Purpose: To illustrate typical wood-pile-to-beam connections, provide basic construction guidelines on various connection methods, and show pile bracing connection techniques.

NOTE: The pile-to-beam connection is one of the most critical links in the structure. This connection must be designed by an engineer. See Fact Sheet No. 10 for “load path” information. The number of bolts and typical bolt placement dimensions shown are for illustrative purposes only. Connection designs are not limited to those shown here, and not all of the information to be considered in the designs is included in these illustrations. Final designs are the responsibility of the engineer.

Key Issues
- Verify pile alignment and correct, if necessary, before making connections.
- Carefully cut piles to ensure required scarf depths.
- Limit cuts to no more than 50 percent of pile cross-section.
- Use corrosion-resistant hardware, such as hot-dipped galvanized or stainless steel (see Fact Sheet No. 8).
- Accurately locate and drill bolt holes.
- Field-treat all cuts and holes to prevent decay.
- Use sufficient pile and beam sizes to allow proper bolt edge distances.

Pile-to-beam connections must:
1. provide required bearing area for beam to rest on pile
2. provide required uplift (tension) resistance
3. maintain beam in an upright position
4. be capable of resisting lateral loads (wind and seismic)
5. be constructed with durable connectors and fasteners

Note: Pile-to-beam connections must be designed by an engineer.
Problem: Misaligned piles – some piles are shifted in or out from their intended (design) locations.

Possible Solutions (see drawings on page 3 and details on page 4):

Option 1 (see page 3) – beam cannot be shifted

Option 2 (see page 3) – beam can be shifted laterally and remains square to building

Option 3 (see page 3) – beam can be shifted laterally, but does not remain square to building

Option 4 (not shown) – beam cannot be shifted, and connections shown in this fact sheet cannot be made; install and connect sister piles; an engineer must be consulted for this option

Option 5 (not shown) – beam cannot be shifted, and connections shown in this fact sheet cannot be made; remove and reinstall piles, as necessary
Connections to misaligned piles

String stretched to establish center of beam

Pile shifted out

Standard connection (see Detail A1)
Bearing sufficient

Pile shifted out

Connection with scabbed member or engineered bracket (see Detail B1 or C1)
Bearing insufficient

Pile shifted in

Connection with steel plate(s) (see Detail D1)
Bearing sufficient; uplift resistance insufficient

Pile shifted in

Standard connection with opposite side of pile notched (see Detail A2)
Bearing sufficient

Option 1
Beam cannot be shifted

Option 2
Beam can be shifted laterally and remains square to building

Option 3
Beam can shifted laterally, but does not remain square to building

Intended pile location
Actual pile location

Note: Pile-to-beam connections must be designed by an engineer.
Connections to misaligned piles (see drawings on page 3 and details below)

1. The ability to construct the pile-to-beam connections designed by the engineer is directly dependent on the accuracy of pile installation and alignment.
2. Misaligned piles will require the contractor to modify pile-to-beam connections in the field.
3. Badly misaligned piles will require removal and reinstallation, sister piles, or special connections, all to be determined by the engineer.

Note: Pile-to-beam connections must be designed by an engineer.
Note: Splicing the beam over a pile may increase the required pile diameter because of bolt/nail end distance requirements on the beam or bolt edge distance requirements on the pile.

Lapped splice (built-up beam)

Note: Laminated lumber beams can be used for longer, unspliced spans.

Beam bolted at pile (not recommended)

Note: This detail is not recommended. The connection shown has reduced capacity, may violate bolt edge-distance requirements, and can result in a weaker beam.

Knee brace connection on square pile*

*Knee braces of this type can also be used on notched round piles.

Diagonal brace connections on round pile

Note: Pile-to-beam connections must be designed by an engineer.