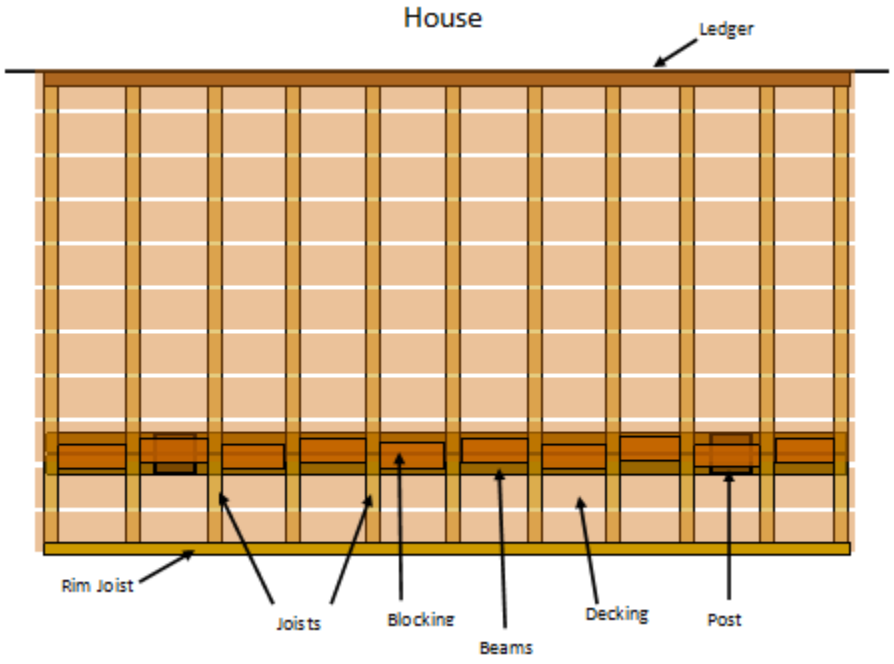
Patio Decks



CITY OF COLFAX

The State of North Dakota requires that you call *811* at least two business days before you dig or go online to www.ndonecall.com

This handout does not address any covenants or easements assigned to the property, nor does it relieve you of code compliance with items that may not have been included from the International Residential Code (IRC).

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Common Issues that Arise in Deck Building

1) Any ledger board should be fastened to the house using ½" diameter lag screws, ½" diameter bolts, or equivalent fasteners approved by the International Residential Code.

2) Ledgers cannot be fastened to cantilevered floors or bay/bow windows.

3) Joist hangers must be attached using fasteners allowed by the manufacturer's specifications.

4) Hangers must be attached using nails, *not screws*, approved for the hanger used. All nail holes in the hanger must be filled with a fastener.

5) Use the fastener stamped on the connector you are using, including diameter, length, and type. Deck screws *cannot* be substituted for other fasteners. They are too brittle and usually too short.

6) Beams attached to posts should be attached with at least two ½-inch diameter bolts or have a minimum of 1½ inches of bearing.

7) Lag screws, bolts, and washers shall be hot-dipped galvanized or stainless steel.

8) Lag screws, bolts, or other approved fasteners shall be staggered.

9) The ledger board shall be flashed.

10) Handrails must run *the full length of the stairs* at a height between 34 and 38 inches.

11) Guardrails are required on any open sides of stairways that connect to a deck more than 30 inches above grade.

12) Open risers are not allowed on stairways unless they are constructed so that a 4" sphere cannot pass through the open part of the riser.

Further details for each of these issues are covered in later portions of this booklet. If you have questions or need more information you can find the city inspector information within the Building Permit Application found on our website.

REMINDER: These are not the complete code requirements for decks and stairs. Refer to the current International Residential Code for the complete regulations.

Common Questions about Permits

Is a building permit required for constructing replacing of a patio deck?

Yes! Before you begin any work, you must get a building permit.

Why should I get a permit?

- To have assistance in determining whether your patio deck is constructed safely;
- To help safeguard your family, property, and visitors from damage or injury;
- To help protect yourself from complaints from future owners;
- To establish a record of the construction and remodeling history on your property.

What is needed to get a permit?

- The address of the property;
- Whether the deck will be attached to the house and, if so, how;
- The estimated value of the patio deck; and
- A site plan showing the size and location of all existing buildings on your property along with the proposed patio deck. Basic construction drawings are helpful but are not required.

Are inspections required?

Yes! It is the responsibility of the permit holder to arrange for required inspections. This would include a **framing** and a **final** inspection. If your deck is designed or engineered for future enclosure, this would also include a foundation inspection. Inspections are a part of the permit process so there is no additional cost beyond the permit fee for these inspections. Building inspections consist of examining and evaluating to determine if the work is compatible with the accepted standard of construction.

Can I just copy my neighbor's deck?

No. Codes change over the years and there is no guarantee that your neighbor had the required permit and inspections. Follow the guidelines in this handout and you will meet current codes and have a safe, sturdy deck you can enjoy for years to come!

Deck Footings and Posts

The City of Colfax does not currently require that footings for uncovered decks attached to the house extend below the 4½-foot frost depth, although we do encourage it. If your deck will not be attached to the house, we *recommend* that the footing extend at least 12 inches below grade. You can use pier blocks or a standoff post base on top of concrete as well.

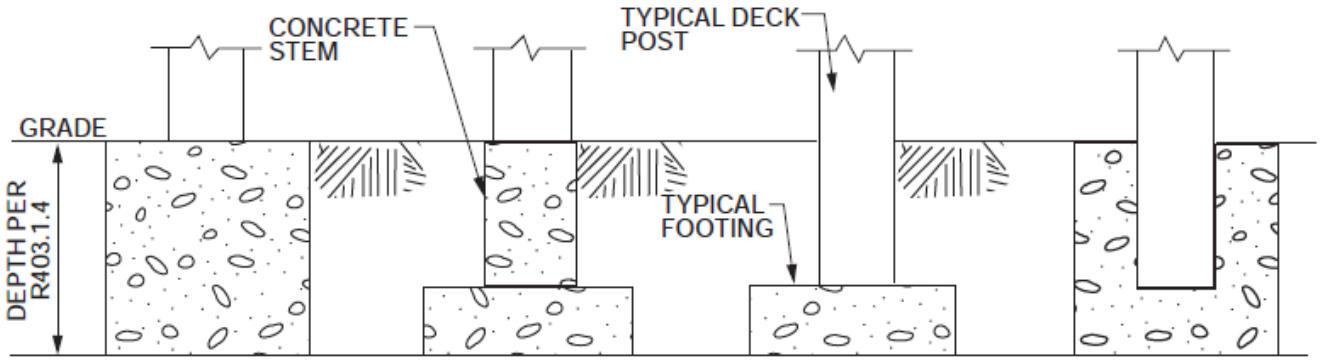


FIGURE R507.8.1
TYPICAL DECK POSTS TO DECK FOOTINGS

Typically, 4”x4” deck posts will be sufficient unless you are using triple beams (see Page 8 for sizing your beams) or if you will be notching the top of the post to carry your beams. All posts are required to be treated wood.

Deck Post Sizes

The required minimum size of your deck post is determined by how far above the ground the bottom of the support beams will be. The maximum heights are as follows:

Deck Post Size	Maximum Height
4”x4”	8’
4”x6”	8’
6”x6”	14’

Ledger Boards: Attachment to the House

Deck ledgers must be a minimum 2"x8" and pressure-treated. It cannot be attached *to any cantilevered floors or bay/bow windows* that extend out past the foundation of the house. You'll need to use two rows of either hot-dipped galvanized or stainless-steel fasteners to attach the ledger to the house. The table below explains the maximum distance between the lag screws and the figure below that the required staggered spacing.

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST[a, b]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

CONNECTION DETAILS	JOIST SPAN						
	6′ and less	6′1″ to 8′	8′1″ to 10′	10′1″ to 12′	12′1″ to 14′	14′1″ to 16′	16′1″ to 18′
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing[c, d]	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing[d]	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing[e]	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

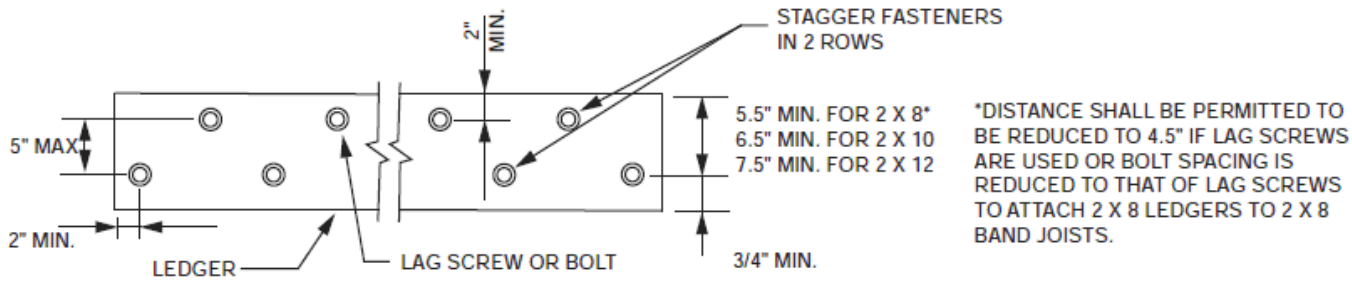
a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

b. Snow load shall not be assumed to act concurrently with live load.

c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

d. Sheathing shall be wood structural panel or solid sawn lumber.

e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.



For SI: 1 inch = 25.4 mm.

FIGURE R507.2.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

Your ledger cannot be used to support the beams for your deck. In essence, it acts as a beam itself. You should attach the ends of your joists to it with hangers. All holes in your hangers need to be filled with the fasteners approved by the hanger manufacturer.

You will need hold-down devices to help keep your deck from moving laterally (sideways) as well as all of these fasteners to resist vertical (up-and-down) movement. They type you choose will dictate how many are required. Don't forget the flashing over the top of your ledger board. This is meant to keep water from running behind the board and into your house.

A ledger is not required. You may build a free-standing deck right next to the house. This is useful if your floor extends past the foundation wall or if you cannot see the floor framing from the inside to ensure the attachment of the ledger as detailed above.

Joist Connections

Where the ends of joists connect with either the ledger or a beam, the joist must have at least 1½ inches of bearing the full width of the joist. That bearing may be on wood or on metal, such as a joist hanger. In either case, you must provide support to keep the joist from moving both horizontally and vertically.

A joist hanger will provide both bearing and lateral support. Where a joist crosses a beam, you will need to add hardware or blocking to prevent the joist from either rolling or moving sideways off its bearing point. Joist hangers and blocking must be at least 60% of the depth (the vertical height) of the joist.

Deck Joist and Beam Spans

Below you will find tables to help you figure out the sizes and spacing for your beams, the joists those beams support, and the decking on top. Remember, the joist and beam spans are *maximum* values. You can always build your deck with larger or closer-spaced supports. Be aware, however, that the maximum overhang (cantilever) for any beam or joist is one quarter (¼) of the adjacent span. Making your spans shorter by adding more beams or posts may affect their placement.

The first table addressing how far apart your joists may be in order to provide proper support for the decking that you choose. Plastic composite decking must be labeled to show compliance with ASTM standard D7032 and be installed according the manufacturer's instructions.

TABLE R507.4
MAXIMUM JOIST SPACING

MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Perpendicular to joist	Diagonal to joist[a]
$1^1/_4$-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.3	In accordance with Section R507.3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.
a. Maximum angle of 45 degrees from perpendicular for wood deck boards

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES[f] (ft. - in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b] (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	6-8	6-8	6-8
	2 × 8	13-1	11-10	9-8	10-1	10-1	9-8
	2 × 10	16-2	14-0	11-5	14-6	14-0	11-5
	2 × 12	18-0	16-6	13-6	18-0	16-6	13-6
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 × 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 × 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 × 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 × 12	18-0	15-9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 × 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 × 8	11-8	10-7	8-8	8-6	8-6	8-6
	2 × 10	14-11	13-0	10-7	12-3	12-3	10-7
	2 × 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.
a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor
f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

Beams are the workhorses that carry the load from your deck to the posts, which transfer that weight to the ground. To decide what your design will require for beams, use this table backwards.

Find the distance between your beams in the column headings on the right side (how far the joists span from house to beam or beam to beam). Then look for the span you would like your beam to cross between posts down that column. Those two numbers will give you the minimum size and number of beams based on the type of wood. Southern pine is what we typically see in this part of the country.

TABLE R507.6
DECK BEAM SPAN LENGTHS[a, b] (ft. - in.)

SPECIES[c]	SIZE[d]	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	2 – 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 – 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 – 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 – 2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 – 2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 – 2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3 – 2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
	3 – 2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3 × 6 or 2 – 2 x 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2 – 2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2 – 2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2 – 2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 – 2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 – 2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3 – 2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3 – 2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

c. No. 2 grade, wet service factor.

d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

f. Northern species. Incising factor not included.

Connecting Beams to Posts

There are a few different methods you can use to attach your beams to the posts that hold up your deck. All of them have one thing in common: they keep the beam from moving laterally. The whole point of the beam is to transfer the load of the deck, collected by the decking and the joists, to the post. If the beam isn't securely bearing on and attached to that post this transfer can fail—and your deck might.

Note that, if you are using triple beams or notching the post for double beams, you will need to use a minimum 6x6 post for bearing. The two connections specifically approved by the International Residential Code require that all plies of the beam bear entirely on the post and that it be connected to maintain that bearing.

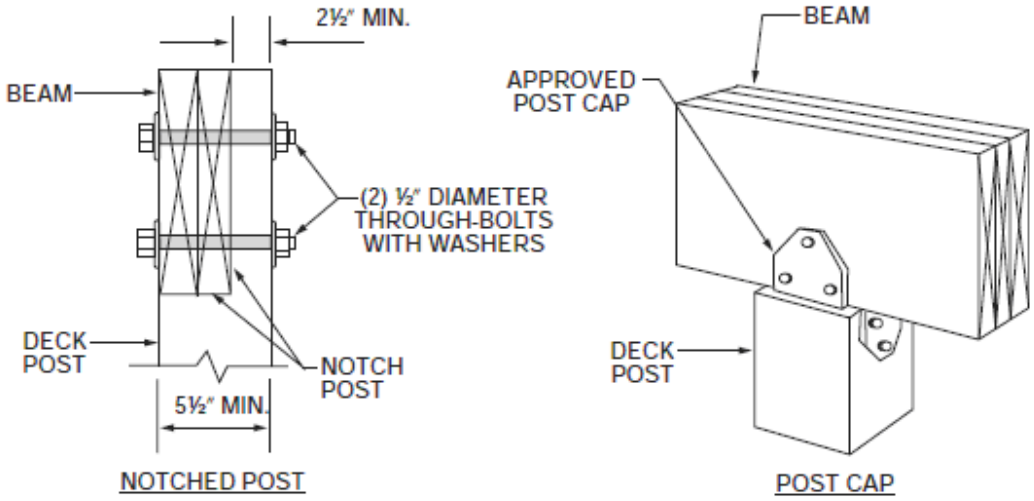
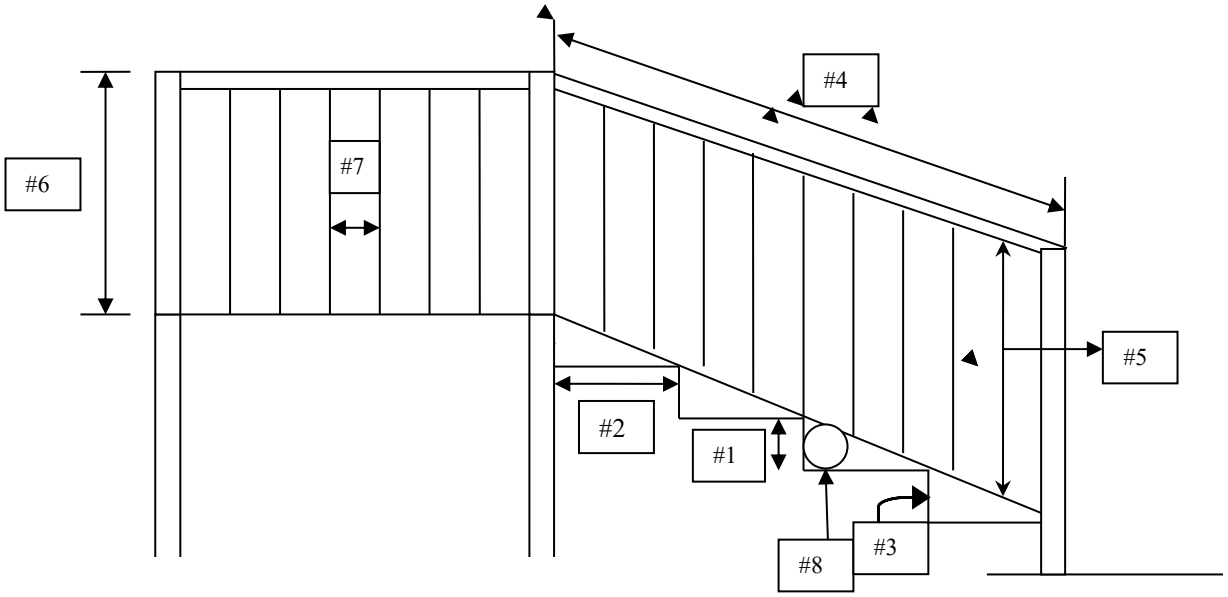


FIGURE R507.7.1
DECK BEAM TO DECK POST

Guards, Handrails, and Stair Codes

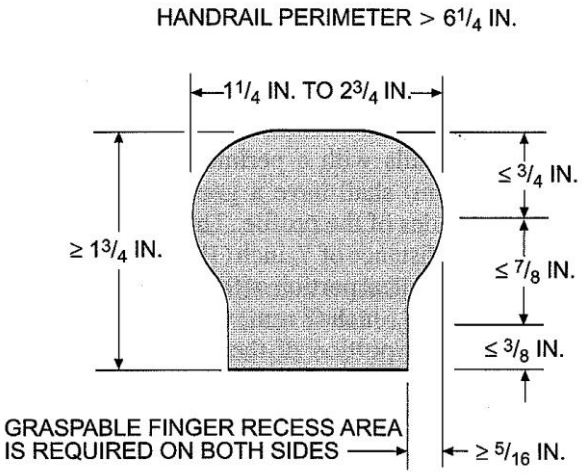
Width Stairways shall not be less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31.5 inches where a handrail is installed on one side and 27 inches where handrails are provided on both sides.

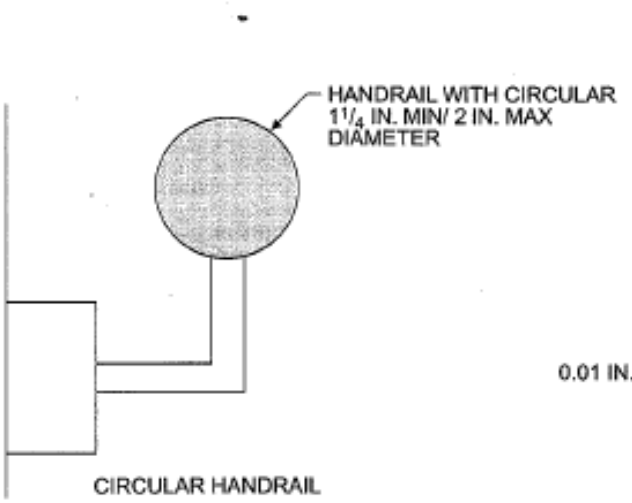
1. **Riser height:** The maximum riser height shall be 8 inches. The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch. Open risers on stairways are not permitted.
2. **Tread depth:** The minimum tread depth shall be 9 inches. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch.
3. **Profile:** Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter sphere.
4. **Handrails:** Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers (if you have to lift your foot at least four times to get from the ground to the top of the deck).
5. **Height:** Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches and not more than 38 inches.
6. **Guards required:** Porches, balconies or raised floor surfaces located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height. Open sides of stairs with a total rise of more than 30 inches above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.
7. **Guard opening limitations:** Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches or more in diameter.
8. **Guard opening limitations:** The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches cannot pass through.

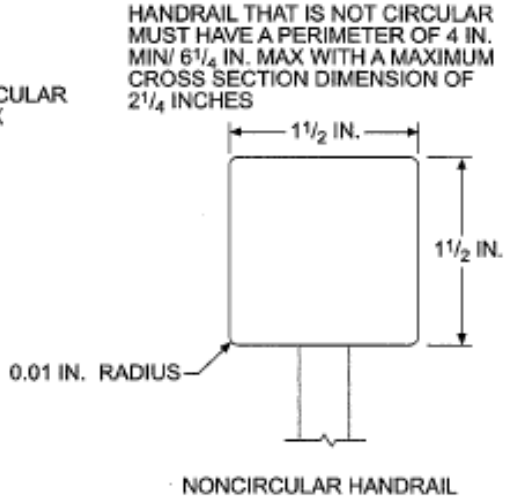


Graspable Handrail Guidelines

Any handrail must meet the requirements for being graspable regardless of its shape. You should be able to run your hand the full length of the handrail without having to lift it except in cases where a newel post interrupts it. Below you will find a guide for the most common shapes of handrail so that you may determine whether the rail you have chosen will comply with these requirements.







What Gets Inspected?

The Colfax Building inspector has put together a short list of the things they look for during deck inspections. This is obviously not an exhaustive list but it covers the basic safety and structural requirements. Other specific concerns may arise depending on site and loading conditions.

- Ledger Connection: the type of fasteners and their spacing. The ledger cannot be attached to a cantilever unless the floor trusses were designed to carry additional load. Information from the truss designer must be provided to staff to demonstrate this.
- Beam to Post Connection: If the sandwich method is used, the fasteners must be minimum ½" through bolts with washers on both ends
- Beams: size, span (distance between posts), and cantilever length if any
- Joists: size, spacing, span, and cantilever length if any
- Are all fasteners and hardware compatible for use with treated lumber and exterior installation?
- Were the proper fasteners used in hangers and have all of the required fasteners been installed?
- Is the guardrail present, if required, and a minimum 36" in height?
- Are the spindles in any guard spaced more than 4" apart? (4" or less is required for safety)
- Stairs: rise, run, consistency between risers, open risers
- Does the angle between guard and stairs leave an opening of 6" or more?
- Is the handrail graspable per code? The City of Fargo will no longer accept a flat 2x4 or 2x6 as a handrail. All handrails will need to comply with the currently adopted IRC.

A separate framing inspection is required before the decking is installed as well as a final inspection when all of the required elements are in place. We welcome questions so please feel free to contact the city inspector. This information can be found in the Building Permit Application found on our website.

Definitions

Covenant:	A formal agreement among property owners within a specific subdivision establishing conditions or restrictions upon the use of land within that subdivision. The City does not enforce covenants.
Easement:	A legal agreement for exclusive or nonexclusive use of a portion or all of a property granted to some party other than the property owner.
Foundations:	The foundation must be constructed of masonry, concrete, or treated wood. We recommend that it extend below the frost line of 52”.
Ledger:	A horizontal lumber beam attached to the existing wall to support the portion of a deck or roof nearest the house. A ledger is only required if the deck will not be free-standing.
Patio deck:	A structure that is open to the sky and which contains neither walls nor components other than handrails or guardrails above the deck surfaces.
Property Line:	A recorded boundary of a plot. It is the owner's responsibility to know where and how to locate the property lines. The City of Wahpeton assumes that the owner knows this information. Errors due to lack of property line knowledge will cause delays and additional expense.
Required:	Needed; essential; necessary
Required Yard, Front:	A yard extending across the full width of a lot and having a depth required by the specific zoning district.
Required Yard, Rear:	A yard extending across the full width of a lot and having a depth required by the specific zoning district. The depth shall be measured perpendicular from the rear property line.
Required Yard, Side:	A yard extending perpendicular the sideline of the lot to that point required by the specific zoning district.