



Residential Deck Information Sheet – One and Two Family Dwellings Chengwatana or Royalton Township

Building Permits: A permit is required if the deck is attached to the dwelling or is 30 inches (or more) above grade. A building permit application must be completed and submitted to the building department. Allow a minimum of 3 business days for review of the plans. You will be contacted when the building permit is ready to be issued. Cost of the permit is based upon the size of the deck. With your permit you will receive a copy of your approved plan. Please be aware that if you later decide to make changes to your plan, these changes must also be approved.

A Permit Application Checklist outlining all application requirements is provided with this handout and must be completed and submitted with your application. See pages within for sample Site Plans, Ledger Connection, Lateral Load Connection, Framing / Foundation Plan and Standard Details.

Setbacks: Always site specific.

Height Above Grade: For decks > 14 feet above grade, a complete design of the framing, connections, and foundation by a Minnesota licensed structural engineer is required. For decks greater than 6' above grade, corner bracing shall be required connecting the beam to the posts.

Multi-level Decks: If the area of any level of a multi-level deck exceeds 120 square feet or if the vertical distance between the top of the floor of the lower level and the bottom of the joist of the upper level exceeds ten (10) feet, design must be by a Minnesota licensed engineer. If proposed deck does not require an engineer, footings must be sized to carry the load from all levels. Design for 42-pound live load plus 10-pound dead load, assuming 1500 psf soil bearing capacity.

Loads: All decks shall be designed to support a live load (people, furniture, grills, etc.) of 40 lbs per square foot, and a dead load (wood, decking, etc.) actual weight of materials foot (R301.4, R301.5).

Joists, Beams & Footings: See *JOIST SPAN* table for minimum joist size and spacing requirements. See *BEAM* table for beam size and footing table for *FOOTING* requirements. Ask your lumber supplier about species and grade.

Cantilevers: Cantilevers are addressed in the foot notes of the joist and beam tables and in table R502.3.3(2)

Cantilever Attachment: Decks shall not be supported by cantilevers extending from the primary structure or from another deck unless the structure is analyzed and approved by a license professional engineer.

Ledger & Attachment: Ledger to be a minimum of 2 X 8 nominal lumber. Different loads require different attachment. Please refer to Table R507.9.1.3(2) and figure R507.9.1.3(1)

Deck Lateral Load Connection: A minimum of two lateral load connections are required per deck. Please refer to the *DECK LATERAL LOAD CONNECTION* requirements provided in this handout.

Flashing: Needed where exterior porches, decks, or stairs attach to a wall or floor assembly of wood frame construction. R703.4.

Frost Footings: Footings are required for any deck attached to a dwelling or to any other structure that has frost footings. The minimum depth to the bottom of the footings is 60 inches. The footing bottom diameter shall be based upon the attached table. If the materials used for posts are not rated for ground contact, the concrete piers must protrude above grade a minimum of 6 inches. See attached *FOOTING SIZE FOR DECKS* table for footing size and spacing requirements. Minimum thickness of footing pad is 8 inches but a thicker pad is required for larger footings (see chart). Reinforce concrete piers with a minimum of (1) - #4 vertical.

Post and Beams: Posts must be centered on the concrete piers and attached with a mechanical fastener (post base) and anchor bolt (or approved equal). Beams must be positively connected to the top of the posts. Options include a mechanical fastener (post

cap) or notch the top of the post 3 inches (two 2x beam only) from one side and thru-bolt the beam with a minimum of (2) – ½ inch diameter bolts (two 2x8) or (3) – ½ inch diameter bolts (two 2x10 or greater). Splices in beams must be centered over a post. Each joist must be connected to the beam with the proper fastening method using nails, joist hangers or hurricane clips. Beam members shall be nailed or screwed together. Attach with a minimum of (2) – rows 10d common nails or (2) – rows #10 screws at 16 inches on center from each side, stagger. Split beam attachment to posts is not allowed.

Stairs: Minimum width is 36 inches. Maximum riser height is 7¾ inches. Minimum tread depth is 10 inches. Treads with a depth less than 11 inches must have compliant nosing. Largest tread depth or riser height shall not exceed the smallest by more than ¾ inch across the run of the stairs. Treads shall be level with a slope no greater than 2%. Lighting capable of illuminating the treads and landings is required, shall be located in the immediate vicinity of the top landing (R303.8). There shall be a landing at the top and bottom of stairs. Landings must be as wide as the stairs they serve, have a minimum length of 36 inches in direction of travel and have a slope no steeper than one-unit vertical in 48 inches horizontal (2% slope). R311.7.7

Handrails: (R311.7.8). Stairways having 4 or more risers shall have at least 1 handrail. The top of the handrail shall not be less than 34 inches or more than 38 inches above the nosing of the treads (to the top of the gripping surface). Handrails shall be continuous for the full length of the stairs and shall protrude from the adjoining surface by at least 1½ inches, but no more than 4½ inches, and the ends shall be returned or terminated into posts. Handrails with a circular cross section shall have an outside diameter of not less than 1¼ inches or more than 2 inches. Other handrails may be acceptable. See the specific code language to be sure your handrail does comply.

Guardrails: (R312.1) A guardrail is required on all decks or any portion of a deck more than 30 inches above grade or above a lower deck. Deck guardrails must be a minimum of 36 inches high. Open guardrails on decks must have intermediate rails (balusters) or an ornamental pattern that a 4-inch sphere cannot pass through. Guardrails on stairs cannot have an opening between balusters that a 4³/₈-inch sphere can pass through.

Structural Details: Header beams and joists that frame into beams shall be supported by approved framing anchors such as joist hangers. Beams supporting deck joists shall not be supported on deck ledgers or band joists. Posts shall be attached to concrete piers with a post base and anchor bolt (or approved equal). Installation of these framing anchors shall be in accordance with the manufacturer's installation instructions; typically, special nails are required. **Note:** Decks must be positively anchored to the primary structure or be self-supporting. Please see drawings provided.

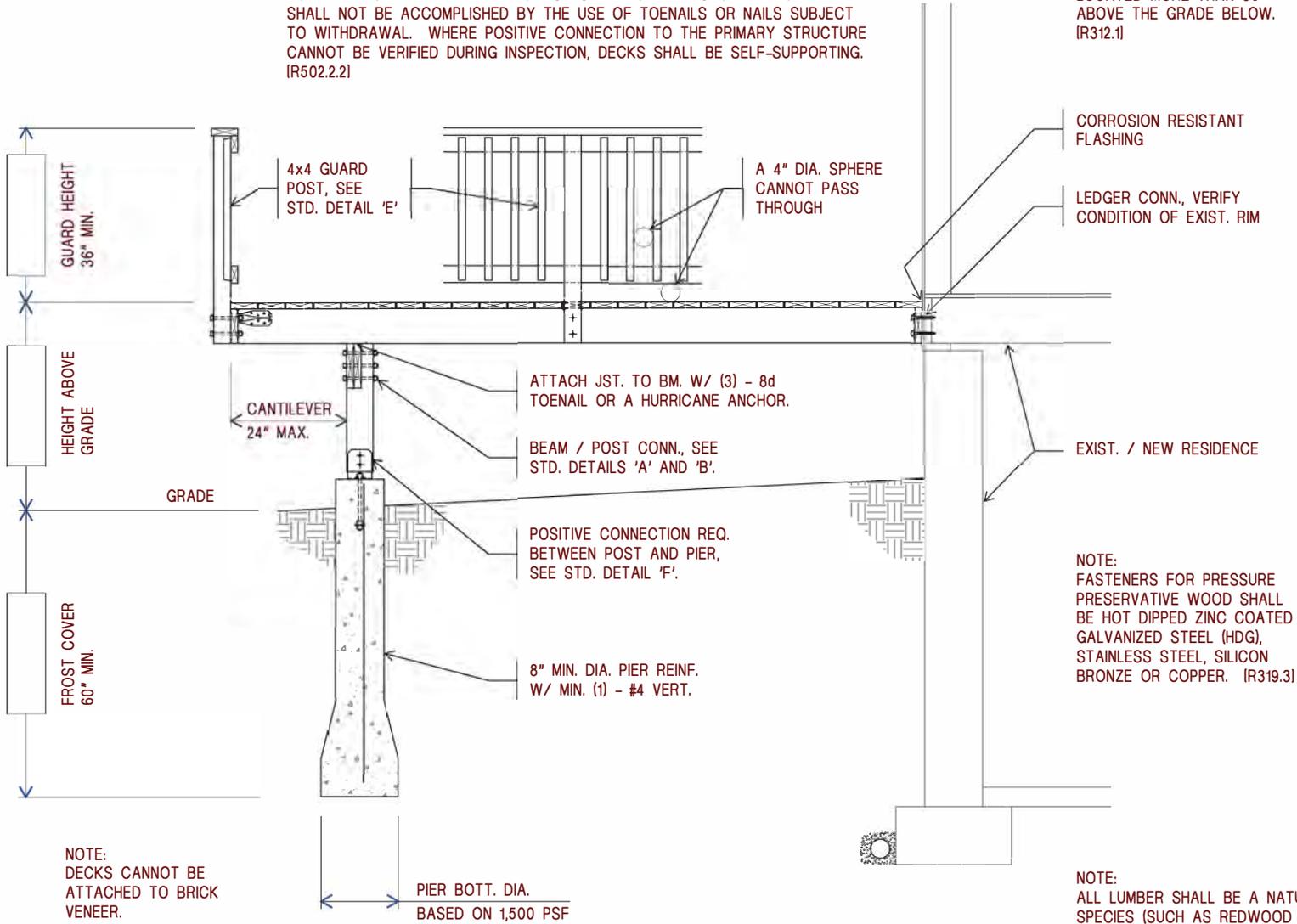
Nails, Screws and All Connection Hardware: Fasteners for pressure-preservative wood shall be hot dipped zinc coated galvanized steel (HDG), stainless steel, silicon bronze or copper. Ask your materials supplier for an approved fastener (R317.3.1). Screws cannot be used to attach joist hangers unless specifically approved for such application.

Inspections: You must call for a scheduled appointment time (please try to schedule inspections a minimum of 24 hours in advance). The approved plan must be on site for all inspections. Typically, 3 inspections are required:

1. Footings – These will be checked for proper diameter, depth, belled bottom, a flat surface at the base, and no water in the holes. The form (sonotube) and reinforcement must be in place. The post bases and anchor bolts (or approved equal) must be on-site.
2. Framing – If your deck surface is 4 feet or closer to the ground, you must pass a framing inspection before the decking material may be applied to the deck surface. Structural integrity and proper attachment of all connectors will be inspected.
3. Final – For decks that are 4 feet or greater off the ground, framing and final inspections may be completed together. A final inspection must be completed to be sure that the deck complies with the current *Minnesota State Building Code*.

NOTE:
 WHERE SUPPORTED BY ATTACHMENT TO AN EXTERIOR WALL, DECKS SHALL BE POSITIVELY ANCHORED TO THE PRIMARY STRUCTURE AND DESIGNED FOR BOTH VERTICAL AND LATERAL LOADS AS APPLICABLE. SUCH ATTACHMENT SHALL NOT BE ACCOMPLISHED BY THE USE OF TOENAILS OR NAILS SUBJECT TO WITHDRAWAL. WHERE POSITIVE CONNECTION TO THE PRIMARY STRUCTURE CANNOT BE VERIFIED DURING INSPECTION, DECKS SHALL BE SELF-SUPPORTING. (R502.2.2)

NOTE:
 GUARDS ARE REQ. FOR DECKS W/ SURFACES LOCATED MORE THAN 30" ABOVE THE GRADE BELOW. (R312.1)



NOTE:
 DECKS CANNOT BE ATTACHED TO BRICK VENEER.

NOTE:
 FASTENERS FOR PRESSURE PRESERVATIVE WOOD SHALL BE HOT DIPPED ZINC COATED GALVANIZED STEEL (HDG), STAINLESS STEEL, SILICON BRONZE OR COPPER. (R319.3)

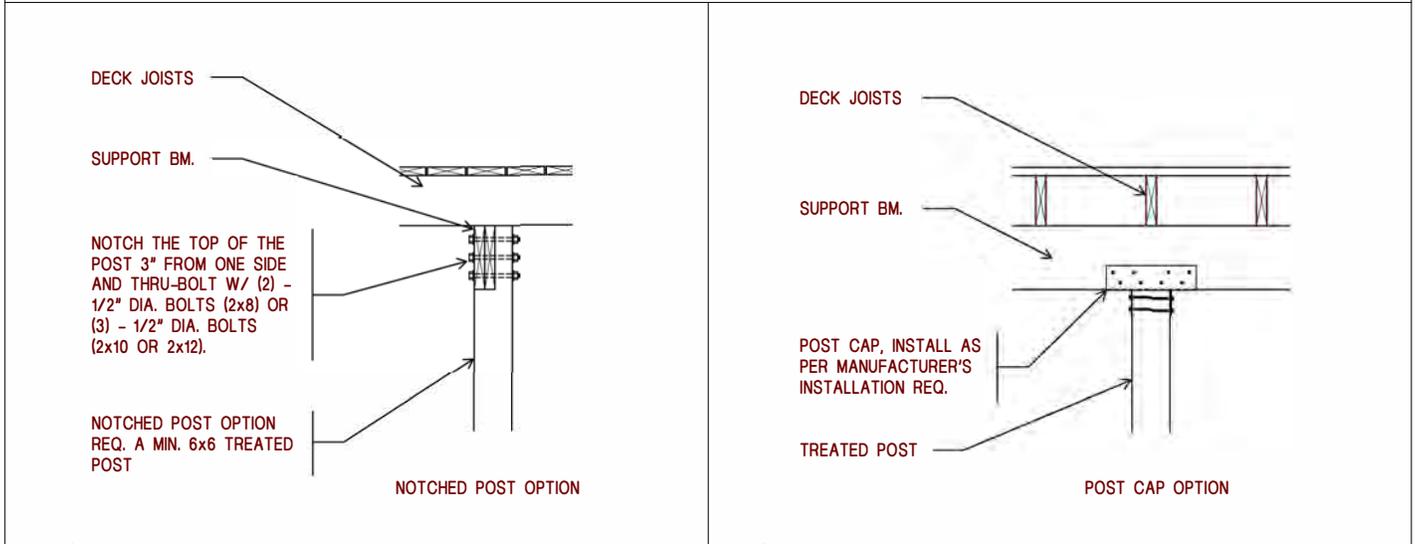
NOTE:
 ALL LUMBER SHALL BE A NATURALLY DURABLE SPECIES (SUCH AS REDWOOD OR WESTERN CEDARS) OR BE PRESSURE TREATED WITH AN APPROVED PROCESS AND PRESERVATIVE IN ACCORDANCE WITH AMERICAN WOOD PROTECTION ASSOCIATION STANDARDS (TABLE 1) (R319.1 AND R320.1). ALL LUMBER IN CONTACT WITH THE GROUND SHALL BE APPROVED PRESERVATIVE TREATED WOOD SUITABLE FOR GROUND CONTACT. (R319.1.2)

NOTE:
 FILL IN ALL BOXES

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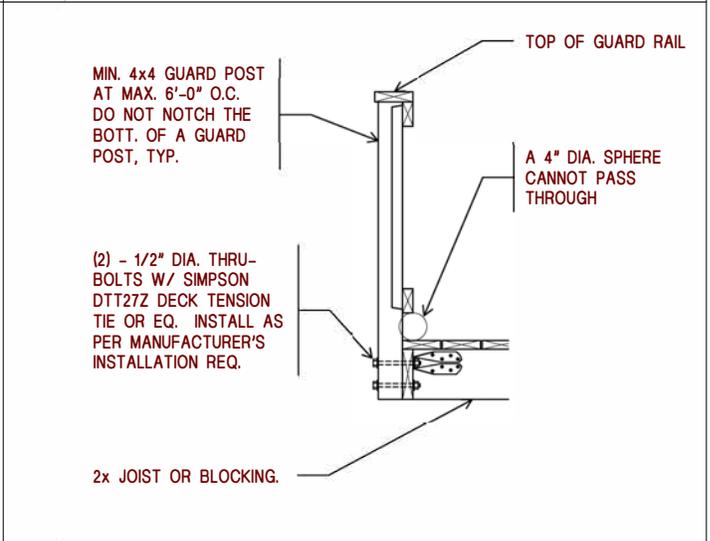
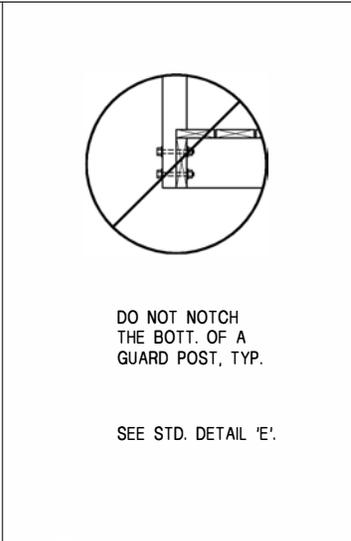
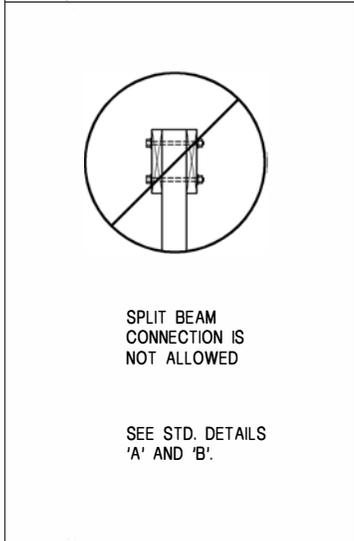
DECK SECTION -
 NOT TO SCALE

STANDARD DETAILS



A BEAM / POST CONNECTION

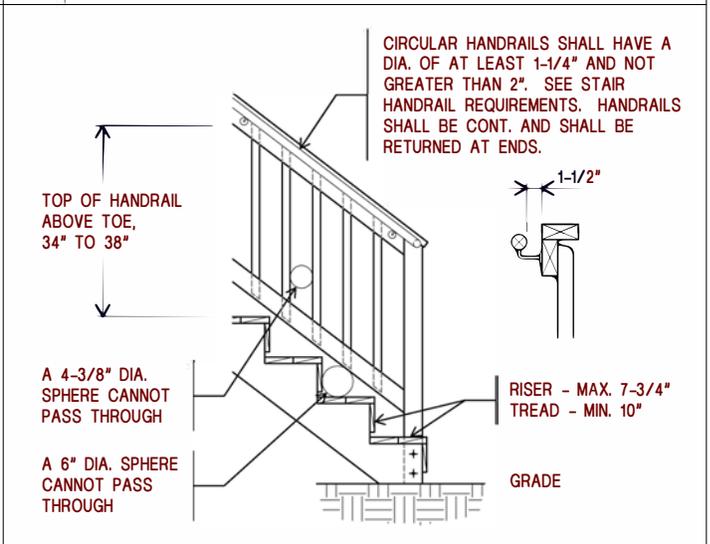
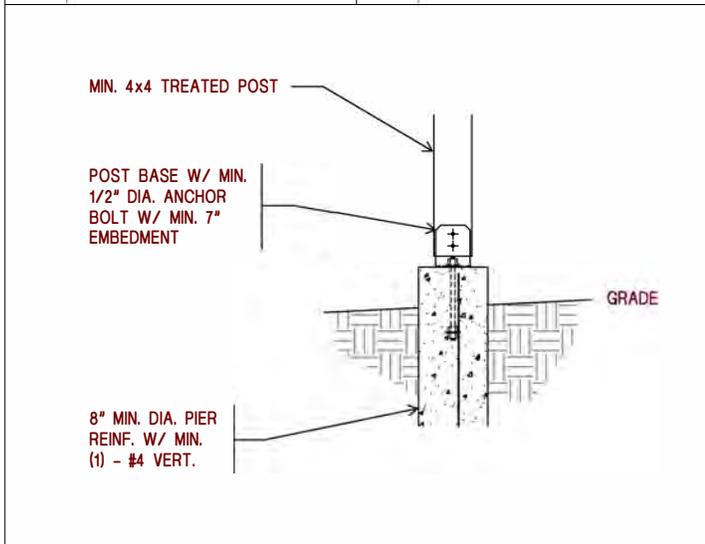
B BEAM / POST CONNECTION



C BEAM CONN.

D GUARD CONN.

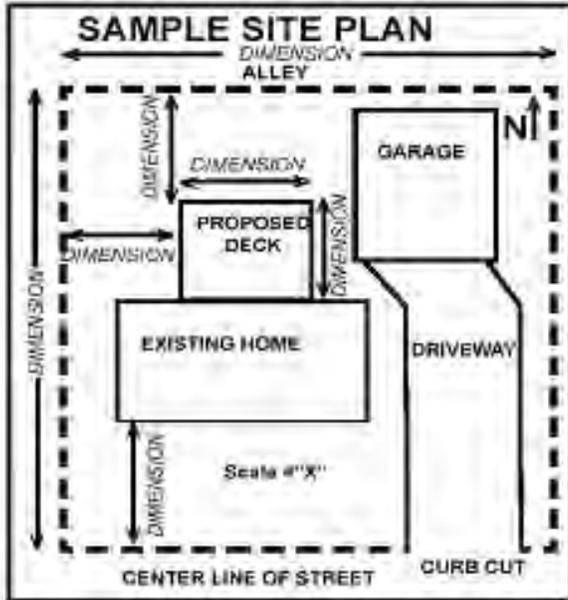
E GUARD POST CONNECTION



F POST / PIER CONNECTION

G STAIR / HANDRAIL

Sample Site Plan, Elevation and Framing Plan



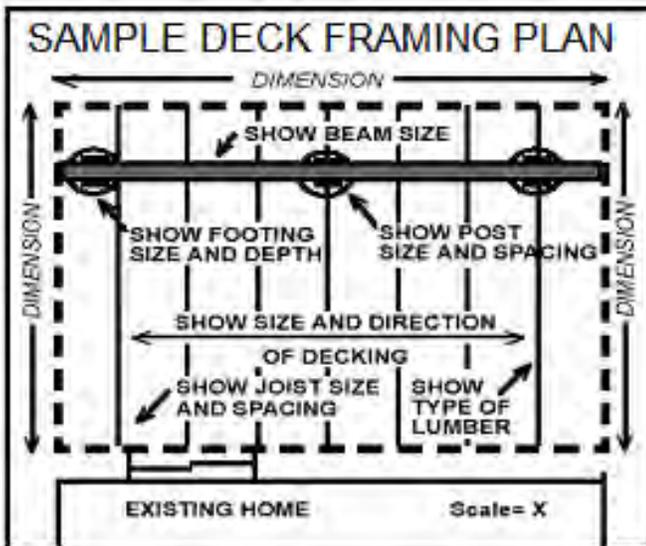
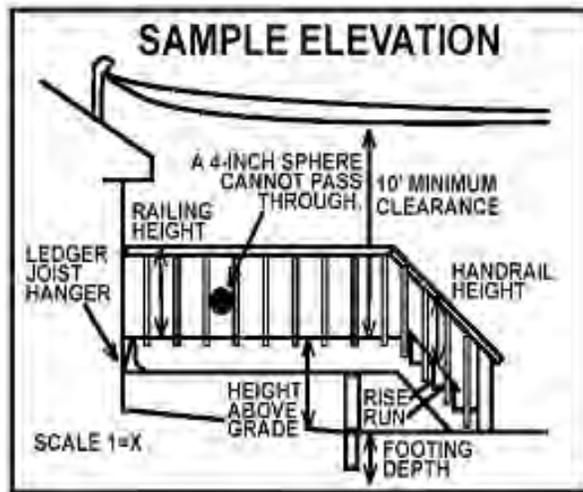
PLANS: SITE, DECK FRAMING, and ELEVATION

The following text and sample drawings show the minimum detail expected so the permit process can proceed smoothly. **TWO sets of each plan are required if you do not use our forms.** Plans do not need to be professionally drawn. However, plans should include all of the information requested. The application for permit can be filled out at the time you drop off your plans.

Certificate of Survey or Site Plan drawn to scale indicating the lot dimensions, the location and size of the existing structure(s), and the location and a size of the proposed structure. Indicate the setbacks from property lines of the existing and proposed structure(s), including septic system area and wells if applicable.

ELEVATION

1. Height of structure surface from grade.
2. Size and depth of footings.
3. Guard height and spacing (if any).
4. Stairway rise/run and handrail height (if any).
5. Clearance of over-head wires (if applicable).
6. Gas meters cannot be located above or below a new deck.



DECK FRAMING PLAN

1. Proposed deck size.
2. Size and spacing of deck joists.
3. Size and type of decking material.
4. Size, type, location, and spacing of posts.
5. Size and type of beams.
6. Size of pier bottom diameter.
7. Ledger connection.

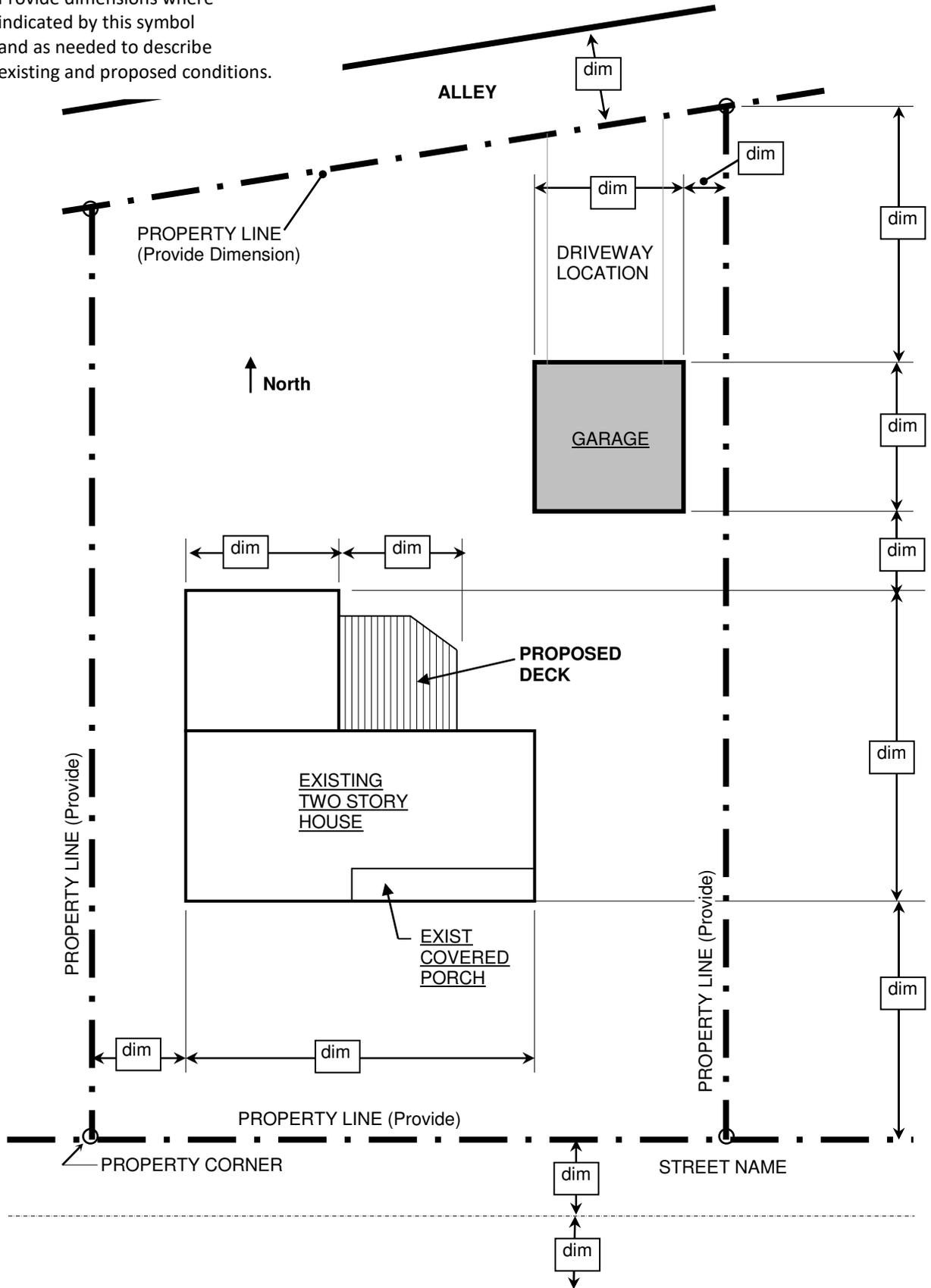
Sample Site Plan

Don't use this sheet-create your own drawing.

SCALE: 1" = _____ FEET

dim

Provide dimensions where indicated by this symbol and as needed to describe existing and proposed conditions.



**TABLE R507.6
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)**

SPECIES ^a	SIZE	ALLOWABLE JOIST SPAN ^b			MAXIMUM CANTILEVER ^{c, f}		
		SPACING OF DECK JOISTS (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS ^e (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch ^d , hem-fir ^d spruce-pine-fir ^d ,	2 × 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 × 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 × 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 × 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 × 6	8-10	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-8	10-7	8-8	1-8	1-10	2-0
	2 × 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 × 12	17-5	15-1	12-4	3-10	3-9	3-1

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. 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.

**TABLE R507.7
MAXIMUM JOIST SPACING FOR DECKING**

DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking 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 R507.2	In accordance with Section R507.2

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 R507.4
DECK POST HEIGHT^a**

DECK POST SIZE	MAXIMUM HEIGHT ^{a, b} (feet-inches)
4 × 4	6-9 ^c
4 × 6	8
6 × 6	14
8 × 8	14

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

- a. Measured to the underside of the beam.
- b. Based on 40 psf live load.
- c. The maximum permitted height is 8 feet for one-ply and two-ply beams. The maximum permitted height for three-ply beams on post cap is 6 feet 9 inches.

TABLE R507.5
DECK BEAM SPAN LENGTHS^{a, b, c} (feet - inches)

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

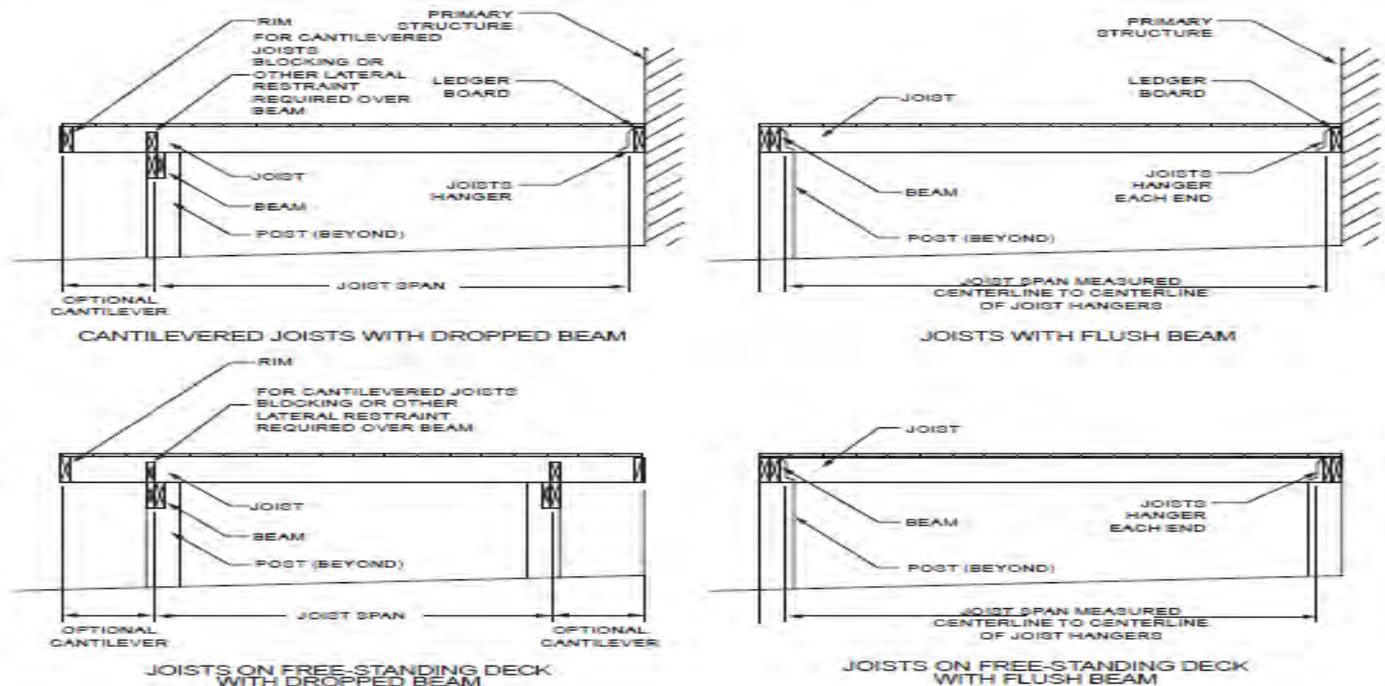
c. No. 2 grade, wet service factor.

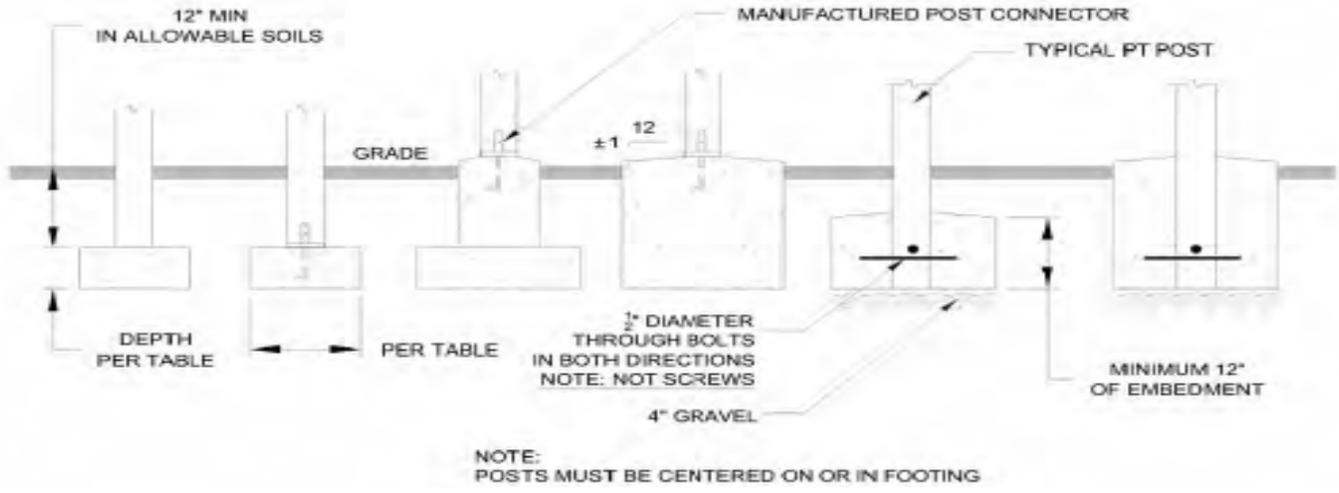
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

f. Northern species. Incising factor not included.

g. Beam cantilevers are limited to the adjacent beam's span divided by 4.





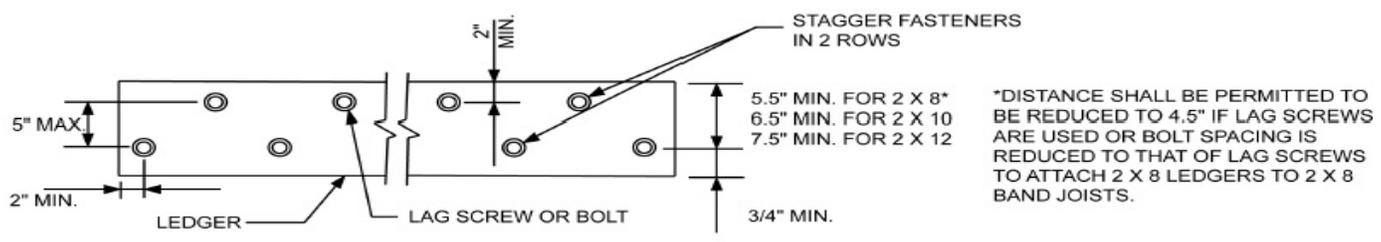
**TABLE R507.3.1
MINIMUM FOOTING SIZE FOR DECKS**

LIVE LOAD ^a (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS ^{a,c,d} (psf)											
		1500*			2000*			2500*			≥ 3000*		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6
	120	24	27	9	21	23	7	19	21	6	17	19	6
	140	26	29	10	22	25	8	20	23	7	18	21	6
160	28	31	11	24	27	9	21	24	8	20	22	7	

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa.
 a. Interpolation permitted, extrapolation not permitted.
 b. Live load = 40 psf, dead load = 10 psf.
 c. Assumes minimum square footing to be 12 inches x 12 inches x 6 inches for 6 x 6 post.
 d. If the support is a brick or CMU pier, the footing shall have a minimum 2-inch projection on all sides.
 e. Area, in square feet, of deck surface supported by post and footings.

Deck Ledger Connection to Band Joist^a (Deck Live Load = 40 psf, Deck Dead Load = 10 psf)

- a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- b. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- c. Sheathing shall be wood structural panel or solid sawn lumber.
- d. 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.



Lag Screws:

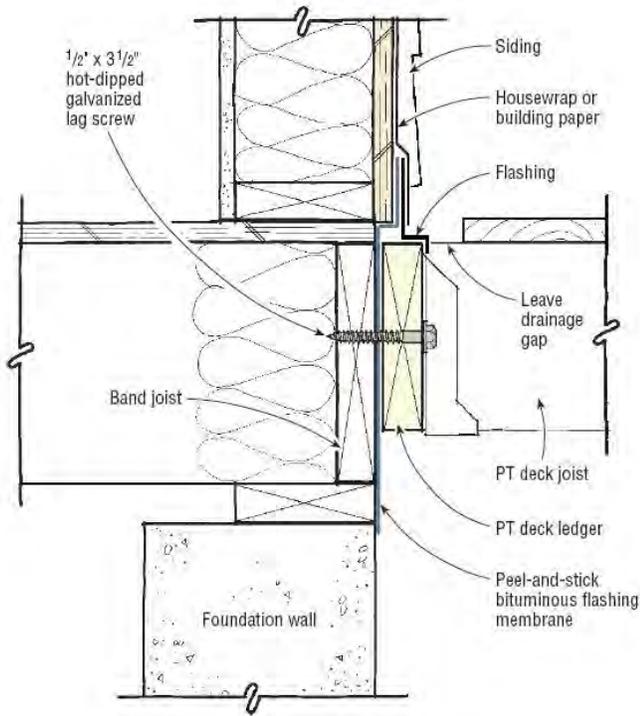
Lag screws shall have a minimum diameter of 1/2 inch. Lag screws may be used only when the field conditions conform to those shown above. All lag screws shall be with washers.

Thru-Bolts:

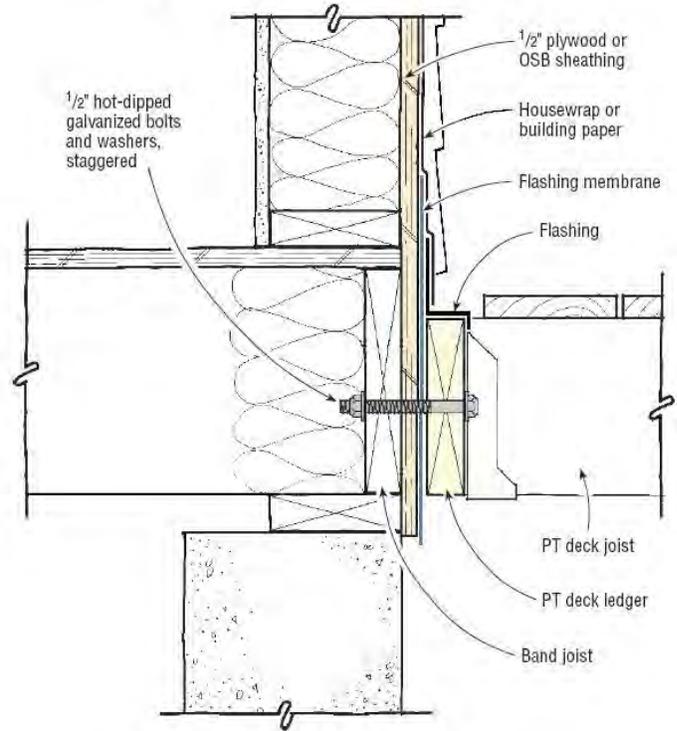
Thru-bolts shall have a diameter of 1/2 inch. Pilot holes for thru-bolts shall be 17/32 inch to 9/16 inch in diameter. Thru-bolts require washers at the bolt head and nut.

Ledger Attachment Requirements

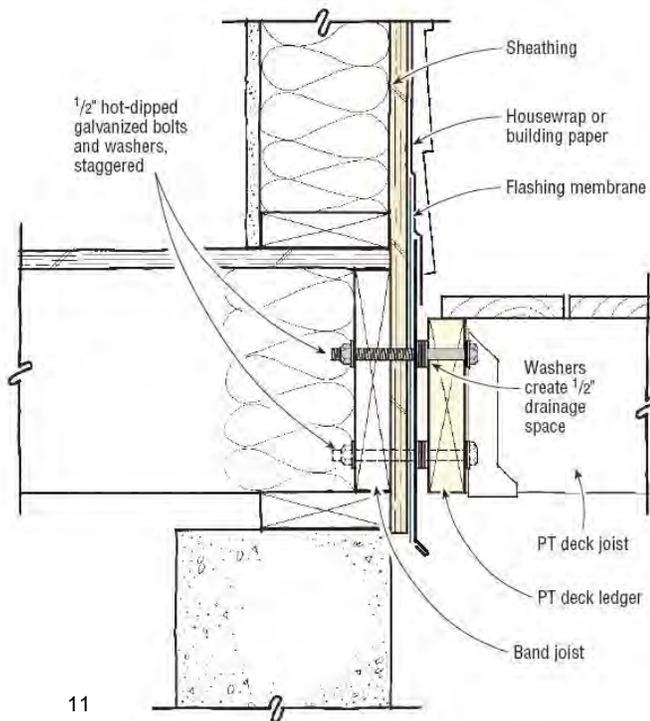
Detail 1: Attaching Ledger Directly to Band Joist



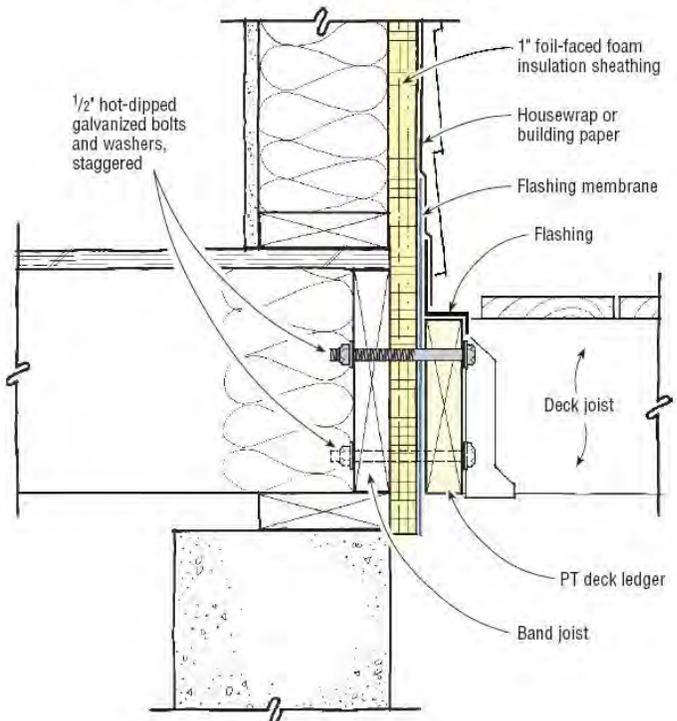
Detail 2: Attaching Ledger to Band Joist Over Structural Sheathing



Detail 3a: Attaching Ledger With Drainage Spacers



Detail 3b: Attaching Ledger Over Foam Sheathing



Deck Lateral Load Connection

The building code requires that decks be designed for both vertical and lateral loads. A minimum of two lateral load connections are required for each deck. The intention of the lateral load connection is to tie the deck and ledger into the residence's floor system. The primary deck failure mode is the ledger pulling away from the residence. Figures 507.2.3(1) & 507.2.3(2) (below) are **TWO POSSIBLE OPTIONS** for complying with the lateral load connection requirement. Coordinate the lateral load connection requirement with the Construction Inspector. Complying with the lateral load connection requirement will be on a case by case basis dependent on the type of and direction of floor framing to be attached to. Where a ledger is expansion anchored to a concrete wall, a deck lateral load connection is only required to connect to the ledger expansion anchors.

- R507.1 Decks.** Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.
- R507.2.3 Deck Lateral Load Connection.** The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures 507.2.3(1) or 507.2.3(2). Where the lateral load connection is provided in accordance with Figure 507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1,500 pounds. Where the lateral load connections are provided in accordance with Figure 507.2.3(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds.

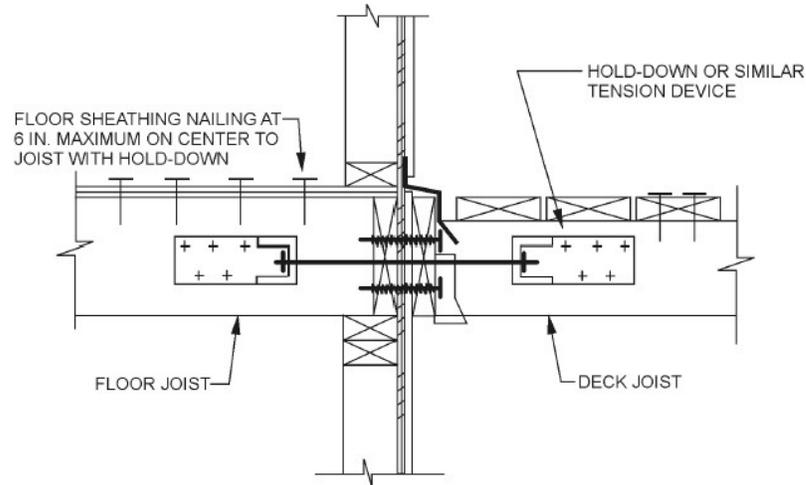


Figure 507.2.3(1)

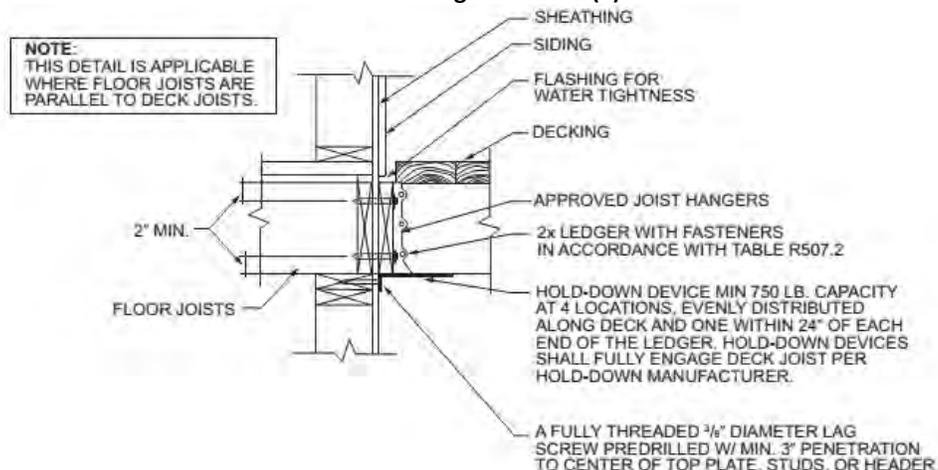


Figure 507.2.3(2)