FROM EXISTING GROUND LINE TO THE FIRST STORY OF THE PORCH OR DECK MUST NOT EXCEED 6'-0".

**TYPE B—ONE-UNIT WIDE BUILDING—MASONRY CONSTRUCTION**



NOTE - IF A PORCH OR DECK HAS THREE STORIES, THE VERTICAL DIMENSION FROM EXISTING GROUND LINE TO THE FIRST STORY OF THE PORCH OR DECK MUST NOT EXCEED 6'-0".

TYPE C—TWO-UNIT WIDE BUILDING—FRAME CONSTRUCTION



NOTE - IF A PORCH OR DECK HAS THREE STORIES, THE VERTICAL DIMENSION FROM EXISTING GROUND LINE TO THE FIRST STORY OF THE PORCH OR DECK MUST NOT EXCEED 6'-0".

**TYPE D—TWO-UNIT WIDE BUILDING—MASONRY CONSTRUCTION**

---

## Appendix A: Glossary of Terms

---

Whatever project you do – build a porch or deck or repair your car – it is important to use the correct “jargon” or terminology. In this way, you can communicate with others to make certain that you are talking about the same thing. The people who sell materials for porches and decks and those who build them use certain words to describe what they are doing. In this section, we define the most commonly used terms and phrases that are used in this **Guide** and in the industry. If you refer to the three-dimensional porch/deck configuration drawings on pages 7 to 10 of this Volume, you will see where some of the various elements of a porch or deck are found.

**Ballusters.** Vertical members (usually 2x2’s and with no more than 4” clear spacing between members) used in guards or railings to fill the spaces between support posts.

**Beam.** A horizontal member that is used to transfer or carry the load from one member into another. Beams typically support joists and are typically supported by columns and walls. Sometimes, beams are called “lookouts” or “girders”.

**Beam Pocket.** An opening in the building wall that supports the end of a beam that runs perpendicular to the wall.

**Bollard.** A device, commonly consisting of a steel pipe anchored into the ground and filled with concrete, that is used to protect vulnerable structures from damage by vehicles.

**Brick Facing.** Load bearing brick that is placed directly against the outside of a masonry block wall.

**Brick Veneer.** Non-load bearing brick facing that is placed outside of a masonry block wall or a framed wall that is not a primary part of the structure and has an air space behind it. It is usually tied to the support structure with metal ties.

**Bridging.** See Joist Bracing.

**Building Permit.** A document issued by the City of Chicago that gives a building owner legal permission to make an improvement to their property. Obtaining a permit requires the submittal of an application, and in many cases, a fee.

**Carriage Bolt.** A steel bolt with threads for a nut that provides a high strength connection by through-bolting.

**Cell.** The hollow space inside of a masonry block which may or may not be filled with grout and reinforcing.

**Column.** A vertical member, continuous or in spliced sections, that is used to support the levels of a porch, deck, landing or stairway. A column transfers the load from the levels of the deck to the ground below. Sometimes, columns are called “uprights” or “posts”.

**Common Brick.** Brick that is typically 2<sup>1</sup>/<sub>4</sub> inches high by 8 inches long in profile, although larger sizes are occasionally used. It is used in a variety of applications and may also be considered “Face Brick” if it has a higher quality exposed face.

**Concrete.** A material that is a mixture of water, sand and stone which is mixed with cement. Cement serves as the “glue” that binds the sand and stone together and provides great strength.

**Deck or Decking.** The floor surface you walk upon on the porch or deck. Decking can either be individual boards laid closely together and attached to the joists or it can be “tongue in groove” decking which provides a closed surface. Plywood is not an acceptable decking material.

**Department of Buildings (DOB).** The City of Chicago's Department of Buildings, which is a regulatory agency dedicated to advancing public safety through vigorous enforcement, community partnership and use of creative technical solutions making Chicago a safe place to live, work, and build.

**Department of Construction and Permits (DCAP).** The City of Chicago's Department of Construction and Permits, which is dedicated to encouraging development and renovation in the City through the issuance of Building Permits.

**Downspout.** A hollow metal tube that connects the gutters to the ground.

**Face Brick.** See Common Brick.

**Fasteners.** A general term referring to all mechanical connectors such as bolts, nuts, screws, and nails.

**Flashing.** Stainless steel or copper that is used as a means of waterproofing openings in a building. Flashing is used at a ledger beam connection.

**Footing.** The concrete pad that supports the column pedestal. The footing extends into the ground where it spreads out the weight of the porch or deck. Footings should be made of concrete and extend to a depth of at least 36 inches below the top of soil.

**Frame Construction.** Wall construction that consists of vertical wood studs as the primary means of structural support for the building.

**Grout.** A thin mortar mix that is commonly used to seal cracks and to fill the cells in reinforced masonry block.

**Guard or Guardrail.** Guards are used to enclose the edges of porches, decks, and stairways. Guards are always a minimum of 42 inches in height. Guards also may be known as porch or deck rails and handrails.

**Gutter.** If a porch has a roof, it should have a gutter. Gutters catch the rain water that accumulates on the roof, collecting it along the low edge, and redirecting it down to the ground through a downspout.

**Hex Bolt.** A steel bolt with a hexagon-shaped head and threads for a nut that provides a high strength connection by through-bolting.

**Hot-Dip Galvanizing.** A process by which steel is made resistant to corrosion (rusting) by being dipped in a liquid form of zinc to provide a weatherproof coating.

**Joist.** Members that span from beam to beam, spaced relatively close to one another, which support the decking.

**Joist Bracing.** Also known as “Bridging”, this is used to brace long joist spans against rotation. Joist bracing may consist of solid wood pieces, diagonal metal lacing, or diagonal wood lacing.

**Joist Hanger.** Joist hangers are prefabricated metal pieces that simplify the connection of joists to beams or ledgers.

**Lag Bolt or Lag Screw.** A steel fastener that is threaded and is used to connect wood members together without requiring a nut on the opposite end of the connection.

**Landing.** A large horizontal surface between stair runs.

**Ledger.** Beams that transfer or carry loads from joists to the building face. Most often, ledgers are attached to the building face by means of bolts into

brick or lag screws into wood.

**Masonry Block.** Also known as “Concrete Masonry Unit” or “CMU”, this is most commonly 8 inches high by 16 inches long in profile (although a wide variety of sizes are available). Masonry blocks typically have two large hollow cells that are sometimes reinforced by inserting reinforcing bars and filling solid with grout.

**Masonry Construction.** Wall construction that consists of masonry block and/or common brick as the primary means of structural support for the building.

**Multiple Wythe Solid Brick.** Multiple layers of brick placed together to form one solid wall.

**Nosing.** Stair treads should extend slightly past the face of the riser. This is called the nosing. Nosing is used to make certain that the back of your foot clears the face of the riser.

**Pedestal.** A vertical concrete piece that spans between the bottom of a wood column and the footing. A Pedestal may be circular, square, or rectangular, and may be reinforced or unreinforced.

**Pier.** Similar to a Pedestal, but without a footing underneath.

**Plywood.** A wood product that is made up of thin layers of processed wood “sandwiched” between wood sheets and glued together.

**Porch.** An unheated roofed portion of a building, generally containing a stair used for ingress and egress and a floor area, and separated from the principal portion of the building by a fire rated wall and unrated doors and windows.

**Pressure Treated Lumber.** Also known as “Wolmanized Lumber”, this is chemically treated wood which is much more resistant to rot than untreated wood. There are several varieties of chemical treatment available, which are described in more detail in Appendix B: Materials for Construction.

**Redi-Mix Concrete.** Concrete that is purchased from a supplier and delivered in large batches directly to the construction site.

**Reinforcement.** Steel bars that are used to strengthen concrete structures.

**Rim Joist.** The horizontal joist that runs around the outside of a building of frame construction between the floor of one story and the ceiling of the story below.

**Riser.** Stairways are composed of risers – the vertical surface or face of each step – and treads – the horizontal surface you step on when walking up and down a stairway. Risers and treads should be of a consistent height and width to minimize the likelihood of tripping.

**Sheathing.** Plywood sheets used on roofs and in walls are called sheathing. Sheathing spans between the roof joists or studs to provide a surface to which you can attach your roofing material or siding.

**Siding.** The exterior finish material used on the outside of a building of frame construction, generally consisting of wood, aluminum, or vinyl.

**Southern Yellow Pine.** The most commonly used species of wood for porch and deck construction in the Chicago area. It has good strength properties, a pleasant visual appearance, and accepts pressure treatment well.

**Splice.** The connection of two members in a straight continuous line.

**Story Height.** The vertical measurement between finished floor levels of a building.

**Stair Stringer.** Stair stringers span diagonally between the floors of a porch or deck. They support the risers and treads of a stairway.

**Stucco.** A plaster coating made mostly from Portland cement, sand, and lime that is used as a finish coat and typically has a swirled pattern.

**Stud.** A vertical structural member that is typically a wood 2x4 used in frame construction.

**Tread.** Stairways are composed of treads – the horizontal surface you step on when walking up and down a stairway, and risers – the vertical surface or face of each step. Risers and treads should be of a consistent height and width to minimize the likelihood of tripping.

**Unit.** Refers to a single apartment in a multi-family building.

**“Wolmanized Lumber”.** Although a brand name, used generically to mean pressure treated lumber used in porch and deck construction.

**Wythe.** A single continuous vertical wall of brick. A multiple-wythe brick wall consists of multiple layers of brick to form one wall.

---

## Appendix B: Materials for Construction

---

A strong, durable porch or deck requires strong, durable materials. In this Appendix, you will learn about the types of materials that are to be used for the construction of your porch or deck.

### Wood

Wood is the most commonly used material for porch and deck construction since it is easily cut and drilled, and it is durable when properly protected. Other materials, such as steel or steel and wood in combination, are also used for some larger porches and decks, but are beyond the scope of this **Guide**.

Wood comes in many species, sizes and shapes. The most commonly used species of wood for porch and deck construction in the Chicago area is Southern Yellow Pine. This is the material recommended for use for the porches and decks shown in this **Guide**. Many other wood species do not have the same strength properties as Southern Yellow Pine, and would result in a weaker porch or deck. The grain of Southern Yellow Pine is aesthetically appealing, especially when natural finishes and stains are used. It is also easily pressure treated due to its unique cellular structure and does not require any type of perforation of the wood to accept chemical preservatives.

“Wolmanized” or pressure treated wood resists the rot to which untreated wood is susceptible. Pressure treated wood will retain its strength 10 to 20 times longer than untreated wood. On December 31, 2003, the pressure treated wood industry transitioned away from using chromated copper arsenate, or “CCA” for residential uses. Southern Yellow Pine shall be pressure treated with alkaline copper quat (ACQ-C or ACQ-D) or copper azole (CBA-A or CA-B) preservative treatment for new exterior porch and deck applications. The American Wood Preservers’ Association (AWPA) has developed standards for treated wood. Treated wood carries a mark or label indicating it as such. The mark or label describes the relative strength of the lumber and the amount/type of preservative used for treatment measured in pounds of preservative per square foot of wood. All treated columns and beams used in this **Guide** shall be UC1-3. Preservative retention shall be in pounds of preservative per square foot of timber: 0.25 for (ACQ-C & ACQ-D), 0.20 for (CBA-A), 0.10 for (CA-B).

All wood is “graded” as to quality and comes with a quality mark or “label” from an agency accredited by the American Lumber Standard Committee (ALSC). The Southern Pine Inspection Bureau (SPIB) along with several other accredited organizations are authorized to inspect and grade mark Southern Yellow

Pine lumber for compliance with SPIB. These marks are most commonly found on the ends of the member and are either a stamp or a tag. These grade marks ensure that the lumber is in compliance with the grade requirements and moisture content for that particular piece of wood. Commonly used grades for Southern Yellow Pine are (from highest to lowest quality) Dense Structural Select, Dense Structural, No. 1, No. 2, and No. 3. For the porches and decks shown in this Guide, No. 1 Southern Yellow Pine or better must be used for the columns, and No. 2 Southern Yellow Pine or better must be used everywhere else.

### TYPICAL SOUTHERN PINE LUMBER GRADE MARKS

**Example 1:** SPIB<sup>®</sup> No. 2, KD19, (7)

**Example 2:** TP<sup>®</sup> NO.1 KD-15-000, SYP

**Example 3:** RR<sup>®</sup> No 1, SYP KD19, 001

*Quality Southern Pine lumber is graded in accordance with the grading rules of the Southern Pine Inspection Bureau (SPIB), SPIB, Timber Products Inspection, Inc., Renewable Resource Associates, Inc. (RRA) and other organizations\* are accredited to inspect and grade mark Southern Pine lumber in accordance with SPIB grading rules.*

- 1 Inspection Service: Southern Pine Inspection Bureau (SPIB)
- 2 Inspection Service: Timber Products Inspection, Inc. (TP)
- 3 Inspection Service: Renewable Resource Associates, Inc. (RRA)
- 4 Lumber Grade
- 5 Mill Identification Number
- 6 Lumber Species
- 7 (optional) Logo denoting a member mill of Southern Forest Products Association (SFPA)
- 8 Moisture Content (MC): Kiln-dried (KD) to a maximum of 19%
- 9 Moisture Content (MC): Kiln-dried (KD) to a maximum of 15%

\*Note: Mill agencies are accredited by ALSC to inspect and grade all or selected Southern Pine products according to SPIB Grading Rules, including: California Lumber Inspection Service (CLIS), Northeastern Lumber Manufacturers Association (NELMA), West Coast Lumber Inspection Bureau (WCLIB), and Western Wood Products Association (WWPA).

### TYPICAL QUALITY MARK FOR TREATED LUMBER

**Example:** 2000 GROUND CONTACT 2001, ABC TREATING CO. ANYTOWN, USA, CCA .40, KDAT, AWPA C2, C9 (UC-4A) STDS.

- 1 Trademark of inspection agency accredited by American Lumber Standard Committee (ALSC)\*
- 2 Applicable American Wood Preservers' Association (AWPA) Standard
- 3 Year of Treatment
- 4 Preservative used for Treatment
- 5 Retention Level
- 6 Dry or KDAT, if applicable
- 7 Proper Exposure Conditions
- 8 Treating Company & Location

\* Contact the Southern Pine Council/Member listing of accredited inspection agencies.

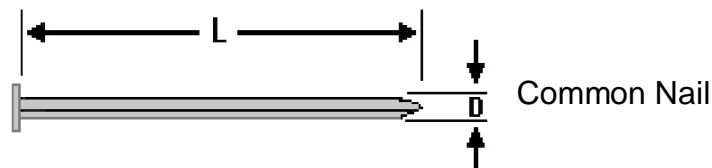
**Figure:** Sample Grade Marks for Wood Members

## **Fasteners**

All fasteners used shall be stainless steel or shall have a hot-dipped galvanized coating. If galvanized fasteners are used, all components of that connection shall be galvanized. If stainless steel fasteners are used, all components or that connection shall be stainless steel. The mixing of stainless steel and hot-dipped galvanized fasteners and connectors may lead to corrosion and shall not be allowed.

### Common Nails:

Common nails are available in different thickness and lengths and are referred to as “# penny”. The figure below shows the common thickness or gage (D) and length (L). For example, a 16d “16 penny” nail has a gage thickness (D) of 8 and a length (L) of 3 ½”. Stainless steel or hot-dipped galvanized nails will be used for attaching joist hangers, spiking wood members together, bridging, and securing other miscellaneous members. Use only common nails, exposed tips of nails shall be clinched.



### Deck Screws:

Deck screws are also designated by a # and length and similar to nails, the # refers to the thickness. Deck screws are considered self-tapping and pre-drilling is not required. Deck screws (#8 size minimum) shall be used to attach decking members. The advantage of using deck screws over nails is that over time, the nails may pop up above the deck surface and will require continued maintenance. Screws shall be driven flush with the top of the deck surface. Stainless steel or hot-dipped galvanized steel decking screws which are 2 ½” to 3 ½” long shall be used to fasten the deck boards to the joists.



### Lag Bolts:

Lag Bolts (also known as Lag Screws) are designated by diameter and length. For example, a  $\frac{1}{2}$ " x  $2\frac{1}{2}$ " bolt has a  $\frac{1}{2}$ " diameter and is  $2\frac{1}{2}$ " long. Lag bolts will be used to connect wood members together without penetrating completely through the second connecting wood member. Lag bolts shall be stainless steel or hot-dipped galvanized steel. Lag bolts shall be SAE Grade 2.



### Hex bolts:

Hex bolts are designated by diameter and length. For example, a  $\frac{1}{2}$ " x  $2\frac{1}{2}$ " bolt has a  $\frac{1}{2}$ " diameter and is  $2\frac{1}{2}$ " long. Hex bolts will be used to connect wood members together by penetrating through all wood members involved in the connection. Once the bolt is placed through the connecting members, a washer on both ends and a nut is used to secure the members together. Hex bolts may be used to make through-bolt connections. Hex bolts shall be stainless steel or hot-dipped galvanized steel. Hex bolts shall be ASTM A307.



## **Concrete**

Concrete is the primary material used in the footings that support your porch or deck. You can mix your own concrete using prepackaged concretes such as “Sackrete” or “Quickrete”, or you can purchase your concrete as Redi-mix. When using prepackaged concretes, it is important to strictly adhere to the amount of water added to the dry mix. By adding too much water, the concrete will lose strength. By adding too little water, you will not have proper mixing of the stone, sand, and cement. Redi-mixed concrete purchased from a supplier has the advantage of being able to provide a large amount of concrete in a short time. The amount of water in Redi-mixed concrete is also important for workability and strength. All concrete shall be thoroughly mixed prior to placement and shall have an air entrainment agent added to it to provide 5 to 8% air in the mix to help resist freeze-thaw cycles.

Regardless of the method you use, once you start pouring the concrete you must continue pouring each footing until it is completed. Stopping and returning later to complete the footing means that you will have “cold joints” between the pours of concrete. Cold joints reduce the strength of the footing and are not acceptable. When ordering concrete either prepackaged or Redi-mix, you should request a concrete that will achieve a compressive strength of at least 3,500 pounds per square inch measured at 28 days after placement.

## **Reinforcement Bars**

Reinforcement bars shall be ASTM A615, Grade 60 steel. If splices are used, the minimum splice length shall be 30 times the bar diameter (in inches).

## **Masonry**

Masonry is a general term that refers to any brick or block products used commonly in wall construction. If you have a masonry building, the beam pocket construction will require masonry work.

Masonry Units : Shall comply with applicable ASTM standards.

Mortar: Shall be Type M or S, with  $f'm = 1,150$  psi. No Calcium chloride shall be used.

## **Structural Steel**

All structural steel shall be ASTM A-36 (minimum) constructed according to the American Institute of Steel Construction, Inc. specifications. All structural steel shall be coated with a rust prohibited primer with a minimum dry thickness of 3 mils.

## **Metal Construction Connectors**

Metal construction connectors shall be used to make many of the connections required on your porch or deck. They are used in a variety of locations including joist-to-ledger connections, joist-to-beam connections, and column-to-pier connections. All metal construction connectors shall be either “continuous” hot-dip galvanized with a 1.85 ounce/square foot of zinc coating per ASTM A653, or “batch”/“post” hot-dip galvanized with zinc per ASTM A123 or A153, or stainless steel. Fasteners and connectors must be fabricated from like materials. In other words, hot-dip galvanized fasteners and connectors must be used together, and stainless steel fasteners and connectors must be used together.

**TABLE A—METAL CONNECTORS**

<u>Item</u>	<u>SST Model #</u>	<u>USP Model #</u>	<u>Gage</u>	<u>Installation Hardware</u>
Single Joist Hanger 1	LUS210Z or SS	JUS210TZ,SS	18	4-10d (Joist),8-10d (Header)
Double Joist Hanger 2	LUS210-2Z or SS	JUS210-2TZ,SS	18	6-16d (Joist), 8-16d (Header)
Single Joist Hanger 3	LUS28-Z	JUS28TZ, SS	18	4-10d (Joist), 6-10d (Header)
Double Joist Hanger 4	LUS28-2Z	JUS28-2TZ	18	4-16d (Joist), 6-16d (Header)
Metal Angle 1	L90 Z	AC9 TZ	16	10-10d, 5 each leg
Metal Angle 2	A23 Z	A3 TZ	18	*8-10d x 1 1/2", 4 each leg
Metal Angle 3	TA9 Z or KT	SCA9 TZ	12	5-1/4" dia x 1 1/2" wood screw
Column Base, 6x6 post	CBSQ66-SDS2 HDG	CBSQ66-SDS2 TZ	12	14-1/4" dia x 2" wood screws
Post Base, Railing post	PBS44A HDG	WAS 44 TZ	12	14-16d, 2-1/2" dia bolts
Metal Strap	MSTA12 Z or SS	MSTA12 TZ, SS	18	10-10d
Post Base Plate	CPS 4	CPB44	-	4-10d

\*NOTE: Use smaller length nails with specified penny weight.

SST—Simpson Strong Tie; USP— United Steel Products

HDG—Hot Dipped Galvanized, SS— Stainless Steel

Z— Z MAX Galvanized (G-185), TZ— Triple Zinc Galvanized (G-185)

### **Flashing and Sealants**

Flashing used for beam pocket / masonry construction or for ledger beam / frame construction shall be stainless steel (28 GA., 0.015 inch minimum thickness, **ASTM A167**, Type 304) or cold rolled copper (16 oz. minimum, 0.021 inch minimum thickness, **ASTM B370**). The copper flashing is less expensive, easy to work with, but will stain and discolor. The stainless steel is extremely durable, non-staining, but is more expensive and more difficult to form than copper flashing. The flashing shall be placed over CCW-705 Self-Adhering Vapor/Air Barrier System by Carlisle Coatings and Waterproofing Inc., or equal system. Follow manufactures instructions for the vapor barrier installation. Attach flashing with fasteners that will not cause corrosion and lap flashing in a fashion that will not allow water penetration. The flashing shall be lapped a minimum of 6" horizontally and 3" vertically. Install the flashing working from the bottom up. All areas of the existing construction exposed to weather shall be flashed, and small openings such as holes in wood for bolting shall be sealed with sealant. The sealant shall be 100% Silicone Rubber Sealant with a 50 year durability guarantee. Gaps larger than 1/8" must be flashed unless noted otherwise on the plans.

---

## Appendix C: Structural Design Issues

---

The details and guidelines presented in this **Guide** have been developed using sound engineering design and practical judgment. The materials that are specified should be commonly available and easy to obtain. Some of the connection details presented may seem to be very conservatively designed and incorporate more bolts or screws than typically encountered in a porch or deck. Also, the main framing members may seem to be heavier than typically observed in many porches. This is because many existing porches and decks have not been thoroughly designed to the standards required by the applicable design codes.

This **Guide** presents standard configurations and design details that have been properly engineered to support the 100 pound per square foot live load that is required by the City of Chicago's Building Code. The live load design must be carried through all elements of the porch or deck, including the joists, beams, columns, footings, stairways, beam pockets, ledgers, and connections. Cheating on any element of the structure will consequently increase the risk of failure for the structure as a whole. Therefore, it is imperative that all of the details and material specifications presented in this **Guide** be followed.

Published codes that were used to develop this **Guide** include the following:

- Chicago Building Code
- International Building Code
- National Design Specification for Wood Construction

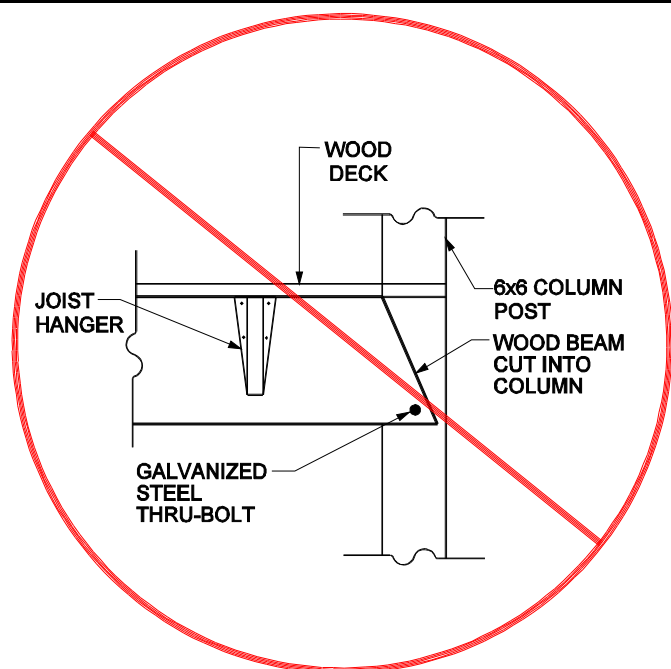
---

## Appendix D: Unacceptable Details

---

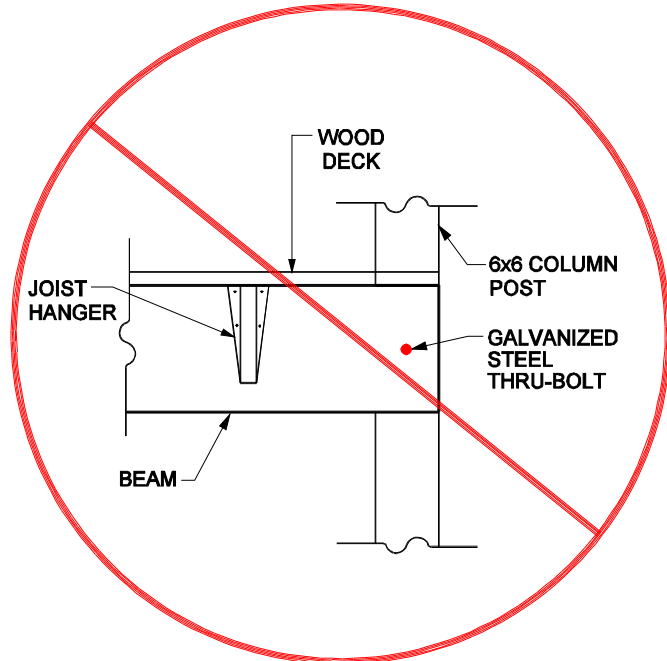
This Appendix highlights several poor details that are commonly found in existing porch and deck construction. These details should be avoided since they compromise the structural integrity of the porch system. They are provided as an example of how NOT to build your porch or deck. This **Guide**, if followed, will result in a porch or deck that will be structurally sound for years to come if properly maintained.

In Figure D.1, the beam improperly frames into the notched column. A notch into the column is not allowed since it weakens the column. All beams and joists shall be run adjacent to the column and thru-bolted to it.



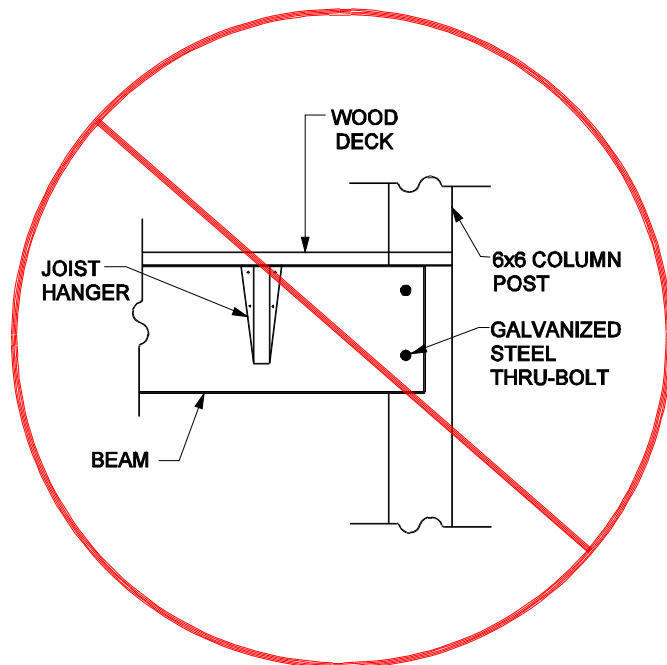
**Figure D.1:** Beam Improperly Framing Into Column

In Figure D.2, only one bolt is shown attaching the beam to the column. This provides an unstable connection. A minimum of two fasteners are used in all framing connections, and in most cases a beam seat angle is used. The details in this Guide should be followed regarding the number of bolts required.



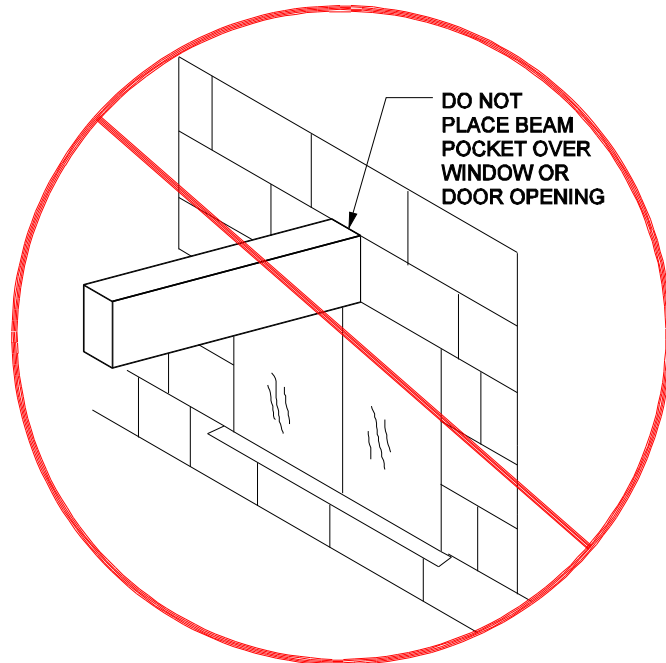
**Figure D.2:** Beam Improperly Fastened to Column

In Figure D.3, the beam should be supported by a beam seat angle. The connection is also too close to the edge of the beam to properly transfer the load to the column.



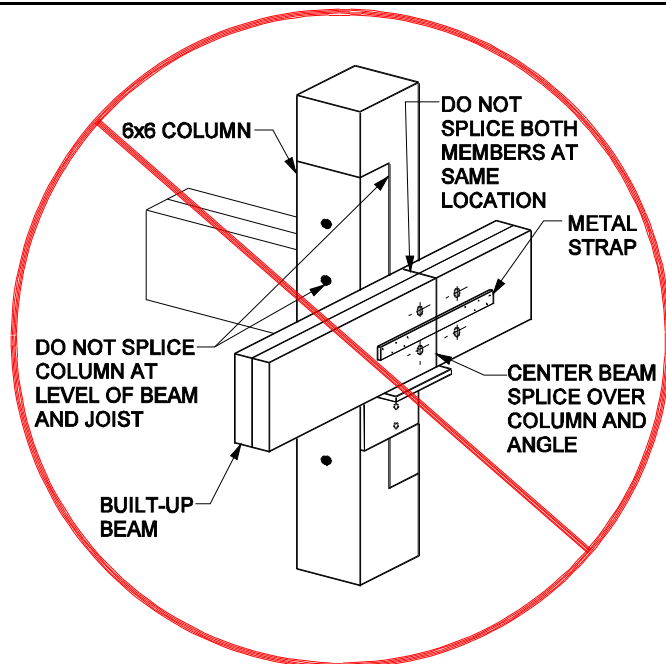
**Figure D.3:** Beam Improperly Fastened to Column

In Figure D.4, the beam pocket is formed directly above a window (shown) or door. This could result in possible failure of the lintel (the framing member above the opening), and subsequently, the porch or deck.



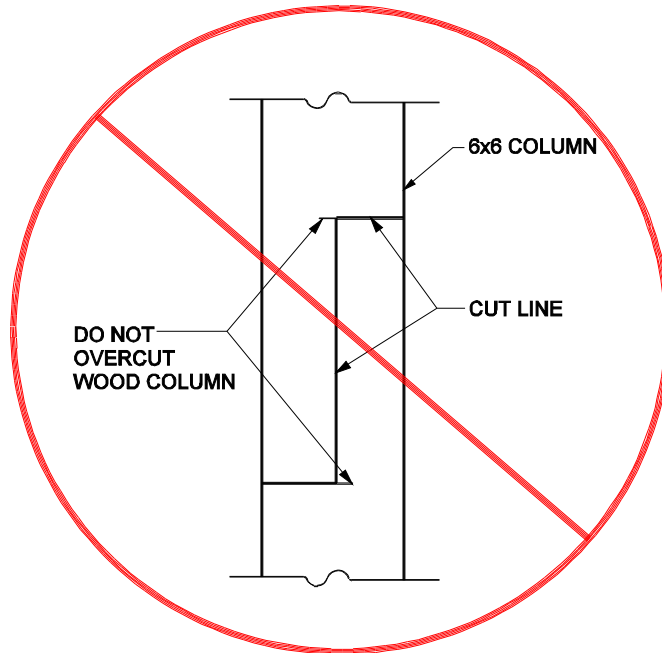
**Figure D.4:** Beam Pocket Over Opening

In Figure D.5, both members of the built-up beam are spliced at the same location along one column. Only one member should be spliced at a column location. Also, beam splices should only occur at column locations and not at midspan. The beam splice should be centered over both the steel angle and the 6x6 column (not off center as shown). Finally, column splices should not occur at the level of the beams and joists. They should be above or below the deck level.



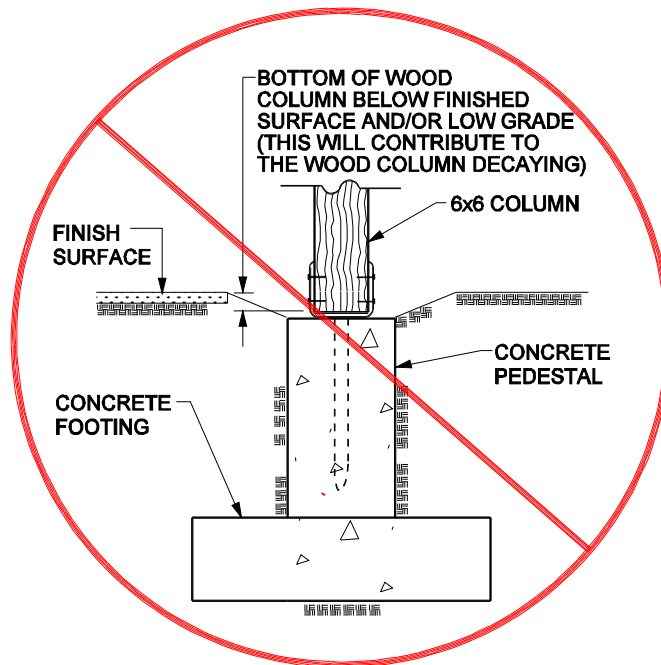
**Figure D.5:** Improper Beam to Column Connection

In Figure D.6, the horizontal cuts in the column are overcut. This increases the chances of future problems with splitting. At splices, stair stringers, and all sawcut members, it is very important that an exact cut is made!



**Figure D.6:** Improper Column Splice Cuts

In Figure D.7, the footing pedestal is completely below ground as shown. The footing pedestal should extend a minimum of 1" above the ground surface to prevent decay at the base of the wood column.



**Figure D.7:** Improper Footing Placement

