ICC-ES Evaluation Report

ESR-2652*

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 12 19—Shear Wall Panels

REPORT HOLDER:

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EVALUATION SUBJECT:

TRUS JOIST® TJ® SHEAR BRACE

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009, 2006, 2003 and 2000 *International Building Code®* (IBC)
- 2009, 2006, 2003 and 2000 *International Residential Code®* (IRC)
- 1997 *Uniform Building Code™* (UBC)

Property evaluated:

Structural

2.0 USES

The TJ® Shear Brace (TJSB) is recognized for use as a shear wall in wood framed buildings classified as Type V construction (IBC and UBC), and in buildings constructed in accordance with the IRC. The TJSB is also used as a replacement for braced wall panels specified in the IBC, IRC, and UBC in accordance with Section 4.1 of this report.

3.0 DESCRIPTION

3.1 General:

The TJSB is a prefabricated, wood-based, shear-resisting wall assembly, designed and constructed to support gravity loads and resist lateral in-plane and out-of-plane wind and seismic loads in wood framed wall construction.

The TJSB is shown in Figure 1. Sizes are noted in Tables 1 and 4. The TJSB is permitted vertical diaphragm dimension ratios (height/width) greater than those specified in Section 2305.3 of the 2003 and 2006 IBC, Section 2302 of the 2009 IBC, and Table 23-11-G of the UBC.

The TJSB may be supported directly on a concrete foundation or on a Raised Floor Kit (RFK) as shown in Figure 2. The TJSB may be used as part of a portal frame system installed on a concrete foundation. Figures 3 and 4 show single and double portal frame systems, respectively. The TJSB may be used in stacked, two-story applications, installed on a concrete foundation. Figures 5 and 6 show stacked applications using an MSK (Multi-story Kit). The TJSB is supplied with openings and chases as shown in Figure 7.

3.2 Materials:

3.2.1 Wood Components:

3.2.1.1 TJSB Body: The TJSB body consists of a preconfigured piece of TimberStrand® LSL recognized in ICC-ES evaluation report ESR-1387. The TJSB is manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.1.2 Raised Floor Kit (RFK) Body: The RFK body consists of TimberStrand® LSL, which is recognized in ICC-ES evaluation report ESR-1387. The RFK body is manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.1.3 MSK Bearing Block: The MSK Bearing Block consists of TimberStrand® LSL machined to meet the specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.1.4 Portal Column: Columns used in a single portal may be TimberStrand® LSL, Parallam® PSL, Microllam® LVL, glued-laminated timber, or solid sawn lumber. The TimberStrand® LSL, Parallam® PSL and Microllam® LVL are recognized in ESR-1387. Minimum column dimensions are 3 inches by $3^1/_2$ inches (76 mm by 89 mm).

3.2.1.5 Portal Header: The portal header is TimberStrand® LSL, Parallam® PSL, Microllam® LVL, glued-laminated timber, or solid sawn lumber. Minimum and maximum header widths are $3^1/_8$ inches (79 mm) and $5^1/_2$ inches (140 mm), respectively. Minimum and maximum header depths are $9^1/_4$ inches (241 mm) and 18 inches (457 mm), respectively.

The clear span of the portal header must be at least 8 feet (2440 mm) and no more than 18 feet 6 inches (5640 mm). The minimum header stiffness and maximum header stiffness, K_{beam}, are 90 lbs./in. (15.8 N/mm) and 4000 lbs./in. (700 N/mm), respectively.

Header stiffness, K_{beam}, is defined as: $K_{beam} = Ebd^3/12L^3$

where:

E = Header modulus of elasticity, psi (N/mm^2).

b = Header width, inches (mm).

d = Header depth, inches (mm).

L = Header clear span, inches (mm).

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3.2.2 Steel Components: The following components are provided by Weyerhaeuser, with the exception of the concrete anchor rod. Only the supplied components can be used to install the TJ Shear Braces.

3.2.2.1 Wood Screw: $6^3/_4$-inch-long (171 mm) "FastenMaster TrussLok screws." Six screws are provided for the 12-inch-wide (305 mm) TJSB, eight screws for the 18-inch-wide TJSB, and twelve screws for the 24-inch-wide TJSB.

3.2.2.2 Framing Anchor: "USP MP4F" plate. Each anchor is to be nailed with a minimum of twelve field-attachment nails (see Section 3.2.2.4). See Figure 2 for location.

3.2.2.3 Proprietary Strap: A proprietary, galvanized steel strap manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report. Each strap must be nailed with a minimum of sixteen field-attachment nails (see Section 3.2.2.4). See Figures 3 and 4 for locations.

3.2.2.4 Field-Attachment Nail: Minimum $1^1/_2$-inch-long -by-0.148-inch-diameter (38 mm by 3.8 mm) carbon steel nails, complying with ASTM F1667.

3.2.2.5 Hold-Down Nut: Minimum SAE J995 Grade 5, or ASTM A194 hex nut or slotted hex nut, complying with ANSI B18.2.2. A $^7/_8$-inch (22mm) nut must be used for 12- and 18-inch-wide TJSB, and a 1-inch (25mm) nut for 24-inch-wide TJSB.

3.2.2.6 Hold-Down Washer: Minimum ASTM F436 Type 1 round washer. A $^7/_8$-inch (22mm) washer must be used for 12- and 18-inch-wide TJSB, and a 1-inch (25mm) washer for 24-inch-wide TJSB.

3.2.2.7 Footing Washer: Minimum ASTM A1011 Grade 30, 2-inch-diameter (51 mm), round or square (outside dimension) steel washer.

3.2.2.8 Proprietary Anchor Bolt Spacer: A proprietary galvanized steel plate, manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.2.9 Hex Nut: A $^7/_8$-inch (22 mm) nut complying with the minimum specifications noted in Section 3.2.2.5 is used with the 12-inch-wide and 18-inch-wide TJSB; and a 1-inch diameter (25mm) nut complying with the minimum specifications noted in Section 3.2.2.5 is used with the 24-inch-wide TJSB.

3.2.2.10 Proprietary Hold-Down Bracket: A proprietary welded steel assembly manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.2.11 Proprietary MSK Hold-Down Bracket: A proprietary welded steel assembly manufactured to meet specifications in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.2.12 Concrete Anchor Rod: Threaded rod must comply with ASTM A193 B7 or ASTM A 449. A $^7/_8$-inch-diameter (22mm) threaded rod is used for 12- and 18-inch-wide TJSB, and a 1-inch-diameter (25mm) threaded rod for 24-inch-wide TJSB.

3.2.2.13 RFK Ported Coupler: A minimum ASTM A 563 Grade A, $^7/_8$-inch (22 mm) coupler compatible with ASTM A193 B7 or ASTM A449 threaded rod.

3.2.2.14 RFK Threaded Rod: A minimum $^7/_8$-inch-diameter (22 mm) threaded rod complying with ASTM A193 B7 or ASTM A449.

3.2.2.15 RFK Plate: A proprietary galvanized steel sheet manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.2.16 RFK Spacer Plate: A proprietary galvanized steel sheet manufactured to meet specifications noted in the Weyerhaeuser Manufacturing Standard associated with this report.

3.2.2.17 Supplemental Concrete Bearing Plate: A minimum 3.5-inch-by-6.5-inch-by-$^3/_8$-inch-thick, ASTM A36 (minimum) bearing plate for the 24-inch TJSBs and a minimum 3.5-inch-by-4.25-inch-by-$^3/_8$-inch-thick A36 (minimum) bearing plate for the 12-inch and 18-inch TJSBs, with primer grey coating used to increase the bearing capacity of the shear brace in high load applications.

3.2.3 Installation Kits: The following kits are provided by Weyerhaeuser:

3.2.3.1 RFK Kit: The RFK Kit includes two RFK Ported Couplers, two RFK Threaded Rods, two RFK Plates attached to one Raised Floor Kit Body (TimberStrand LSL), two RFK Spacer Plates, and one framing anchor.

3.2.3.2 MSK Kit: The MSK Kit includes two MSK Hold-Down Brackets, two Hold-Down Washers, two Hold-Down Nuts and 12-inch, 18-inch and 24-inch MSK Bearing Blocks.

3.2.4 Concrete: Concrete must be normal-weight concrete complying with the provisions of IBC Chapter 19 or IRC Section R402.2, as applicable, and must have a minimum specified concrete compressive strength, f'_c, of 2,500 psi (17.2 MPa) at 28 days, or as required by the applicable code, or as noted in the footnotes to the tables in this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The maximum allowable design loads for the TJSB are indicated in Tables 1 and 4 of this report. Allowable design loads for specific applications and support conditions are indicated in the following tables:

APPLICATION	SUPPORT CONDITION	
	Direct Attachment to Concrete	Raised Floor Kit
Stand-Alone Brace	Table 2	Table 3
Portal Assemblies	Table 5	Not allowed
Stacked Braces	Table 6 and 7	Not allowed

A supplemental bearing plate described in Section 3.2.2.17 of this report needs to be specified, under each hold-down, when required by Tables 2, 5 and 7 of this report. The allowable out-of-plane lateral loads are shown in Table 8. Table 9 shows the maximum secondary bending moment, shear, and axial force induced in the header member in portal frame applications.

TJ® Shear Braces may be used as components within a seismic force–resisting system consisting of light framed, load-bearing wood walls with wood structural panels, provided the seismic design coefficients and factors used in design do not exceed the following values:

BUILDING CODE	R	Ω_0	C_d
UBC	5.5	2.8	Not applicable
2000 IBC	6	3[1]	4
2003, 2006 and 2009 IBC	6.5	3[1]	4

[1]Where shear braces are installed in structures with flexible diaphragms, as determined in accordance with Section 12.3.1 of ASCE-7, the tabulated value of Ω_0 may be reduced in accordance with Footnote g, Table 12.2-1, of ASCE-7.

TABLE 2—TJ® SHEAR BRACE ALLOWABLE SHEAR LOADS (ASD) FOR DIRECT ATTACHMENT TO CONCRETE FOUNDATIONS OR FOOTINGS[1,2,3,4,5,6,7]

		2500 psi Concrete Strength				2500 psi Concrete Strength w/Bearing Plate[9]				3000 psi Concrete Strength			
		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)	
TJ®Shear Brace Model	Allowable Axial Compression Load[8] (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)
TJSB 24x7	4000	5150	0.29	5200	0.30	5150	0.29	5200	0.30	5150	0.29	5200	0.30
	6000	5150	0.29	5182	0.29	5150	0.29	5200	0.30	5150	0.29	5200	0.30
	8000	5150	0.29	4935	0.28	5150	0.29	5200	0.30	5150	0.29	5200	0.30
TJSB 12x8	4500	905	0.38	995	0.52	905	0.38	995	0.52	905	0.38	995	0.52
TJSB 18x8	0	2215	0.37	2293	0.41	2215	0.37	2435	0.44	2215	0.37	2435	0.44
	2000	2215	0.37	2137	0.39	2215	0.37	2435	0.44	2215	0.37	2435	0.44
	4000	2215	0.37	1981	0.36	2215	0.37	2435	0.44	2215	0.37	2338	0.42
	6000	2152	0.36	1825	0.33	2215	0.37	2296	0.41	2215	0.37	2182	0.39
	8000	1996	0.33	1669	0.30	2215	0.37	2147	0.39	2215	0.37	2025	0.37
TJSB 24x8	0	4435	0.37	4880	0.42	4435	0.37	4880	0.42	4435	0.37	4880	0.42
	2000	4435	0.37	4749	0.41	4435	0.37	4880	0.42	4435	0.37	4880	0.42
	4000	4435	0.37	4542	0.39	4435	0.37	4880	0.42	4435	0.37	4880	0.42
	6000	4435	0.37	4335	0.37	4435	0.37	4823	0.41	4435	0.37	4880	0.42
	8000	4435	0.37	4128	0.35	4435	0.37	4621	0.39	4435	0.37	4880	0.42
TJSB 12x9	4500	790	0.43	890	0.59	790	0.43	890	0.59	790	0.43	890	0.59
TJSB 18x9	0	1905	0.43	2032	0.50	1905	0.43	2090	0.51	1905	0.43	2090	0.51
	1000	1905	0.43	1963	0.48	1905	0.43	2090	0.51	1905	0.43	2090	0.51
	2000	1905	0.43	1893	0.46	1905	0.43	2090	0.51	1905	0.43	2090	0.51
	4000	1905	0.43	1755	0.43	1905	0.43	2090	0.51	1905	0.43	2071	0.51
	6000	1905	0.43	1617	0.39	1905	0.43	2034	0.50	1905	0.43	1933	0.47
	8000	1769	0.40	1478	0.36	1905	0.43	1902	0.46	1905	0.43	1794	0.44
TJSB 24x9	0	3905	0.42	4295	0.47	3905	0.42	4295	0.47	3905	0.42	4295	0.47
	2000	3905	0.42	4208	0.46	3905	0.42	4295	0.47	3905	0.42	4295	0.47
	4000	3905	0.42	4024	0.44	3905	0.42	4295	0.47	3905	0.42	4295	0.47
	6000	3905	0.42	3841	0.42	3905	0.42	4273	0.47	3905	0.42	4295	0.47
	8000	3905	0.42	3657	0.40	3905	0.42	4094	0.45	3905	0.42	4295	0.47
TJSB 12x10	4500	605	0.49	665	0.54	605	0.49	665	0.54	605	0.49	665	0.54
TJSB 18x10	0	1725	0.48	1824	0.55	1725	0.48	1895	0.57	1725	0.48	1895	0.57
	1000	1725	0.48	1762	0.53	1725	0.48	1895	0.57	1725	0.48	1895	0.57
	2000	1725	0.48	1700	0.51	1725	0.48	1895	0.57	1725	0.48	1895	0.57
	4000	1725	0.48	1575	0.47	1725	0.48	1895	0.57	1725	0.48	1859	0.56
	6000	1712	0.48	1451	0.44	1725	0.48	1826	0.55	1725	0.48	1735	0.52
	8000	1588	0.44	1327	0.40	1725	0.48	1707	0.51	1725	0.48	1611	0.48
TJSB 24x10	0	3325	0.47	3660	0.53	3325	0.47	3660	0.53	3325	0.47	3660	0.53
	2000	3325	0.47	3660	0.53	3325	0.47	3660	0.53	3325	0.47	3660	0.53
	4000	3325	0.47	3612	0.52	3325	0.47	3660	0.53	3325	0.47	3660	0.53
	6000	3325	0.47	3448	0.50	3325	0.47	3660	0.53	3325	0.47	3660	0.53
	8000	3325	0.47	3283	0.48	3325	0.47	3660	0.53	3325	0.47	3660	0.53
TJSB 12x11	4500	545	0.54	600	0.60	545	0.54	600	0.60	545	0.54	600	0.60
TJSB 18x11	0	1530	0.53	1654	0.63	1530	0.53	1685	0.64	1530	0.53	1685	0.64
	1000	1530	0.53	1598	0.61	1530	0.53	1685	0.64	1530	0.53	1685	0.64
	2000	1530	0.53	1542	0.59	1530	0.53	1685	0.64	1530	0.53	1685	0.64
	4000	1530	0.53	1429	0.54	1530	0.53	1685	0.64	1530	0.53	1685	0.64
	6000	1530	0.53	1316	0.50	1530	0.53	1657	0.63	1530	0.53	1574	0.60
	8000	1440	0.50	1204	0.46	1530	0.53	1549	0.59	1530	0.53	1461	0.56
TJSB 24x11	2000	3010	0.52	3315	0.59	3010	0.52	3315	0.59	3010	0.52	3315	0.59
	4000	3010	0.52	3277	0.58	3010	0.52	3315	0.59	3010	0.52	3315	0.59
	6000	3010	0.52	3127	0.55	3010	0.52	3315	0.59	3010	0.52	3315	0.59
	8000	3010	0.52	2978	0.53	3010	0.52	3315	0.59	3010	0.52	3315	0.59
TJSB 12x12	4500	485	0.59	535	0.65	485	0.59	535	0.65	485	0.59	535	0.65
TJSB 18x12	0	1340	0.59	1475	0.70	1340	0.59	1475	0.70	1340	0.59	1475	0.70
	2000	1340	0.59	1411	0.67	1340	0.59	1475	0.70	1340	0.59	1475	0.70
	4000	1340	0.59	1308	0.62	1340	0.59	1475	0.70	1340	0.59	1475	0.70
	6000	1340	0.59	1205	0.57	1340	0.59	1475	0.70	1340	0.59	1440	0.68
	8000	1318	0.58	1102	0.52	1340	0.59	1417	0.67	1340	0.59	1337	0.63
TJSB 24x12	4000	2695	0.57	2965	0.64	2695	0.57	2965	0.64	2695	0.57	2965	0.64
	6000	2695	0.57	2862	0.62	2695	0.57	2965	0.64	2695	0.57	2965	0.64
	8000	2695	0.57	2725	0.59	2695	0.57	2965	0.64	2695	0.57	2965	0.64
TJSB 18x13	1000	1200	0.64	1320	0.74	1200	0.64	1320	0.74	1200	0.64	1320	0.74
	2000	1200	0.64	1300	0.73	1200	0.64	1320	0.74	1200	0.64	1320	0.74
	3010	1200	0.64	1252	0.70	1200	0.64	1320	0.74	1200	0.64	1320	0.74

Where TJSB panels are placed in a wall (under the IBC and UBC) and combined with other shear-resisting elements, the applied loads must be proportioned based on relative lateral stiffness of the vertical resisting elements in accordance with ASCE 7-05 Section 12.8.4. Any combination with other lateral-force-resisting elements for which the stiffness cannot be determined by a rational engineering analysis is prohibited.

Each 12-inch-wide brace, 9 feet (2740 mm) and less in height, and each 18-inch- or 24-inch-wide brace, 12 feet (3660 mm) and less in height, may replace each length of alternate braced wall panel or each 4 feet of braced wall panel as required by Section 2308.9.3 of the IBC, Section R602.10 of the IRC or Sections 2320.11.3 and 2320.11.4 of the UBC.

The maximum secondary bending moment, shear and axial forces induced in the header member of the portal frame systems detailed in this report are given in Table 9. The bending moment, shear and axial forces shown are based on application of the allowable in-plane shear loads given in Table 4 for portal frame applications.

Tables 10 and 11 show minimum concrete anchorage embedment lengths and footing dimensions. Anchorage details are found in Figures 8, 9, 10 and 11. These details may be modified for specific conditions in the field by a registered design professional as indicated in Section 5.3.

Installation on masonry walls or foundations or steel beams may be permitted, subject to approval of the code official, based on calculations and details prepared by a registered design professional. Design and details for anchorage must be in accordance with Chapter 21 of the IBC. Design and details for connection to steel beams must be in accordance with Chapter 22 of the IBC. Welding or modification of the hold-down is not permitted.

The foundation must be designed to resist all loads transferred, including the overturning moment induced by the TJSB.

4.2 Installation:

The TJSB must be installed within the wall envelope between the foundation and the wall top plate (see Figure 1). Concrete anchor rods must comply with Section 3.2.2.12. The RFK kit is required when the TJSB is installed over raised floor framing. The RFK must be installed between the foundation and the TJSB (see Figure 2). For portal frame installations, see Figures 3 and 4 and the information provided in this section (Section 4.2). For two-story, stacked brace installations using an MSK Kit, see Figures 5 and 6. Field-drilling of the TJSB is limited to that described in Figure 7. The TJSB may be field-trimmed per the manufacturer's installation instructions. Corrosion-resistant parts complying with Section 2304.9.5 of the IBC must be used when parts are in contact with fire-retardant- or preservative-treated wood.

For portal frame applications, the header must be connected to the TJSB using the wood screws described in Section 3.2.2.1. For a 12-inch-wide (305 mm) TJSB, three screws per side (six, total) must be used. For an 18-inch-wide (458 mm) TJSB, four screws per side (eight, total) must be used. For a 24-inch-wide (610 mm) TJSB, six screws per side (12, total) must be used. The header must be connected to the TJSB using four proprietary straps described in Section 3.2.2.3 (two on the front face and two on the back). In single portal frame installations, the header must be connected to the column with a connection capable of resisting a minimum allowable 1,000 pounds (4450 N) uplift. At the bottom of the column, a hold-down device capable of resisting a minimum allowable tension load of 1,000 pounds (4450 N) must be used to connect the column to the foundation.

When using a $3^1/_8$-inch-wide (79 mm) header in portal frame applications, a $^3/_8$-inch-thick (9.5 mm) wood furring strip (a minimum of $2^1/_2$ inches by 10 inches) must be installed (on one side of the header) between the header and each steel strap. The furring strip must be connected to the header with ten 8d common nails. When using a $5^1/_8$-, $5^1/_4$- or $5^1/_2$-inch-wide (130, 133 or 140 mm) beam, a $^7/_8$-inch-thick (22 mm) wood furring strip must be installed (on each side of the TJSB) between the TJSB and each steel strap. The furring strip must be connected to the TJSB with ten 8d common nails. Each steel strap must be nailed through the wood furring strip and into the header and TJSB.

The wood portion of the TJSB must not be in direct contact with concrete. The TJSB is designed such that when installed on level and smooth concrete, there is a $^1/_8$-inch gap between the wood at the bottom of the TJSB and the concrete.

4.3 Special Inspection:

4.3.1 IBC: When the TJSB is installed in jurisdictions governed by the IBC, periodic special inspections in Seismic Design Categories C, D, E or F must be provided for installation, in accordance with Section 1707.3 of the IBC, with the exception of those structures that qualify under Section 1704.1. If special inspection is required, the inspector is responsible for verifying proper hold-down anchor size and placement, with respect to embedment length, spacing and edge distance. The inspector must also verify proper connection to the member above, per Figures 1, 3, and 4.

4.3.2 UBC: Depending upon the load factors selected by the registered design professional for design of the anchorage to concrete, special inspection may be required in accordance with UBC Section 1923.2. The inspector is responsible for verifying proper hold-down anchorage size and placement with respect to embedment length and edge distance.

5.0 CONDITIONS OF USE

The TJ® Shear Brace (TJSB) described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The TJSB, MSK Kit, and Raised Floor Kit (RFK) must be installed in accordance with this report, the manufacturer's instructions and the building plans approved by the code official. In the event of a conflict between this report and the manufacturer's installation instructions, this report governs.

5.2 Design loads and drifts must comply with this report.

5.3 Calculations and details justifying that the design loads (including the design of the portal system and combined loads for the TJSB body) do not exceed allowable loads specified in this report must be submitted to the code official, except for the braced and alternate braced wall substitutions noted in Section 4.1. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 Design of the concrete foundation system is outside the scope of this report.

5.5 The TJSB and RFK are produced at the Weyerhaeuser assembly plant located in Boise, Idaho, under a quality control program with inspections by PFS Corporation (AA-652).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Prefabricated Wood Shear Panels (AC130), dated October 2009 (editorially revised March 2010). Additional data was submitted for the anchorage to concrete in accordance with ACI 318, Appendix D.

7.0 IDENTIFICATION

The TJ® Shear Brace and Raised Floor Kit are identified with a label bearing the manufacturer's name (Weyerhaeuser), the product name or designation, the production date, the evaluation report number (ESR-2652), and the name of the inspection agency (PFS Corporation).

TABLE 1—TJ® SHEAR BRACE DESCRIPTION, SIZES AND MAXIMUM ALLOWABLE SHEAR LOADS (ASD)[1,2,3,4,5]

				Seismic (SDC C-E)			Wind (SDC A-B)			
TJ® Shear Brace Model	Nominal Width (in)	Height (in)	Allowable Axial Compression Load[6] (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Hold-down Uplift at Allowable Shear (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Hold-down Uplift at Allowable Shear (lbs)	Brace Weight (lbs)
TJSB 24x7	24	78	8000	5150	0.29	20800	5200	0.30	21000	170
TJSB 12x8	12	93.25	4500	905	0.38	9715	995	0.52	10680	105
TJSB 18x8	18	93.25	8000	2215	0.37	14185	2435	0.44	15590	150
TJSB 24x8	24	93.25	8000	4435	0.37	21415	4880	0.42	23560	200
TJSB 12x9	12	105.25	4500	790	0.43	9570	890	0.59	10780	115
TJSB 18x9	18	105.25	8000	1905	0.43	13770	2090	0.51	15105	170
TJSB 24x9	24	105.25	8000	3905	0.42	21280	4295	0.47	23405	225
TJSB 12x10	12	117.25	4500	605	0.49	8165	665	0.54	8975	125
TJSB 18x10	18	117.25	8000	1725	0.48	13890	1895	0.57	15255	185
TJSB 24x10	24	117.25	8000	3325	0.47	20185	3660	0.53	22220	250
TJSB 12x11	12	129.25	4500	545	0.54	8110	600	0.60	8925	140
TJSB 18x11	18	129.25	8000	1530	0.53	13580	1685	0.64	14955	205
TJSB 24x11	24	129.25	8000	3010	0.52	20145	3315	0.59	22185	270
TJSB 12x12	12	141.25	4500	485	0.59	7885	535	0.65	8700	150
TJSB 18x12	18	141.25	8000	1340	0.59	12995	1475	0.70	14305	220
TJSB 24x12	24	141.25	8000	2695	0.57	19710	2965	0.64	21685	295
TJSB 18x13	18	153.25	3010	1200	0.64	14185	1320	0.74	13890	240
TJSB 24x13	24	153.25	4850	2440	0.63	21415	2685	0.70	21305	320
TJSB 18x16	18	192	3010	770	0.77	14185	845	0.86	11140	290
TJSB 24x16	24	192	4850	1650	0.80	21415	1815	0.89	18045	390
TJSB 18x20	18	240	3010	550	0.97	14185	605	1.08	9970	365
TJSB 24x20	24	240	4850	1150	1.00	21415	1265	1.11	15720	490

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Loads shown are the maximum allowable load based on AC130 tests. For allowable loads with various support conditions, see Tables 2 and 3.
[2]Hold-down uplift at allowable shear is based on a moment arm of 8.688 inches, 14.563 inches and 19.313 inches for 12-inch, 18-inch and 24-inch-wide braces respectively. In-plane shear must also be considered in hold-down anchor design. Values shown in the Table are at allowable stress design level resistance. No increase for duration of load is allowed.
[3]To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights. Use the hold-down uplift value of the shorter TJSB.
[4]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[5]All TJSB 's taller than 18 feet require a 2x6 minimum full-length stud attached to the 3.5 inches edges of the brace. Attach studs to TJSB with 10d nails at 16" on-center spacing.
[6]Half of the applied axial load is assumed to be supported by each TJSB hold down device.

TABLE 2—TJ® SHEAR BRACE ALLOWABLE SHEAR LOADS (ASD) FOR DIRECT ATTACHMENT TO CONCRETE FOUNDATIONS OR FOOTINGS[1,2,3,4,5,6,7] (Continued)

TJ® Shear Brace Model		2500 psi Concrete Strength				2500 psi Concrete Strength w/Bearing Plate[9]				3000 psi Concrete Strength			
		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)	
	Allowable Axial Compression Load[8] (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)
TJSB 24x13	2000	2440	0.63	2685	0.70	2440	0.63	2685	0.70	2440	0.63	2685	0.70
	4000	2440	0.63	2685	0.70	2440	0.63	2685	0.70	2440	0.63	2685	0.70
	4850	2440	0.63	2685	0.70	2440	0.63	2685	0.70	2440	0.63	2685	0.70
TJSB 18x14	3010	1030	0.69	1130	0.78	1030	0.69	1130	0.78	1030	0.69	1130	0.78
TJSB 24x14	4850	2130	0.69	2340	0.77	2130	0.69	2340	0.77	2130	0.69	2340	0.77
TJSB 18x16	3010	770	0.77	845	0.86	770	0.77	845	0.86	770	0.77	845	0.86
TJSB 24x16	4850	1650	0.80	1815	0.89	1650	0.80	1815	0.89	1650	0.80	1815	0.89
TJSB 18x18	3010	660	0.87	725	0.97	660	0.87	725	0.97	660	0.87	725	0.97
TJSB 24x18	4850	1400	0.90	1540	1.00	1400	0.90	1540	1.00	1400	0.90	1540	1.00
TJSB 18x20	3010	550	0.97	605	1.08	550	0.97	605	1.08	550	0.97	605	1.08
TJSB 24x20	4850	1150	1.00	1265	1.11	1150	1.00	1265	1.11	1150	1.00	1265	1.11

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Table values assume foundation and anchorage solutions shown in Tables 10 and 11, and Figures 8 and 9.
[2] Values shown in the table are at allowable stress design level resistance. No increase for duration of load is allowed.
[3]To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, straight line interpolate between nearest TJSB heights.
[4]To calculate allowable shear loads and drifts for a brace with an axial load between those listed, straight line interpolation of values is allowed.
[5]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[6]All TJSB 's taller than 18' require a 2x6 minimum full-length stud attached to the 3.5-inch edges of the brace. Attach studs to TJSB with 10d nails at 16 inch on-center spacing.
[7]Hold-down uplift at allowable shear is based on a moment arm of 8.688 inches, 14.563 inches and 19.313 inches for 12-inch, 18-inch and 24-inch braces respectively. In-plane shear must also be considered in hold-down anchor design. Values shown in the table are at allowable stress design level resistance. No increase for duration of load is allowed.
[8]Half of the applied axial load is assumed to be supported by each TJSB hold down device.
[9]See Section 4.1 for bearing plate details.

TABLE 3—TJ® SHEAR BRACE DESCRIPTION, SIZES AND ALLOWABLE SHEAR LOADS (ASD) FOR RAISED FLOOR KIT (RFK) APPLICATIONS[1,2,3,4,5]

TJ® Shear Brace Model	Nominal Width (in)	Height (in)	Allowable Axial Compression Load[6] (lbs)	Seismic (SDC C-E)			Wind (SDC A-B)		
				Allowable Shear (lbs)	Drift at Allowable Shear[7] (in)	Hold-down Uplift at Allowable Shear (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear[7] (in)	Hold-down Uplift at Allowable Shear (lbs)
TJSB 12x8	12	93.25	4500	815	0.47	8750	895	0.61	9605
TJSB 18x8	18	93.25	8000	2025	0.45	12965	2225	0.56	14245
TJSB 12x9	12	105.25	4500	690	0.52	8360	760	0.66	9205
TJSB 18x9	18	105.25	8000	1670	0.51	12070	1840	0.63	13300
TJSB 18x10	18	117.25	8000	1475	0.57	11875	1620	0.70	13045
TJSB 18x11	18	129.25	8000	1170	0.62	10385	1290	0.76	11450
TJSB 18x12	18	141.25	8000	890	0.68	8630	985	0.83	9555

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Table values require 2,500 psi concrete, minimum.
[2]Hold-down uplift at allowable shear is based on a moment arm of 8.688 inches, 14.563 inches and 193313 inches for 12-inch, 18-inch and 24-inch braces respectively. In-plane shear must also be considered in hold-down anchor design. Values shown in the Table are at allowable stress design level resistance. No increase for duration of load is allowed.
[3]To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights. Use the hold-down uplift value of the shorter TJSB.
[4]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[5]Loading applicable to single story applications only.
[6]Half of the applied axial load is assumed to be supported by each TJSB hold down device.
[7]Drifts at allowable shear are for the entire assembled height of the brace including an RFK for a 16 inches joist height, and provides for a conservative stiffness if other floor joist depths are used. For drifts with other depths of floor systems, or for drifts for story-to-story heights different than the total assembled height, contact your Weyerhaeuser representative.

TABLE 4—TJ® SHEAR BRACE DESCRIPTION, SIZES AND MAXIMUM ALLOWABLE SHEAR LOADS (ASD) FOR PORTAL ASSEMBLIES[1,2,3,4]

					Seismic (SDC C-E)			Wind (SDC A-B)		
	TJ® Shear Brace Model	Nominal Width (in)	Height (in)	Allowable Axial Compression Load[5] (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Hold-down Uplift at Allowable Shear (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Hold-down Uplift at Allowable Shear (lbs)
Double Portal	TJSB 12x7	12	78	8000	2730	0.29	9805	3000	0.31	10775
	TJSB 18x7	18	78	8000	5600	0.30	13495	6160	0.33	14845
	TJSB 24x7	24	78	8000	10300	0.29	20800	10400	0.30	21000
	TJSB 12x7.5	12	85.5	8000	2520	0.32	9920	2770	0.35	10905
	TJSB 18x7.5	18	85.5	8000	5380	0.34	14215	5910	0.37	15615
	TJSB 12x8	12	93.25	8000	2310	0.35	9915	2540	0.39	10905
	TJSB 18x8	18	93.25	8000	5150	0.37	14840	5665	0.40	16325
	TJSB 24x8	24	93.25	8000	8870	0.37	21415	9760	0.42	23560
	TJSB 12x9	12	105.25	8000	1580	0.43	9570	1780	0.59	10780
	TJSB 18x9	18	105.25	8000	3810	0.43	13770	4180	0.51	15105
	TJSB 24x9	24	105.25	8000	7810	0.42	21280	8590	0.47	23405
Single Portal	TJSB 12x7	12	78	8000	1300	0.27	9335	1430	0.33	10270
	TJSB 18x7	18	78	8000	2800	0.31	13495	3080	0.36	14845
	TJSB 24x7	24	78	8000	5150	0.29	20800	5200	0.30	21000
	TJSB 12x7.5	12	85.5	8000	1200	0.31	9450	1320	0.38	10390
	TJSB 18x7.5	18	85.5	8000	2625	0.33	13870	2885	0.40	15245
	TJSB 12x8	12	93.25	8000	1100	0.35	9445	1210	0.42	10390
	TJSB 18x8	18	93.25	8000	2450	0.36	14120	2695	0.43	15530
	TJSB 24x8	24	93.25	8000	4435	0.37	21415	4880	0.42	23560
	TJSB 12x9	12	105.25	8000	790	0.43	9570	890	0.59	10780
	TJSB 18x9	18	105.25	8000	1905	0.43	13770	2090	0.51	15105
	TJSB 24x9	24	105.25	8000	3905	0.42	21280	4295	0.47	23405

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Loads show are the maximum allowable capacity based on AC130 tests. For allowable loads with various support conditions, see Table 5.
[2]Hold-down uplift at allowable shear is based on a moment arm of 8.688 inches, 14.563 inches and 19.313 inches for 12-inch, 18-inch and 24-inch braces respectively, reduced by a factor of 0.8 and 0.9 for 12-inch and 18-inch braces 93.25 inches or less in height, respectively. In-plane shear must also be considered in hold-down anchor design. Values shown in the Table are at allowable stress design level resistance. No increase for duration of load is allowed.
[3]Braces may be trimmed to a minimum height of $74^{1}/_{2}$ inches. To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights, or use the allowable loads of the taller TJSB. Use the hold-down uplift value of the shorter TJSB used for interpolation. For braces trimmed to a height less than 78 inches, use values shown for 78 inches height.
[4]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[5]Axial load can be a concentrated load applied at any point on the top of the brace.

TABLE 5— TJ® SHEAR BRACE ALLOWABLE SHEAR LOADS (ASD) FOR PORTAL APPLICATIONS DIRECTLY ATTACHED TO CONCRETE FOUNDATIONS OR FOOTINGS[1,2,3,4,5,6]

			2500 psi Concrete Strength				2500 psi Concrete Strength w/Bearing Plate[8]				3000 psi Concrete Strength			
	TJ® Shear Brace Model	Allowable Axial Compression Load[7] (lbs)	Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)	
			Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)
Double Portals	TJSB 12x7	6000	2730	0.29	3000	0.31	2730	0.29	3000	0.31	2730	0.29	3000	0.31
		8000	2730	0.29	2975	0.31	2730	0.29	3000	0.31	2730	0.29	3000	0.31
	TJSB B 18x7	0	5600	0.30	6092	0.33	5600	0.30	6160	0.33	5600	0.30	6160	0.33
		2000	5600	0.30	5677	0.30	5600	0.30	6160	0.33	5600	0.30	6160	0.33
		4000	5600	0.30	5263	0.28	5600	0.30	6160	0.33	5600	0.30	6160	0.33
		6000	5600	0.30	4848	0.26	5600	0.30	6101	0.33	5600	0.30	5796	0.31
		8000	5303	0.28	4433	0.24	5600	0.30	5703	0.31	5600	0.30	5381	0.29
	TJSB B 24x7	8000	10300	0.29	10400	0.30	10300	0.29	10400	0.30	10300	0.29	10400	0.30
	TJSB 12x7.5	6000	2520	0.32	2770	0.35	2520	0.32	2770	0.35	2520	0.32	2770	0.35
		8000	2520	0.32	2714	0.34	2520	0.32	2770	0.35	2520	0.32	2770	0.35
	TJSB 18x7.5	0	5380	0.34	5558	0.35	5380	0.34	5910	0.37	5380	0.34	5910	0.37
		2000	5380	0.34	5179	0.32	5380	0.34	5910	0.37	5380	0.34	5910	0.37
		4000	5380	0.34	4801	0.30	5380	0.34	5910	0.37	5380	0.34	5666	0.35
		6000	5217	0.33	4422	0.28	5380	0.34	5565	0.35	5380	0.34	5287	0.33
		8000	4838	0.31	4044	0.25	5380	0.34	5203	0.33	5380	0.34	4909	0.31
	TJSB 12x8	6000	2310	0.35	2540	0.39	2310	0.35	2540	0.39	2310	0.35	2540	0.39
		8000	2310	0.35	2489	0.38	2310	0.35	2540	0.39	2310	0.35	2540	0.39
	TJSB 18x8	0	5150	0.37	5096	0.36	5150	0.37	5665	0.40	5150	0.37	5665	0.40
		2000	5150	0.37	4749	0.34	5150	0.37	5665	0.40	5150	0.37	5542	0.39
		4000	5130	0.37	4402	0.31	5150	0.37	5435	0.38	5150	0.37	5195	0.37
		6000	4783	0.34	4055	0.29	5150	0.37	5103	0.36	5150	0.37	4848	0.34
		8000	4436	0.32	3708	0.26	5150	0.37	4771	0.34	5150	0.37	4501	0.32
	TJSB 24x8	2000	8870	0.37	9760	0.42	8870	0.37	9760	0.42	8870	0.37	9760	0.42
		4000	8870	0.37	9672	0.42	8870	0.37	9760	0.42	8870	0.37	9760	0.42
		6000	8870	0.37	9231	0.40	8870	0.37	9760	0.42	8870	0.37	9760	0.42
		8000	8870	0.37	8790	0.38	8870	0.37	9760	0.42	8870	0.37	9760	0.42
	TJSB 12x9	6000	1580	0.43	1780	0.59	1580	0.43	1780	0.59	1580	0.43	1780	0.59
		8000	1580	0.43	1764	0.58	1580	0.43	1780	0.59	1580	0.43	1780	0.59
	TJSB 18x9	0	3810	0.43	4064	0.50	3810	0.43	4180	0.51	3810	0.43	4180	0.51
		2000	3810	0.43	3787	0.46	3810	0.43	4180	0.51	3810	0.43	4180	0.51
		4000	3810	0.43	3510	0.43	3810	0.43	4180	0.51	3810	0.43	4142	0.51
		6000	3810	0.43	3233	0.39	3810	0.43	4069	0.50	3810	0.43	3866	0.47
		8000	3537	0.40	2957	0.36	3810	0.43	3804	0.46	3810	0.43	3589	0.44
	TJSB 24x9	2000	7810	0.42	8590	0.47	7810	0.42	8590	0.47	7810	0.42	8590	0.47
		4000	7810	0.42	8569	0.47	7810	0.42	8590	0.47	7810	0.42	8590	0.47
		6000	7810	0.42	8178	0.45	7810	0.42	8590	0.47	7810	0.42	8590	0.47
		8000	7810	0.42	7788	0.43	7810	0.42	8590	0.47	7810	0.42	8590	0.47
Single Portals	TJSB 12x7	8000	1300	0.27	1430	0.33	1300	0.27	1430	0.33	1300	0.27	1430	0.33
	TJSB 18x7	0	2800	0.31	3046	0.36	2800	0.31	3080	0.36	2800	0.31	3080	0.36
		2000	2800	0.31	2839	0.33	2800	0.31	3080	0.36	2800	0.31	3080	0.36
		4000	2800	0.31	2631	0.31	2800	0.31	3080	0.36	2800	0.31	3080	0.36
		6000	2800	0.31	2424	0.28	2800	0.31	3050	0.36	2800	0.31	2898	0.34
		8000	2652	0.29	2216	0.26	2800	0.31	2852	0.33	2800	0.31	2690	0.31
	TJSB 24x7	4000	5150	0.29	5200	0.30	5150	0.29	5200	0.30	5150	0.29	5200	0.30
		6000	5150	0.29	5182	0.30	5150	0.29	5200	0.30	5150	0.29	5200	0.30
		8000	5150	0.29	4935	0.28	5150	0.29	5200	0.30	5150	0.29	5200	0.30
	TJSB 12x7.5	8000	1200	0.31	1320	0.38	1200	0.31	1320	0.38	1200	0.31	1320	0.38
	TJSB 18x7.5	0	2625	0.33	2779	0.39	2625	0.33	2885	0.40	2625	0.33	2885	0.40
		2000	2625	0.33	2590	0.36	2625	0.33	2885	0.40	2625	0.33	2885	0.40
		4000	2625	0.33	2400	0.33	2625	0.33	2885	0.40	2625	0.33	2833	0.39
		6000	2608	0.33	2211	0.31	2625	0.33	2783	0.39	2625	0.33	2644	0.37
		8000	2419	0.30	2022	0.28	2625	0.33	2602	0.36	2625	0.33	2454	0.34

TABLE 5—TJ® SHEAR BRACE ALLOWABLE SHEAR LOADS (ASD) FOR PORTAL APPLICATIONS DIRECTLY ATTACHED TO CONCRETE FOUNDATIONS OR FOOTINGS[1,2,3,4,5,6] (Continued)

			2500 psi Concrete Strength				2500 psi Concrete Strength w/Bearing Plate[8]				3000 psi Concrete Strength			
			Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)		Seismic (SDC C-E)		Wind (SDC A-B)	
	TJ® Shear Brace Model	Allowable Axial Compresion Load[7] (lbs)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)	Allowable Shear (lbs)	Drift at Allowable Shear (in)
Single Portals	TJSB 12x8	8000	1100	0.35	1210	0.42	1100	0.35	1210	0.42	1100	0.35	1210	0.42
	TJSB 18x8	0	2450	0.36	2548	0.41	2450	0.36	2695	0.43	2450	0.36	2695	0.43
		2000	2450	0.36	2375	0.38	2450	0.36	2695	0.43	2450	0.36	2695	0.43
		4000	2450	0.36	2201	0.35	2450	0.36	2695	0.43	2450	0.36	2597	0.41
		6000	2392	0.35	2027	0.32	2450	0.36	2551	0.41	2450	0.36	2424	0.39
		8000	2218	0.33	1854	0.30	2450	0.36	2385	0.38	2450	0.36	2250	0.36
	TJSB 24x8	0	4435	0.37	4880	0.42	4435	0.37	4880	0.42	4435	0.37	4880	0.42
		2000	4435	0.37	4749	0.41	4435	0.37	4880	0.42	4435	0.37	4880	0.42
		4000	4435	0.37	4542	0.39	4435	0.37	4880	0.42	4435	0.37	4880	0.42
		6000	4435	0.37	4335	0.37	4435	0.37	4823	0.42	4435	0.37	4880	0.42
		8000	4435	0.37	4128	0.36	4435	0.37	4621	0.40	4435	0.37	4880	0.42
	TJSB 12x9	8000	790	0.43	882	0.58	790	0.43	890	0.59	790	0.43	890	0.59
	TJSB 18x9	0	1905	0.43	2032	0.50	1905	0.43	2090	0.51	1905	0.43	2090	0.51
		2000	1905	0.43	1893	0.46	1905	0.43	2090	0.51	1905	0.43	2090	0.51
		4000	1905	0.43	1755	0.43	1905	0.43	2090	0.51	1905	0.43	2071	0.51
		6000	1905	0.43	1617	0.39	1905	0.43	2034	0.50	1905	0.43	1933	0.47
		8000	1769	0.40	1478	0.36	1905	0.43	1902	0.46	1905	0.43	1794	0.44
	TJSB 24x9	0	3905	0.42	4295	0.47	3905	0.42	4295	0.47	3905	0.42	4295	0.47
		2000	3905	0.42	4208	0.46	3905	0.42	4295	0.47	3905	0.42	4295	0.47
		4000	3905	0.42	4024	0.44	3905	0.42	4295	0.47	3905	0.42	4295	0.47
		6000	3905	0.42	3841	0.42	3905	0.42	4273	0.47	3905	0.42	4295	0.47
		8000	3905	0.42	3657	0.40	3905	0.42	4094	0.45	3905	0.42	4295	0.47

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Table values assume foundation and anchorage solutions shown in Table 10 and 11 and Figures 8 and 9.
[2]Hold-down uplift at allowable shear is based on a moment arm of 8.688 inches, 14.563 inches and 19.313 inches for 12-inch, 18-inch and 24-inch braces respectively. Calculated uplifts can be reduced by a factor of 0.8 and 0.9 for 12-inch and 18-inch braces 93.25", or less in height, respectively. In-plane shear must also be considered in hold-down anchor design. Values shown in the table are at allowable stress design level resistance. No increase for duration of load is allowed.
[3]Braces may be trimmed to a minimum height of $74^1/_2$ inches. To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights, or use the allowable loads of the taller TJSB. Use the hold-down uplift value of the shorter TJSB used for interpolation. For braces trimmed to a height less than 78 inches, use values shown for 78 inches height.
[4]To calculate allowable shear loads and drifts for a brace with an axial load between those listed, interpolation of values is allowed. Interpolate between nearest axial loads.
[5]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[6]Portal application must be connected directly to a concrete foundation or footing.
[7]Axial load can be a point load applied at any point on the top of the brace.
[8]See Section 4.1 for bearing plate details.

TABLE 6—TJ® SHEAR BRACE DESCRIPTION, SIZES AND ALLOWABLE SHEAR LOADS (ASD) FOR A STANDARD BRACE IN 2nd FLOOR, STACKED APPLICATIONS WITH MULTISTORY KIT[1,2,3,4]

				Seismic (SDC C-E)		Wind (SDC A-B)	
TJ® Shear Brace Model	Nominal Width (in)	Height (in)	Allowable Axial Compression Load[5] (lbs)	Allowable Shear[6] (lbs)	Drift at Allowable Shear (in.)	Allowable Shear[6] (lbs)	Drift at Allowable Shear (in.)
TJSB 12x9	12	105 1/4	2,000	500	0.44	550	0.5
TJSB 18x9	18	105 1/4	2,000	1,225	0.42	1,345	0.48
TJSB 24x9	24	105 1/4	2,000	2,165	0.41	2,380	0.46
TJSB 18x10	18	117 1/4	2,000	1,125	0.47	1,235	0.53
TJSB 24x10	24	117 1/4	2,000	1,990	0.46	2,190	0.52
TJSB 18x11	18	129 1/4	2,000	1,020	0.52	1,120	0.59
TJSB 24x11	24	129 1/4	2,000	1,815	0.51	1,995	0.59
TJSB 18x12	18	141 1/4	2,000	920	0.57	1,010	0.64
TJSB 24x12	24	141 1/4	2,000	1,640	0.57	1,805	0.65

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Values shown in the Table are at allowable stress design level resistance. No increase for duration of load is allowed.
[2]To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights.
[3]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[4]A multistory kit (MSK) is required for attachment to 1st story TJSB. See figure 5.
[5] Half of the applied axial load is assumed to be supported at each TJSB hold down device.
[6]Allowable shear at the top of the second floor brace.

TABLE 7—TJ® SHEAR BRACE DESCRIPTION, SIZES AND ALLOWABLE SHEAR LOADS (ASD) FOR A STANDARD BRACE IN 1st FLOOR, STACKED APPLICATIONS WITH MULTISTORY KIT[1,2,3,4,5,6,7]

					Seismic (SDC C-E)	Wind (SDC A-B)
TJ® Shear Brace Model	Nominal Width (in)	Height (in)	K x 10^9 (lb-in^2)	Allowable Axial Compression Load[(8)] (lbs)	Allowable Shear[7] (lbs)	Allowable Shear[7] (lbs)
TJSB 18x8	18	93 1/4	9.7	4,000	2,215	2,435
TJSB 24x8	24	93 1/4	19.4	4,000	4,435	4,880
TJSB 18x9	18	105 1/4	10.3	4,000	1,905	2,090
TJSB 24x9	24	105 1/4	21.5	4,000	3,905	4,295
TJSB 18x10	18	117 1/4	11.6	4,000	1,725	1,895
TJSB 24x10	24	117 1/4	22.6	4,000	3,325	3,660
TJSB 18x11	18	129 1/4	12.5	4,000	1,530	1,685
TJSB 24x11	24	129 1/4	24.8	4,000	3,010	3,315
TJSB 18x12	18	141 1/4	12.8	4,000	1,340	1,475
TJSB 24x12	24	141 1/4	26.5	4,000	2,695	2,965

For **SI:** 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 plf = 14.6 N/m

[1]Values shown in the Table are at allowable stress design level resistance. No increase for duration of load is allowed.
[2]To calculate allowable shear loads and drifts for braces trimmed to heights between those listed, interpolate between nearest TJSB heights.
[3]Allowable Axial Loads and Allowable Shear Loads are assumed to act in combination with each other.
[4]The 1st story TJSB must be the same width or wider than the 2nd story TJSB.
[5]Maximum Allowable Axial Load = 2nd story axial load (2,000) + 1st story axial load (4,000) = 6,000 lbs.
[6]Raised floor kits (RFKs) are not allowed in multistory applications.
[7]Drift of the first story brace must comply with code drift limits. To calculate the drift at of the 1st story TJSB at allowable stress design levels, use $\Delta = h_1^2/K\ (3V_2h_3 + 2V_{base}h_1)$, where:
Δ = drift of 1st story TJSB (inches)
h_1 = Height of 1st story TJSB (inches)
h_3 = Height of 2nd story TJSB (inches)
V_2 = Applied shear load on 2nd story TJSB (lbs)
V_{base} = Sum of the applied shear loads on 1st and 2nd story TJSBs (lbs)
K (1st story brace) = from table above (lb-in^2)
See Table 6 for illustrations.
[8] Half of the applied axial load is assumed to be supported by each TJSB hold down device.
[9]Total allowable shear at the top of the first floor brace.

General Notes

1. Shear capacities shown are for individual braces only. To resist forces at both 1st and 2nd floors in a two-story application, check the shear at each story against the maximum capacity for EACH brace.
2. Anchorage shall be per Tables 8 and 9, unless superseded by the design professional of record.
3. The maximum base overturning moment, OM, may not exceed the following:

1st Story Brace Width	Total Axial Load (lbs)	Maximum Allowed Base Overturning Moment (in-lbs)					
		Concrete Strength					
		2500 psi		2500 psi w/ bearing plate[1]		3000 psi	
		Seismic (SDC C-E)	Wind (SDC A-B)	Seismic (SDC C-E)	Wind (SDC A-B)	Seismic (SDC C-E)	Wind (SDC A-B)
18"	0	216115	213845	216115	237740	216115	237740
	2000	216115	199280	216115	237740	216115	232555
	4000	215270	184715	216115	228065	216115	217995
	6000	200705	170155	216115	214130	216115	203430
24"	0	413590	455015	413590	455015	413590	455015
	2000	413590	442845	413590	455015	413590	455015
	4000	413590	423535	413590	455015	413590	455015
	6000	413590	404220	413590	449745	413590	455015

$OM = (V_2h_2) + (V_1h_1)$
V_1 = Applied shear load on 1st story TJSB (lbs)
V_2 = Applied shear load on 2nd story TJSB (lbs)
h_1 = Height of 1st story TJSB (inches)
h_2 = Height of total 1st and 2nd story assembly (inches)

[1]See Section 4.1 for bearing plate details.

TABLE 8—TJ® SHEAR BRACE ALLOWABLE OUT-OF-PLANE LATERAL LOADS (psf)[1,2,3,4,5,6]

	Brace Width	TJ® Shear Brace Height									
	(in)	7'	7.5'	8'	9'	10'	11'	12'	13	16	20
Attached to Double Top Plate	12"	---	---	305	210	150	110	85	---	---	---
	18"	---	---	300	210	150	110	85	65	35	15
	24"	---	---	300	210	150	110	85	65	35	15
Attached to Header[6]	12"	275	255	230	205	150	110	85	---	---	---
	18"	185	170	155	135	125	110	85	---	---	---
	24"	140	---	115	105	90	85	75	---	---	---

For **SI:** 1 psf = 48 N/m2; 1 foot = 0.305 m.

[1]Maximum allowable wall deflection is limited to L/240 where L is the wall height.
[2]The applied out-of-plane lateral loads in the table can be applied in combination with the allowable compressive axial load.
[3]The allowable loads in the table include consideration of the attachment between the TJ® Shear Brace and the surrounding construction using the attachment methods detailed in this report.
[4]No increase for duration of load is allowed.
[5]The TJ® Shear Brace maximum allowable axial load is per Tables 1 to 7.
[6]For header depths of 14 inches or less, no reduction factor is required. Use a load reduction factor of 0.88 for 16 inches deep headers, 0.78 for 18 inches deep headers.

TABLE 9—MAXIMUM ALLOWABLE SECONDARY MOMENT, HORIZONTAL SHEAR AND AXIAL FORCE INDUCED IN THE HEADER MEMBER OF THE SINGLE AND DOUBLE PORTAL FRAME SYSTEMS[1,2,3]

	TJSB Portal	Bending Moment (ft-lbs)	Shear (lbs)	Axial Load (lbs)
K = 90 (lbs./in.)	12" Single	2350	160	1430
	12" Double	3260	430	1490
	18" Single	2500	170	3080
	18" Double	3670	470	3030
K = 250 (lbs./in.)	12" Single	2690	250	1430
	12" Double	3550	640	1490
	18" Single	2980	270	3080
	18" Double	4120	710	3040
K = 1000 (lbs./in.)	12" Single	3110	450	1430
	12" Double	3890	1070	1490
	18" Single	3630	500	3080
	18" Double	4710	1210	3050
K = 4000 (lbs./in.)	12" Single	3440	740	1430
	12" Double	4130	1650	1490
	18" Single	4200	860	3080
	18" Double	5210	1900	3050

For **SI:** 1 lbs. = 4.45 N, 1 ft.-lb. = 1.356 N-m

[1]The maximum induced bending moment, shear and axial forces shown may be reduced linearly if the applied lateral shear load is less than the allowable in-plane shear load in Table 4 of this report.
[2]The maximum shear and axial load are constant along the length of the beam member. In a double portal system the moment reduces linearly from maximum value at the beam ends to zero at the beam mid-span. In a single portal system the moment reduces linearly from maximum value at the end with the TJ® Shear Brace to zero at the end with the column.
[3]The header member allowable stresses may be increased by 160% (duration of load factor) in accordance with Table 2.3.2 of the 2005 NDS when designing the header member.

TABLE 10—ANCHORAGE EMBEDMENT LENGTH INTO UNCRACKED CONCRETE FOOTING[1,2,3,4,5,6,7]

			Wind (SDC A-B)					Seismic (SDC C-E)				
			Minimum Embedment and Footing Dimensions					Minimum Embedment and Footing Dimensions				
Concrete Strength	Brace Size	Anchor Bolt Diameter	Embedment Depth, le	Footing Width	C_1	C_2	C_3	Embedment Depth, le	Footing Width	C_1	C_2	C_3
2500 psi	TJSB 12x_	$^7/_8$"	6"	19"	8"	11"	8"	8"	24"	10"	14"	10"
	TJSB 18x_	$^7/_8$"	8"	25"	11"	14"	11"	12"	36"	16"	20"	16"
	TJSB 24x_	1"	11"	33"	14"	19"	14"	13"	40"	18"	22"	18"
3000 psi	TJSB 12x_	$^7/_8$"	6"	18"	7"	11"	7"	7"	22"	10"	12"	10"
	TJSB 18x_	$^7/_8$"	8"	24"	10"	14"	10"	11"	33"	15"	18"	15"
	TJSB 24x_	1"	10"	30"	14"	16"	14"	13"	38"	18"	20"	18"

For **SI:** 1 inch = 25.4 mm

[1]Seismic indicates Seismic Design Categories C-E (IBC) and Zone 2A-4 for (1997 UBC).
[2]Wind indicates areas controlled by wind and having a SDC A-B (IBC) or Zone 0-1 (1997 UBC).
[3]Information in the table is based on anchorage design in accordance with ACI 318 Appendix D.
[4]Load combinations from Chapter 9 of ACI 318-08 are assumed.
[5]Shear Brace hold-down attachments comply with the ductile attachment requirements of ACI 318 D.3.3.5.
[6]Foundation design for seismic overturning must comply with Section 1801.2.1 of the 2006 IBC and Section 1808.3.1 of the 2009 IBC.
[7]See Figures 8 and 9 for c_1, c_2, and c_3.

TABLE 11—ANCHORAGE EMBEDMENT LENGTH INTO CRACKED CONCRETE FOOTING[1,2,3,4,5,6,7]

			Wind (SDC A-B)					Seismic (SDC C-E)				
			Minimum Embedment and Footing Dimensions					Minimum Embedment and Footing Dimensions				
Concrete Strength	Brace Size	Anchor Bolt Diameter	Embedment Depth, le	Footing Width	C_1	C_2	C_3	Embedment Depth, le	Footing Width	C_1	C_2	C_3
2500 psi	TJSB 12x_	$^7/_8$"	7"	23"	10"	13"	9"	9"	27"	12"	15"	12"
	TJSB 18x_	$^7/_8$"	10"	30"	14"	16"	13"	14"	41"	18"	23"	18"
	TJSB 24x_	1"	12"	37"	17"	20"	17"	15"	46"	21"	25"	21"
3000 psi	TJSB 12x_	$^7/_8$"	7"	21"	9"	12"	9"	9"	26"	12"	14"	12"
	TJSB 18x_	$^7/_8$"	9"	28"	12"	16"	12"	13"	39"	18"	21"	18"
	TJSB 24x_	1"	12"	36"	16"	20"	15"	14"	43"	20"	23"	20"

For **SI:** 1 inch = 25.4 mm

[1]Seismic indicates Seismic Design Categories C-E (IBC) and Zone 2A-4 for (1997 UBC).
[2]Wind indicates areas controlled by wind and having a SDC A-B (IBC) or Zone 0-1 (1997 UBC).
[3]Information in the table is based on anchorage design in accordance with ACI 318 Appendix D.
[4]Load combinations from Chapter 9 of ACI 318-08 are assumed.
[5]Shear Brace hold-down attachments comply with the ductile attachment requirements of ACI 318 D.3.3.5.
[6]Foundation design for seismic overturning must comply with Section 1801.2.1 of the 2006 IBC and Section 1808.3.1 of the 2009 IBC.
[7]See Figures 8 and 9 for c_1, c_2, and c_3.

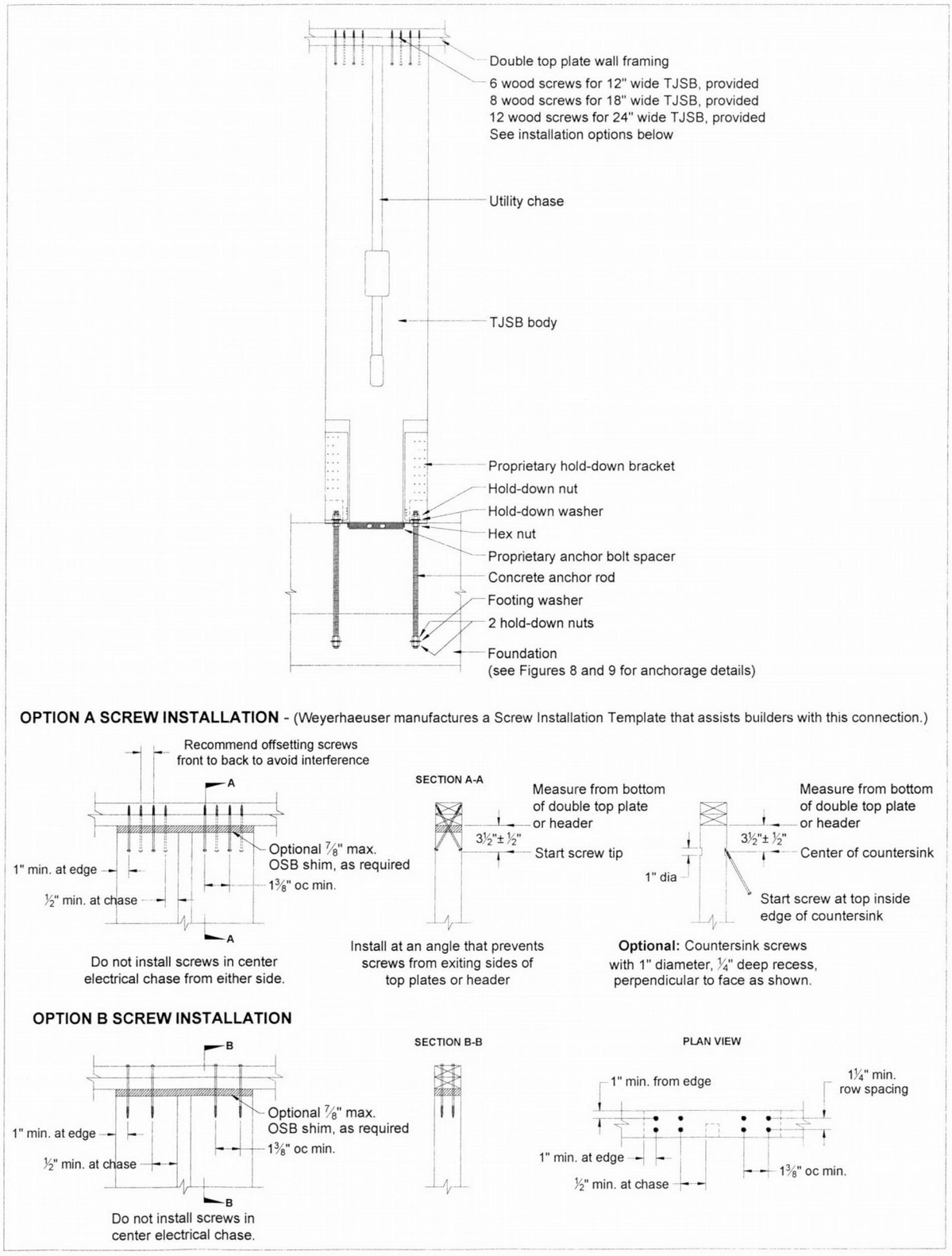
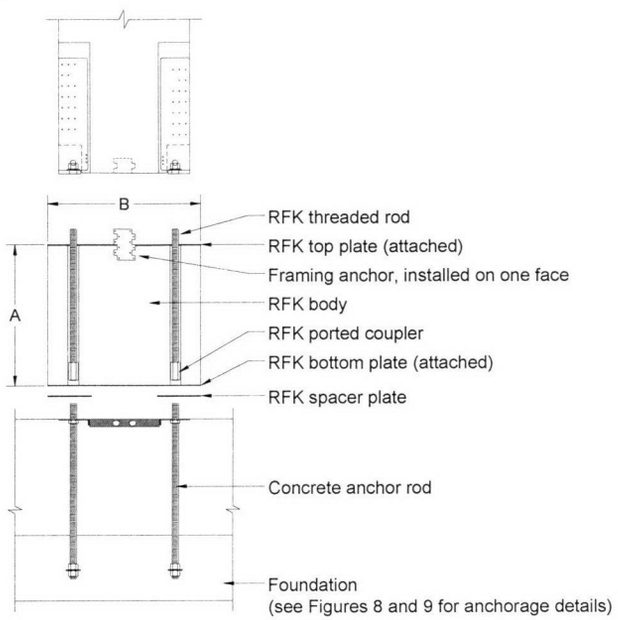


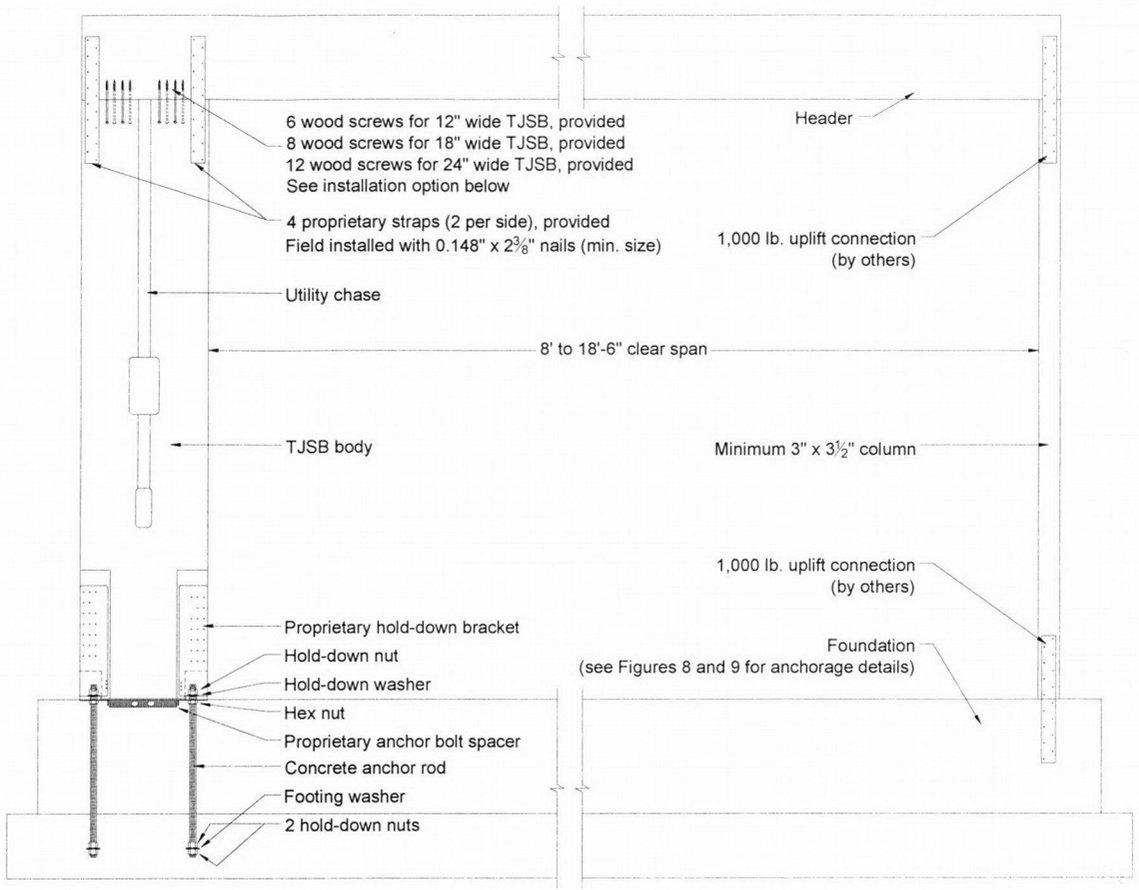
FIGURE 1—TJSB STANDARD PANEL
(See Section 3.2 for Material Description



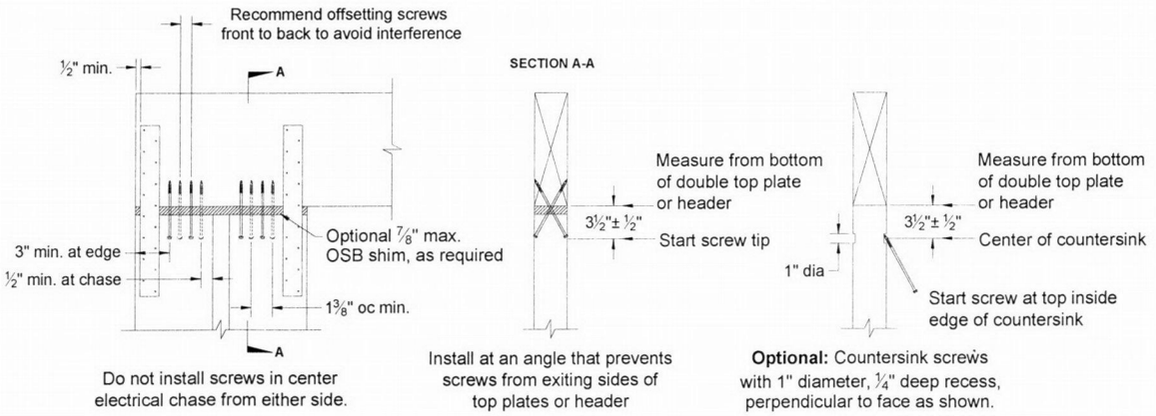
Brace	RFK	Dim. A	Dim. B
TJSB 12x_	RFK 9½ x 12	11¾"	15⅛"
	RFK 11⅞ x 12	14⅛"	15⅛"
	RFK 14 x 12	16¼"	15⅛"
	RFK 16 x 12	18¼"	15⅛"
TJSB 18x_	RFK 9½ x 18	11¾"	21"
	RFK 11⅞ x 18	14⅛"	21"
	RFK 14 x 18	16¼"	21"
	RFK 16 x 18	18¼"	21"

1. 1 inch = 25.4mm.
2. Raised floor kits are available for depths ranging from 11¾ inches to 18¼ inches.

FIGURE 2—RAISED FLOOR KIT
(See Section 3.2 for Material Description)

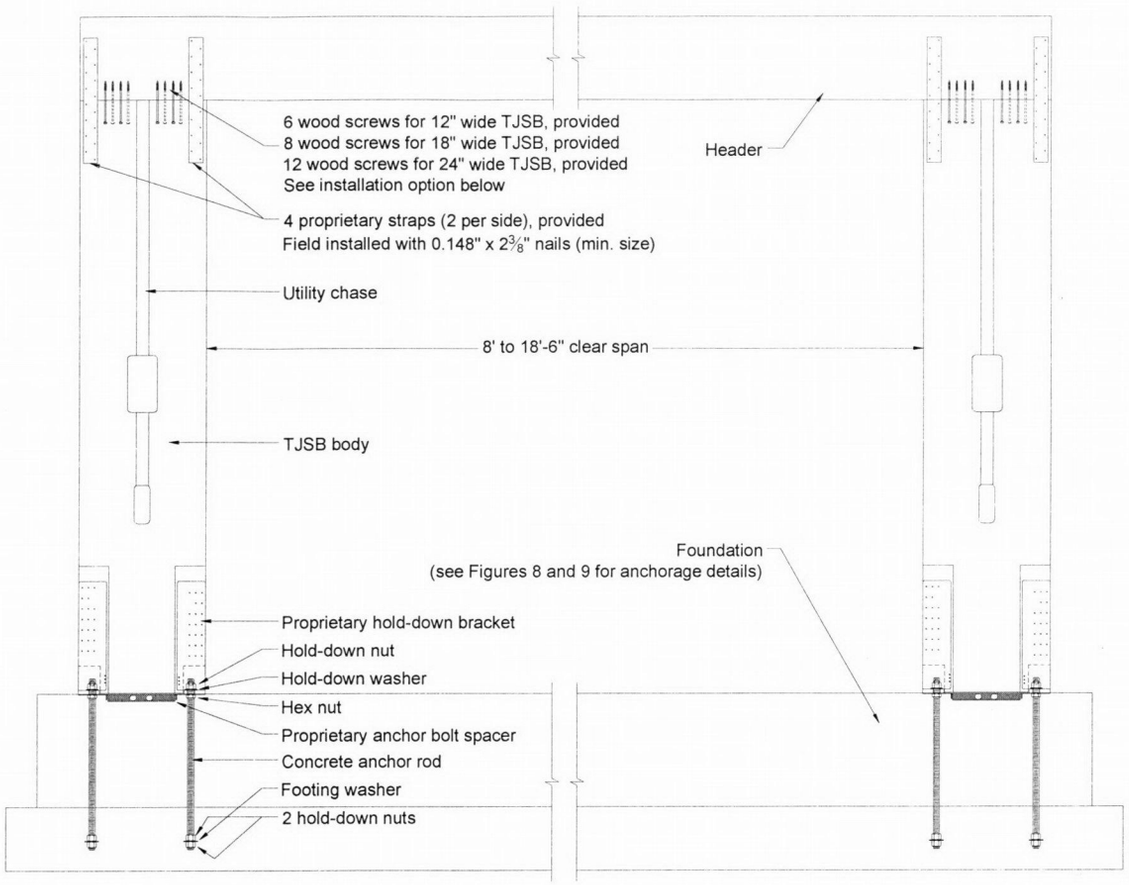


OPTION A SCREW INSTALLATION - (Weyerhaeuser manufactures a Screw Installation Template that assists builders with this connection.)

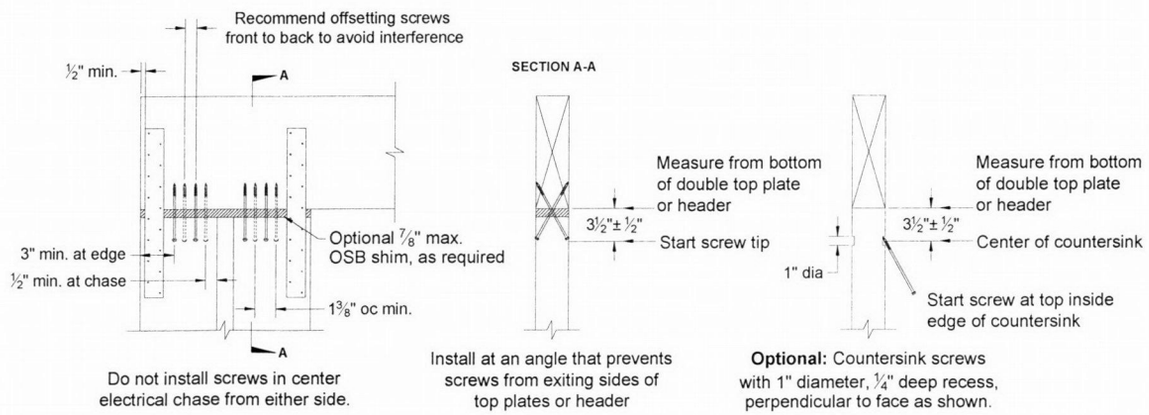


OPTION B SCREW INSTALLATION DOES NOT APPLY FOR PORTAL APPLICATIONS

FIGURE 3—TJSB SINGLE PORTAL
(See Section 3.2 for Material Description)



OPTION A SCREW INSTALLATION - (Weyerhaeuser manufactures a Screw Installation Template that assists builders with this connection.)



OPTION B SCREW INSTALLATION DOES NOT APPLY FOR PORTAL APPLICATIONS

FIGURE 4—TJSB DOUBLE PORTAL
(See Section 3.2 for Material Description)

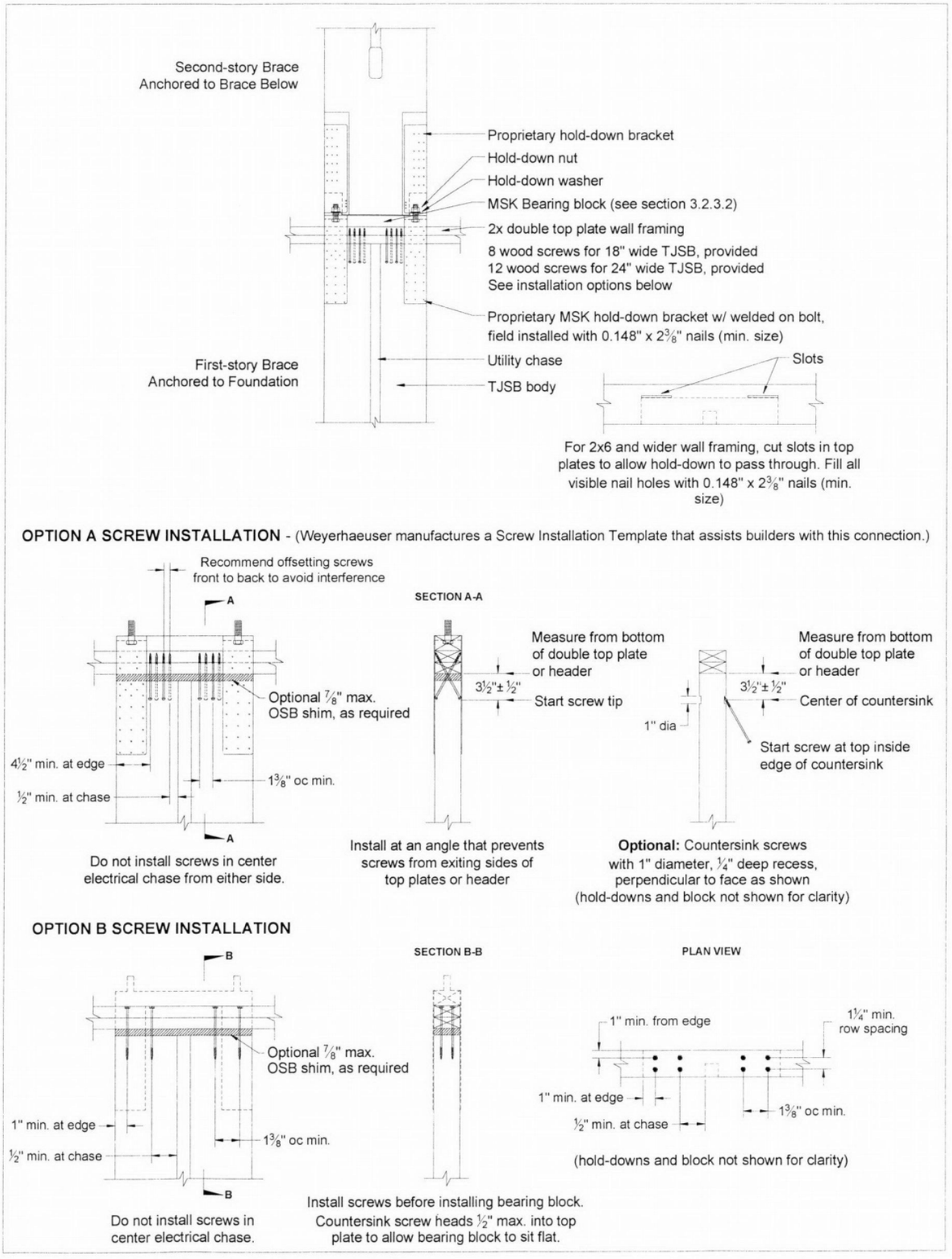


FIGURE 5—TJSB MULTI-STORY
(See Section 3.2 for Material Description)

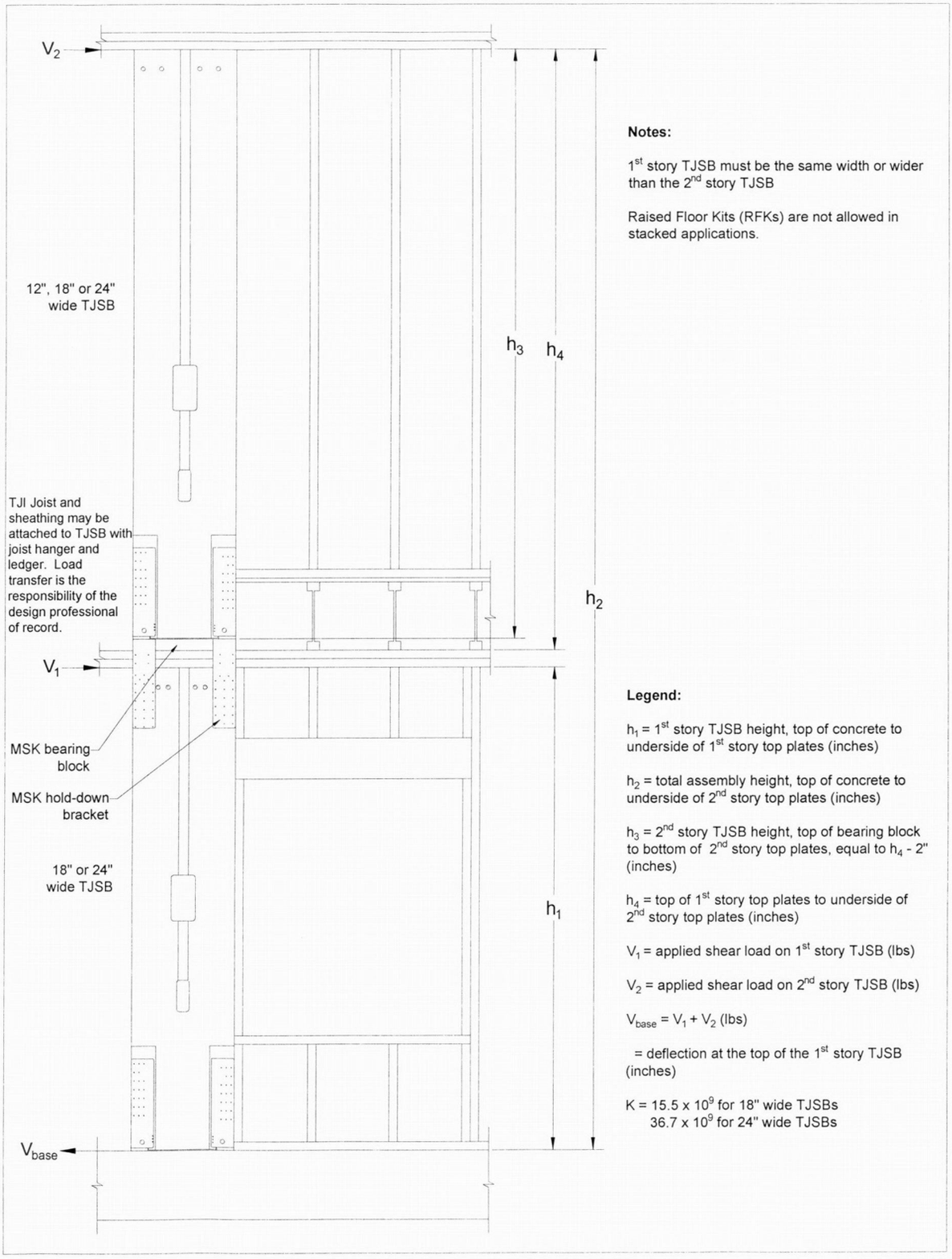


FIGURE 6—TJSB MULTI-STORY WALL ELEVATION
(Framing shown for illustration purposes only)

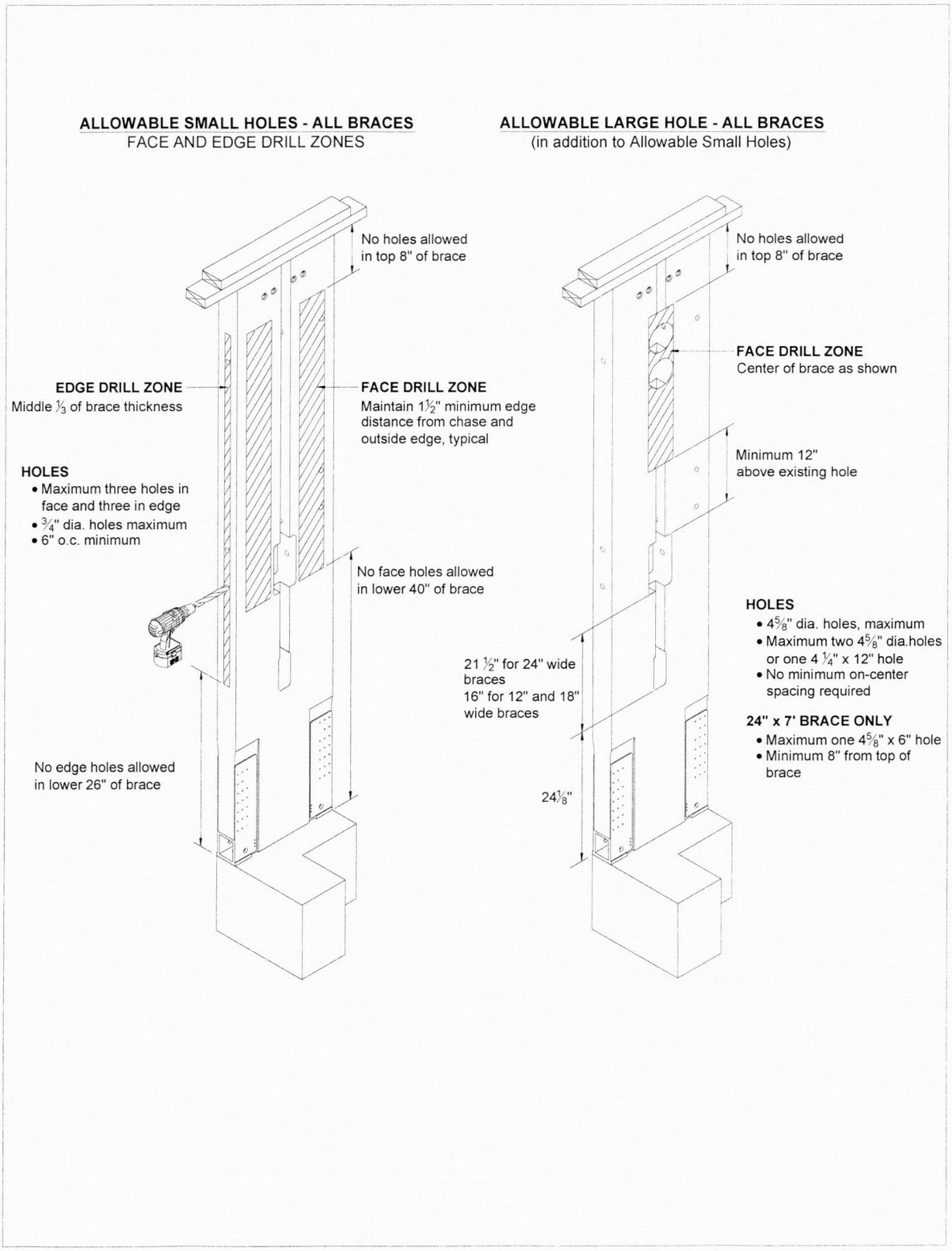
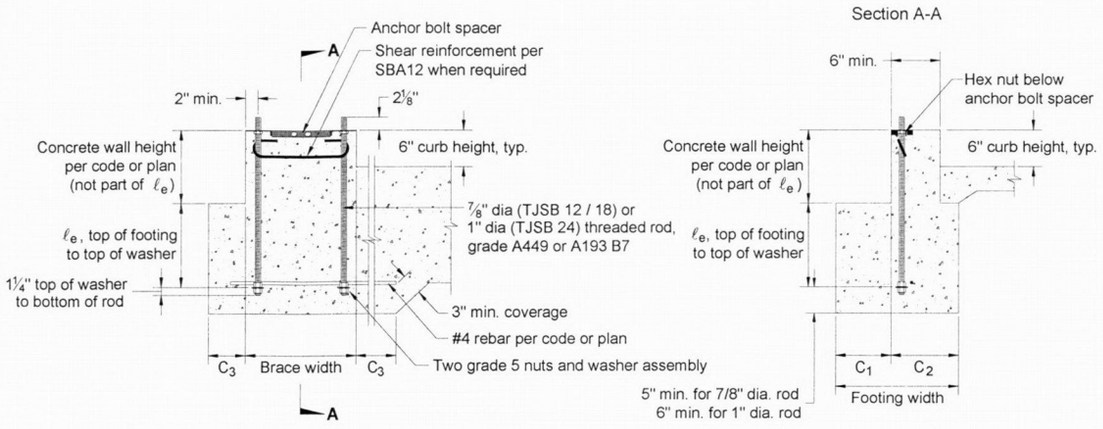
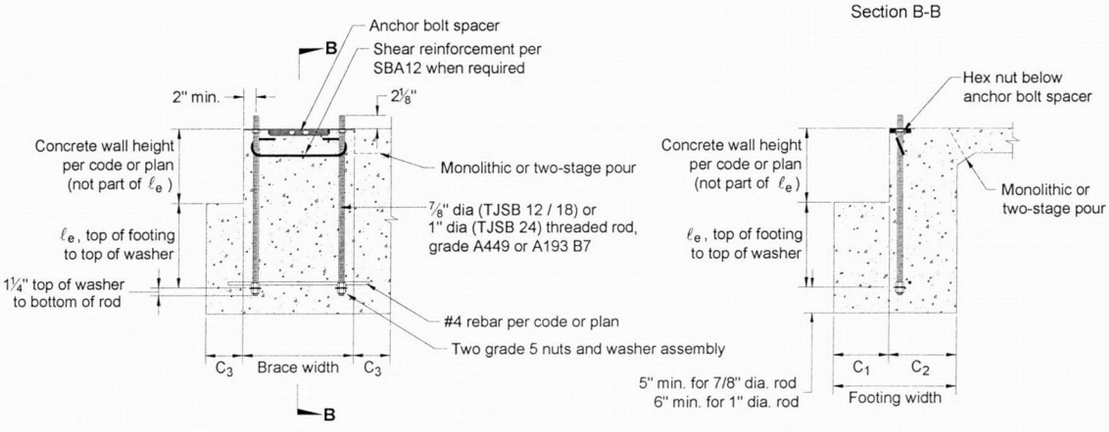


FIGURE 7—TJSB ALLOWABLE HOLE DIAGRAM
(See Section 3.2 for Material Description)

ANCHORAGE FOR GARAGE CURB
SBA1/SBA5



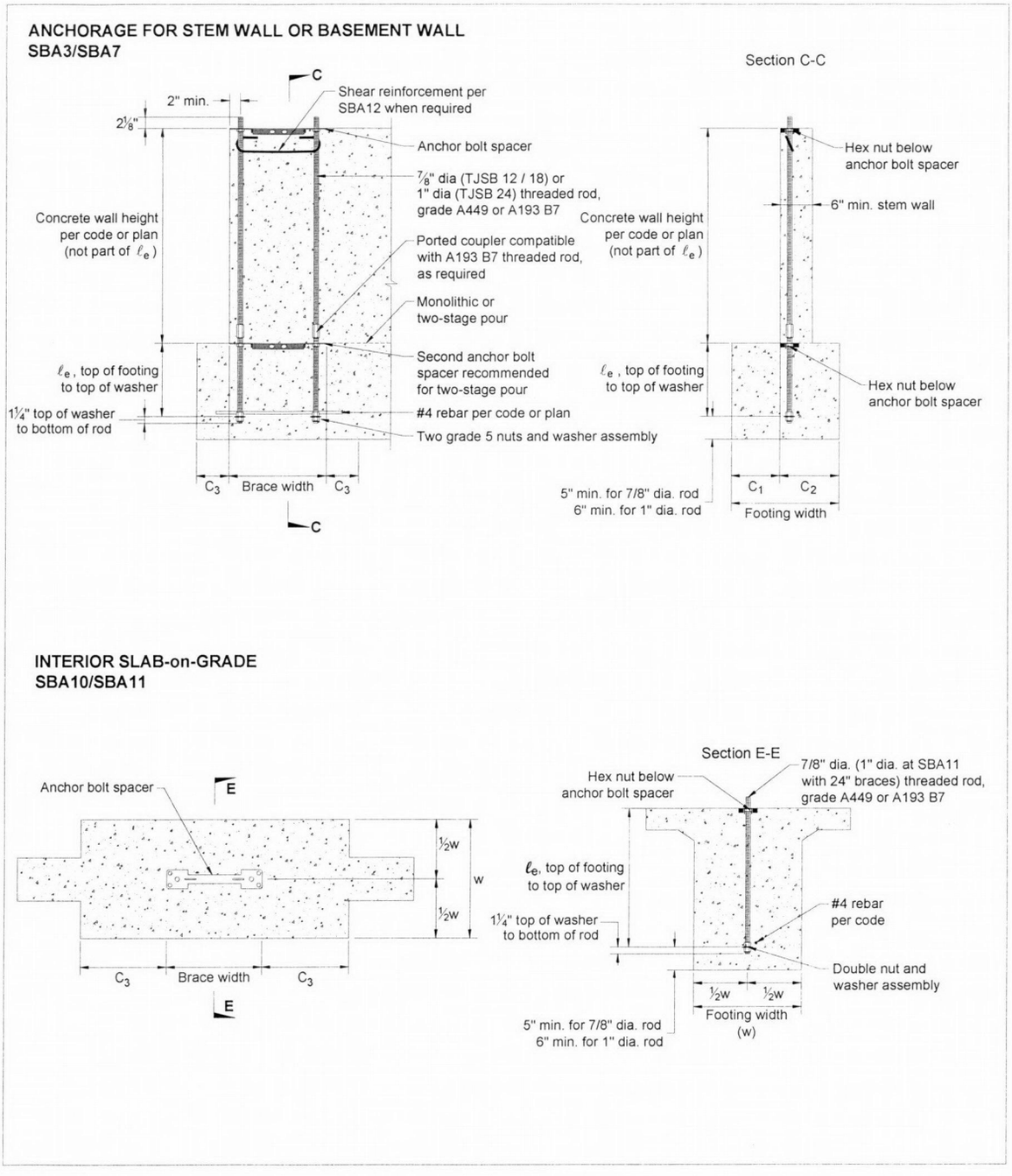
ANCHORAGE FOR SLAB ON GRADE
SBA2/SBA6



General Notes
-See Tables 10 and 11 for embedment length (l_e), C_1, C_2, C_3 and footing width requirements.
-Concrete edge distance for anchors must comply with ACI 318 D.8.2.
-Details are applicable for 2,500 and 3,000 psi concrete with or without supplemental bearing plates.

FIGURE 8—TJSB ANCHORAGE FOR GARAGE CURB AND SLAB ON GRADE

Dimensions provided are for anchorage only – foundation and stem wall design (size and reinforcement) by others in accordance with Chapters 18 and 19 of the IBC or UBC, whichever is applicable.
General Notes

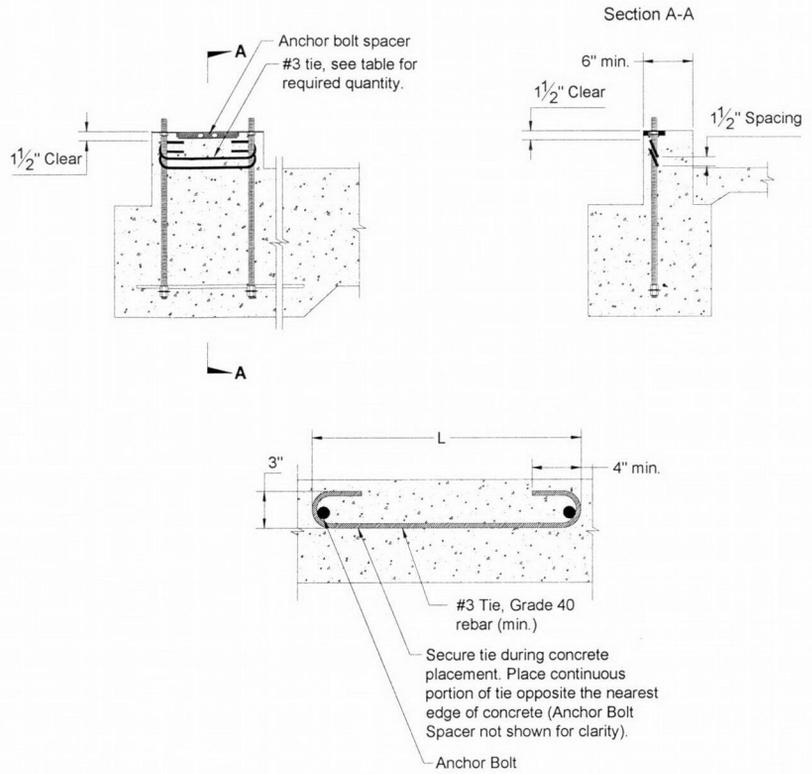


-See Tables 10 and 11 for embedment length (l_e), C_1, C_2, C_3 and footing width requirements.
-Concrete edge distance for anchors must comply with ACI 318 D.8.2.
-Details are applicable for 2,500 and 3,000 psi concrete with or without supplemental bearing plates.

FIGURE 9—TJSB ANCHORAGE FOR STEM OR BASEMENT AND INTERIOR SLAB ON GRADE

Dimensions provided are for anchorage only – foundation and stem wall design (size and reinforcement) by others in accordance with Chapters 18 and 19 of the IBC or UBC, whichever is applicable.

ANCHORAGE SHEAR REINFOREMENT
SBA12



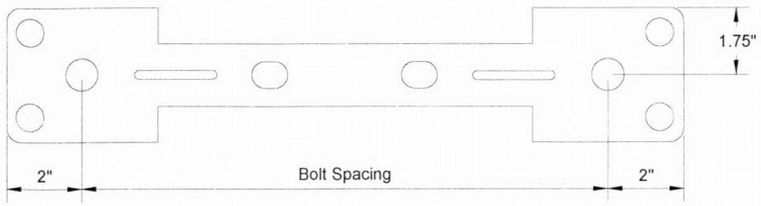
TJ Shear Brace Shear Anchorage[1][2][3][7]			
Seismic[4] / Wind Design[5]			
Brace Size	L	Minimum Total Length of Rebar Required	Required Shear Reinforcement[6]
TJSB 12x_	n/a	n/a	None
TJSB 18x_	16 1/16"	26 5/16"	One #3 Tie
TJSB 24x_	22¼"	32½"	Two #3 Ties

1. Shear anchorage designs conform to ACI 318-08 and assume minimum f'c= 2,500 psi concrete.
2. Shear reinforcement is not required for braces in interior foundation applications (brace installed away from edge of concrete).
3. Minimum curb/stemwall width is 6".
4. Seismic indicates Seismic Design Categories C through E.
5. Wind includes Seismic Design Categories A and B.
6. Shear reinforcement is in addition to the Anchor Bolt Spacer.
7. Concrete edge distance for anchors must comply with ACI D.8.2

FIGURE 10—TJSB ANCHORAGE SHEAR REINFORCEMENT

Dimensions provided are for anchorage only – foundation and stem wall design (size and reinforcement) by others in accordance with Chapters 18 and 19 of the IBC or UBC, whichever is applicable.

ANCHOR BOLT SPACER
SBA8



Brace	Bolt Spacing
TJSB 12x_	8⅛"
TJSB 18x_	14"
TJSB 24x_	20"

FIGURE 11—TJSB ANCHOR BOLT SPACER AND BOLT SPACING

Dimensions provided are for anchorage only – foundation and stem wall design (size and reinforcement) by others in accordance with Chapters 18 and 19 of the IBC or UBC, whichever is applicable.