2003/2004 ICC CODE DEVELOPMENT CYCLE

ERRATA TO THE 2003/2004 FINAL ACTION AGENDA

April 29, 2004 Update

S80-03/04:

THESE 2 PUBLIC COMMENTS WERE INADVERTENTLY LEFT OUT OF THE ORIGINALLY PUBLISHED PUBLIC COMMENT.

Public Comment 2:

Zeno Martin, APA-The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify item 2 as follows:

2308.9.3.2 Alternate bracing wall panel adjacent to a door or window opening. Any bracing required by Section 2308.9.3 is permitted to be replaced by the following when used adjacent to a door or window opening with a full-length header:

1. In one-story buildings, each panel shall have a length of not less than 16 inches (406 mm) and a height of not more than 10 feet (3048 mm). Each panel shall be sheathed on one face with a single layer of 3/8-inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Figure 2308.9.3.2. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed in accordance with Figure 2308.9.3.2. A built-up header consisting of at least two 2 x 12s and fastened in accordance with item 24 of Table 2304.9.1 shall be permitted to be used. A spacer, if used, shall be placed on the side of the built-up beam opposite the wood structural panel sheathing. The header shall extend between the inside faces of the first full-length outer studs of each panel. The clear span of the header between the inner studs of each panel shall be not less than six feet (1829 mm) and not more than 18 feet 5486 mm) in length. A strap with an uplift capacity of not less than 1000-pound (454 kg) shall fasten the header to the inner studs opposite the sheathing. One anchor bolt not less than 5/8-inch (15.9 mm) diameter and installed in accordance with Section 2308.6 shall be provided in the center of each sill plate. The studs at each end of the panel shall have a tie-down device fastened to the foundation with an uplift capacity of not less than 4,200 pounds (1905 kg).
   Where a panel is located on one side of the opening, the header shall extend between the inside face of the first full-length stud of the panel and the bearing studs at the other end of the opening. A strap with an uplift capacity of not less than 1000 pounds (454 kg) shall fasten the header to the bearing studs. The bearing studs shall also have a tie-down device fastened to the foundation with an uplift capacity of not less than ~~4,200 pounds (1905 kg)~~ 1,000 pounds (454 kg).
   The tie-down devices shall be an embedded strap type, installed in accordance with the manufacturer's recommendations. The panels shall be supported directly on a foundation which is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom.
   Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.

2. In the first story of two-story buildings, each wall panel shall be braced in accordance with Item 1 above, except that each panel shall have a length of not less than 24 inches (610 mm).

Modify item 7 as follows:

R602.10.6.2 Alternate bracing wall panel adjacent to a door or window opening. Alternate braced wall panels constructed in accordance with one of the following provisions are also permitted to replace each 4 feet (1219 mm) of braced wall panel as required by Section R602.10.4 for use adjacent to a window or door opening with a full-length header:

1. In one-story buildings, each panel shall have a length of not less than 16 inches (406 mm) and a height of not more than 10 feet (3048 mm). Each panel shall be sheathed on one face with a single layer of 3/8-inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Figure R602.10.6.2. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed in accordance with Figure R602.10.6.2. A built-up header consisting of at least two 2 x 12s and fastened in accordance with Table R602.3(1) shall be permitted to be used. A spacer, if used, shall be placed on the side of the built-up beam opposite the wood structural panel sheathing. The header shall extend between the inside faces of the first full-length outer studs of each panel. The clear span of the header between the inner studs of each panel shall be not less than six feet (1829 mm) and not more than 18 feet (5486 mm) in length. A strap with an uplift capacity of not less than 1000 pounds (454 kg) shall fasten the header to the side of the inner studs opposite the sheathing. One anchor bolt not less than 5/8-inch (15.9 mm) diameter and installed in accordance with Section R403.1.6 shall be provided in the center of each sill plate. The studs at each end of the panel shall have a tie-down device fastened to the foundation with an uplift capacity of not less than 4,200 pounds (1905 kg).

   Where a panel is located on one side of the opening, the header shall extend between the inside face of the first full-length stud of the panel and the bearing studs at the other end of the opening. A strap with an uplift capacity of not less than 1000 pounds (454 kg) shall fasten the header to the bearing studs. The bearing studs shall also have a tie-down device fastened to the foundation with an uplift capacity of not less than ~~4,200 pounds (1905 kg)~~ 1,000 pounds (454 kg).

   The tie-down devices shall be an embedded strap type, installed in accordance with the manufacturer's recommendations. The panels shall be supported directly on a foundation or on floor framing supported directly on a

foundation, which is continuous across the entire length of the braced wall line. The foundation shall be reinforced with not less than one No. 4 bar top and bottom.

Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped not less than 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.

2. In the first story of two-story buildings, each wall panel shall be braced in accordance with Item 1 above, except that each panel shall have a length of not less than 24 inches (610 mm).

Items 1, 3 through 6 and 8 as approved by committee.

Commenter's Reason: The text should be consistent with the figure (item 3 and 8). 1,000 pounds is correctly shown in the figure and provides a consistent uplift load path with the header strap capacity (also 1,000 pounds), where there is no wall segment (e.g. a single portal frame). The 4,200 pounds is still required for the sheathed wall segments.

Public Comment 3:

David Rice, P.E., Trus Joist, A Weyerhaeuser Business, requests Disapproval.

Commenter's Reason: Aspect Ratio: This proposal would allow site-built braced wall panels, with full length headers, next to door and window openings with aspect ratios as high as 7.5:1. It should be noted that shear wall aspect ratios are currently allowed up to 3.5:1 (Table 2305.3.3), for wood structural panels with nailed edges; and, only when the values in Table 2306.4.1 are reduced by 2w/h.

Field Construction: Proposal S80-03/04 provides very specific construction details. There are no provisions that provide assurance that construction will conform to the specified details, or that specified materials will be used. Additionally, no guidance is provided regarding allowable construction tolerances, or concrete anchorage detailing.

Equivalence: The Sturd-I-Frame portals are a very flexible system that potentially will get even more flexible with field construction tolerances and errors. The major complaint stemming from the Northridge earthquake was that high aspect ratio braced wall panels like these were not stiff enough to pick up load. Comparison of the 10 foot high Sturd-I-Frame portal and 8 foot high braced wall panel data provided in APA Report *T2003-11* does not necessarily justify equivalent seismic performance. The stiffness of the 16 inch wide by 10 foot high Sturd-I-Frame portal is 40% less than the stiffness of the 32 inch wide by 8 foot high braced wall panel. The Sturd-I-Frame portal does not yield until it is at a displacement that is four times as far as the braced wall panel. More direct evidence of dynamic equivalence should be required, such as testing of a 10 foot high braced wall panel for comparison to the 10 foot high Sturd-I-Frame portal.

Boundary Conditions: The test data in APA Reports *T2002-46*, *T2003-11*, and *T2002-70* was generated using a heavy steel load beam that was lagged over the entire length of the portal, preventing bending of the header. This boundary condition inflated the portal stiffness overall and relative to the "braced wall" panels (APA Report *T2002-70*) that were tested the same way. APA Report *T2003-11* provides test data for the Sturdy-I-Frame portal with a header to load application connection that allowed for bending of the header. However, only two tests each of two different Sturd-I-Frame portals are reported. No 8 foot high Sturd-I-Frame portals were reported tested with this boundary condition.

Performance Variability: APA Report *T2002-46* indicates an elastic stiffness of 2,874 lbs./in. and an ultimate strength of 2,659 lbs. (Test 3). Testing of the same basic system is reported in APA Report *T2003-1* (Tests 5 and 6) with an average initial stiffness of 2,170 lbs./in. and an average ultimate strength of 1,687 lbs. This represents a 36% reduction in strength and a 24% reduction in stiffness for essentially the same systems.

Anchorage: The Sturd-I-Frame portals were tested with a 4200 lb capacity nailed strap that was rigidly attached to a steel base. The strap was empirically verified for the connection to the wood panels by testing (a sample size of 2). No information has been presented regarding the actual ultimate or design uplift forces experienced during the testing. Nailed single-shear connections can have large ultimate/design ratios. It is not clear that because the nailed strap to portal connection is adequate that the strap to concrete connection will be sufficient.

Load Combinations: The proposed portal frame system will be subjected to vertical header loads as well as the in-plane shear loads. No provisions are included that account for the proposed portal frame performance under combined loading. What happens to the studs, connections, and concrete when the in-plane shear loads are combined with vertical header loads?

Secondary Stresses: The secondary moments induced in the header are not addressed. The applied in-plane shear load will induce moment and shear stresses on the header that need to be combined with vertical design loads.

ICC ES Interim Acceptance Criteria, AC130: Appendix B of APA Report *T2002-46* provides a derivation of design values based on the procedures specified in ICC ES *Interim Acceptance Criteria for Prefabricated Wood Shear Panels (AC130)*. Appendix B states, "*Note: While the product being analyzed isn't intended for approval through AC130, the design value derivation procedure of AC130 ensures both adequate load factor and drift compliance*". The allowable design value derivation provided by AC130 is intended for proprietary factory-built shear panels with greater fabrication consistency, with approved and third party monitored quality control that includes testing of the raw materials and assembled components on a frequent basis. For these reasons, if AC130 were to be used for the derivation of design values for site-built braced wall panels, greater margins of safety should be applied to both the strength and stiffness than implied by AC130.