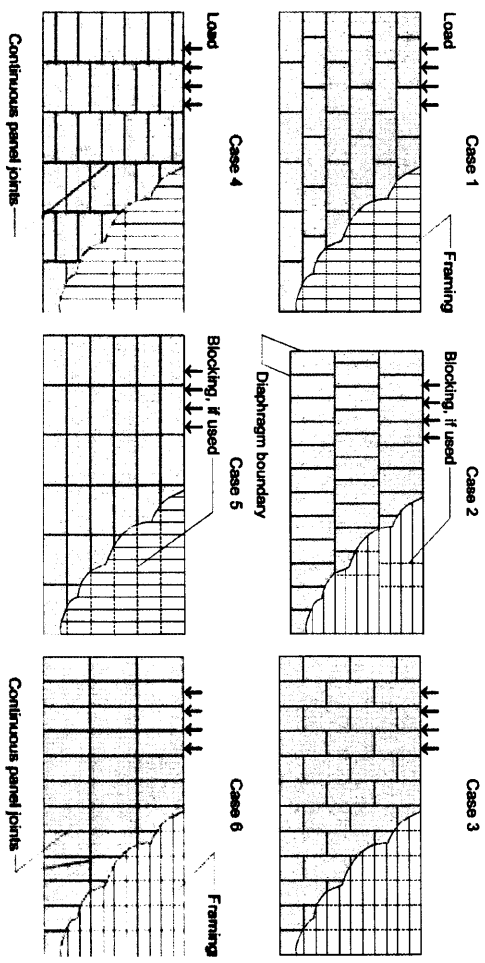


**Table 4.2A Nominal Unit Shear Capacities for Wood-Frame Diaphragms**

**Blocked Wood Structural Panel Diaphragms<sup>1,2,3,4</sup>**

|                            |                  | SEISMIC  |                 |     |     |                 |                 | WIND   |     |                 |                 |       |     |   |   |   |
|----------------------------|------------------|--|-----------------|-----|-----|-----------------|-----------------|--|-----|-----------------|-----------------|-------|-----|---|---|---|
|                            |                  | A  |                 |     | B   |                 |                 | A  |     |                 | B               |       |     |   |   |   |
|                            |                  | Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6) |                 |     |     |                 |                 | Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6) |     |                 |                 |       |     |   |   |   |
|                            |                  | 6  |                 | 4   |     | 2-1/2           |                 | 6  |     | 4               |                 | 2-1/2 |     | 2 |   |   |
| Sheathing Grade            | Common Nail Size | Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4)   |                 |     |     |                 |                 | Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4)   |     |                 |                 |       |     |   |   |   |
|                            |                  | $V_n$ (kip/in.)  | $G_n$ (kip/in.) | PLY | OSB | $V_n$ (kip/in.) | $G_n$ (kip/in.) | PLY  | OSB | $V_n$ (kip/in.) | $G_n$ (kip/in.) | PLY   | OSB |   |   |   |
| Structural I               | 8d               | 1-1/4  | 3/8             | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 1-1/2  | 5/16            | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 1-3/8  | 3/8             | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            | 10d              | 1-1/2  | 15/32           | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 1-1/4  | 5/16            | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 3/8  | 3/8             | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
| Sheathing and Single-Floor | 8d               | 1-3/8  | 7/16            | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 15/32  | 15/32           | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 15/32  | 15/32           | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            | 10d              | 1-1/2  | 19/32           | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 1-1/4  | 5/16            | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |
|                            |                  | 3/8  | 3/8             | 2   | 3   | 3               | 3               | 3  | 3   | 3               | 3               | 3     | 3   | 3 | 3 | 3 |

- Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.1 for wood structural panel diaphragms. See Appendix A for common nail dimensions.
- For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor =  $1 - (0.5 - G)$ , where  $G$  = Specific Gravity of the framing lumber from the *MDS* (Table 11.3.2A). The Specific Gravity Adjustment Factor shall not be greater than 1.
- Apparent shear stiffness values,  $G_{as}$ , are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for diaphragms constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used,  $G_s$  values shall be permitted to be increased by 1.2.
- Where moisture content of the framing is greater than 19% at time of fabrication,  $G_s$  values shall be multiplied by 0.5.



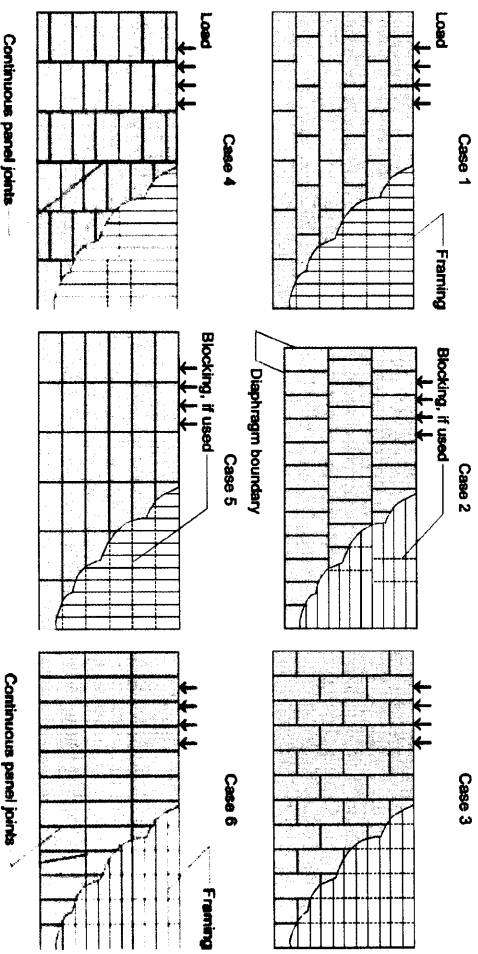
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**Table 4.2B Nominal Unit Shear Capacities for Wood-Frame Diaphragms**

**Blocked Wood Structural Panel Diaphragms Utilizing Multiple Rows of Fasteners (High Load Diaphragms)<sup>1,2,3,4</sup>**

| Sheathing Grade | Common Nail Size | Minimum Penetration in Framing Member or Blocking (in.) | Minimum Nominal Panel Thickness (in.) | Minimum Nominal Width of Nail Face at Adjoining Sides and Edges (in.) | Lines of Fasteners | A SEISMIC  |      |    |      |      |    |  |      |      |      |      |    | B WIND   |      |      |  |      |   |
|-----------------|------------------|---|---------------------------------------|---|--------------------|--|------|----|------|------|----|--|------|------|------|------|----|--|------|------|--|------|---|
|                 |                  |   |                                       |   |                    | Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6) |      |    |      |      |    | Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4) |      |      |      |      |    | Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6) |      |      | Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4) |      |   |
|                 |                  |   |                                       |   |                    | 4  | 4    | 4  | 4    | 4    | 4  | 4  | 4    | 4    | 4    | 4    | 4  | 4  | 4    | 4    | 4  | 4    | 4 |
| Structural I    | 10d              | 1-1/2   | 19/32                                 | 4   | 2                  | OSB PLY  | 1210 | 40 | 24   | 1630 | 53 | 28   | 1750 | 50   | 27   | 2300 | 56 | 29   | 1695 | 2280 | 2450   | 3220 |   |
|                 |                  |   |                                       |   |                    | 1400   | 33   | 21 | 1830 | 48   | 27 | 2010   | 44   | 25   | 2580 | 51   | 28 | 1960   | 2560 | 2815 | 3610   |      |   |
|                 |                  |   |                                       |   |                    | 1750   | 50   | 27 | 2440 | 61   | 30 | 2570   | 59   | 30   | 2790 | 70   | 32 | 2450   | 3415 | 3600 | 3905   |      |   |
|                 |                  |   |                                       |   |                    | 1340   | 38   | 23 | 1780 | 52   | 29 | 1930   | 47   | 27   | 2510 | 54   | 29 | 1875   | 2485 | 2700 | 3515   |      |   |
|                 |                  |   |                                       |   |                    | 1560   | 29   | 20 | 1980 | 46   | 31 | 2220   | 40   | 25   | 2880 | 48   | 27 | 2185   | 2770 | 3110 | 4030   |      |   |
|                 |                  |   |                                       |   |                    | 1930   | 47   | 27 | 2840 | 60   | 31 | 2810   | 57   | 30   | 3580 | 64   | 32 | 2700   | 3695 | 3935 | 5010   |      |   |
|                 |                  |   |                                       |   |                    | 1460   | 33   | 22 | 1910 | 50   | 28 | 2100   | 45   | 27   | 2730 | 53   | 30 | 2045   | 2675 | 2940 | 3820   |      |   |
|                 |                  |   |                                       |   |                    | 1710   | 26   | 19 | 2140 | 43   | 37 | 2420   | 37   | 24   | 3130 | 45   | 27 | 2395   | 2995 | 3390 | 4380   |      |   |
|                 |                  |   |                                       |   |                    | 2100   | 45   | 27 | 2860 | 58   | 32 | 3050   | 56   | 31   | 3800 | 68   | 34 | 2940   | 4005 | 4270 | 5040   |      |   |
|                 |                  |   |                                       |   |                    | 1050   | 43   | 21 | 1450 | 55   | 23 | 1530   | 53   | 23   | 2020 | 58   | 24 | 1470   | 2030 | 2140 | 2830   |      |   |
|                 |                  |   |                                       |   |                    | 1210   | 36   | 19 | 1630 | 50   | 22 | 1750   | 46   | 21   | 2210 | 55   | 23 | 1695   | 2280 | 2450 | 3095   |      |   |
|                 |                  |   |                                       |   |                    | 1530   | 53   | 23 | 2170 | 62   | 24 | 2280   | 61   | 24   | 2990 | 72   | 26 | 2140   | 3040 | 3165 | 3345   |      |   |
| 1300            | 34               | 19  | 1720                                  | 49  | 23                 | 1870   | 45   | 22 | 2430 | 52   | 23 | 1820   | 2410 | 2620 | 3430 |      |    |  |      |      |  |      |   |
| 1510            | 27               | 16  | 1930                                  | 43  | 21                 | 2160   | 37   | 20 | 2740 | 46   | 22 | 2115   | 2700 | 3025 | 3835 |      |    |  |      |      |  |      |   |
| 1870            | 45               | 22  | 2590                                  | 57  | 24                 | 2730   | 55   | 24 | 2970 | 68   | 26 | 2620   | 3610 | 3820 | 4160 |      |    |  |      |      |  |      |   |
| 1420            | 30               | 18  | 1870                                  | 46  | 23                 | 2040   | 42   | 22 | 2670 | 50   | 24 | 1990   | 2620 | 2855 | 3740 |      |    |  |      |      |  |      |   |
| 1650            | 24               | 16  | 2100                                  | 40  | 21                 | 2350   | 34   | 20 | 2890 | 45   | 23 | 2310   | 2940 | 3290 | 4045 |      |    |  |      |      |  |      |   |
| 2040            | 42               | 22  | 2800                                  | 56  | 25                 | 2960   | 53   | 25 | 3130 | 71   | 28 | 2855   | 3920 | 4145 | 4380 |      |    |  |      |      |  |      |   |

- Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.1 for wood structural panel diaphragms. See Appendix A for common nail dimensions.
- For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor =  $[1 - (0.5 - G)]$ , where  $G$  = Specific Gravity of the framing lumber from the WDS (Table 11.3.2A). The Specific Gravity Adjustment Factor shall not be greater than 1.
- Apparent shear stiffness values,  $G_a$ , are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for diaphragms constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used,  $G_a$  values shall be permitted to be increased by 1.2.
- Where moisture content of the framing is greater than 19% at time of fabrication,  $G_a$  values shall be multiplied by 0.5.



SEISMIC SYSTEMS FOR WIND AND SEISMIC



**Table 4.2C Nominal Unit Shear Capacities for Wood-Frame Diaphragms**

**Unblocked Wood Structural Panel Diaphragms<sup>1,2,3,4</sup>**

| Sheathing Grade | Common Nail Size           | Minimum Fastener Penetration in Framing (in.) | Minimum Nominal Panel Thickness (in.) | Minimum Nominal Width of Nailed Face at Supported Edges and Boundaries (in.) | A   |         |                      |                           | B   |                           |                      |                      |                      |                      |
|-----------------|----------------------------|---|---------------------------------------|--|---|---------|----------------------|---------------------------|---|---------------------------|----------------------|----------------------|----------------------|----------------------|
|                 |                            |   |                                       |  | SEISMIC   |         |                      |                           | WIND  |                           |                      |                      |                      |                      |
|                 |                            |   |                                       |  | 6 in. Nail Spacing at diaphragm boundaries and supporting members |         |                      |                           | 6 in. Nail Spacing at diaphragm boundaries and supporting members |                           |                      |                      |                      |                      |
| Structural I    | 6d                         | 1-1/4   | 5/16                                  | 2  | Case 1  | OSB PLY | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | OSB PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 330                  | 9.0                  |
|                 | 8d                         | 1-3/8   | 3/8                                   | 2  | 3   | Case 1  | OSB PLY              | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | OSB PLY                   | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 370                  |
|                 | 10d                        | 1-1/2   | 15/32                                 | 2  | 3   | Case 1  | OSB PLY              | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | OSB PLY                   | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 480                  |
|                 | Sheathing and Single-Floor | 6d  | 1-1/4                                 | 5/16   | 2   | Case 1  | PLY                  | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | PLY                       | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 300                  |
|                 |                            | 8d  | 1-3/8                                 | 3/8  | 2   | 3       | Case 1               | PLY                       | V <sub>s</sub> (plf)  | G <sub>s</sub> (kips/in.) | PLY                  | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      |                      |
|                 |                            | 10d   | 1-1/2                                 | 15/32  | 2   | 3       | Case 1               | PLY                       | V <sub>s</sub> (plf)  | G <sub>s</sub> (kips/in.) | PLY                  | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      |                      |
| 8d              |                            | 1-3/8   | 7/16                                  | 2  | 3   | Case 1  | PLY                  | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | PLY                       | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 370                  |
| 10d             |                            | 1-1/2   | 15/32                                 | 2  | 3   | Case 1  | PLY                  | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | PLY                       | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 430                  |
| 8d              |                            | 1-3/8   | 3/8                                   | 2  | 3   | Case 1  | PLY                  | V <sub>s</sub> (plf)      | G <sub>s</sub> (kips/in.)   | PLY                       | V <sub>w</sub> (plf) | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      |                      | 480                  |
| 10d             | 1-1/2                      | 19/32   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 460                  | 8.5                  |
| 8d              | 1-3/8                      | 7/16  | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 510                  | 7.0                  |
| 10d             | 1-1/2                      | 15/32   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 480                  | 7.5                  |
| 8d              | 1-3/8                      | 15/32   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 530                  | 6.5                  |
| 10d             | 1-1/2                      | 19/32   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 510                  | 15                   |
| 8d              | 1-3/8                      | 3/8   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 580                  | 12                   |
| 10d             | 1-1/2                      | 15/32   | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 570                  | 13                   |
| 8d              | 1-3/8                      | 7/16  | 2                                     | 3  | Case 1  | PLY     | V <sub>s</sub> (plf) | G <sub>s</sub> (kips/in.) | PLY   | V <sub>w</sub> (plf)      | Cases 2,3,4,5,6      | V <sub>w</sub> (plf) |                      |                      |
|                 |                            |   |                                       |  |   |         |                      |                           |   |                           |                      |                      | 640                  | 10                   |

1. Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.1 for wood structural panel diaphragms. See Appendix A for common nail dimensions.

2. For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor =  $[1 - (0.5 - G)]$ , where  $G$  = Specific Gravity of the framing lumber from the *NDS* (Table 11.3.2A). The Specific Gravity Adjustment Factor shall not be greater than 1.

3. Apparent shear stiffness values  $G_a$  are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for diaphragms constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used,  $G_a$  values shall be permitted to be increased by 1.2.

4. Where moisture content of the framing is greater than 19% at time of fabrication,  $G_a$  values shall be multiplied by 0.5.

**Table 4.2D Nominal Unit Shear Capacities for Wood-Frame Diaphragms**

**Lumber Diaphragms<sup>1</sup>**

| Sheathing Material               | Sheathing Nominal Dimensions | Type, Size, and Number of Nails per Board                                 |   | A              |                    | B              |      |
|----------------------------------|------------------------------|---|---|----------------|--------------------|----------------|------|
|                                  |                              | Nailing at Intermediate and End Bearing Supports<br>(Nails/board/support) | Nailing at Boundary Members<br>(Nails/board/endl) | $V_s$<br>(plf) | $G_s$<br>(kips/in) | $V_w$<br>(plf) | WIND |
| Horizontal Lumber Sheathing      | 1x6                          | 2-8d common nails (3-8d box nails)  | 3-8d common nails (5-8d box nails)                | 100            | 1.5                | 140            |      |
|                                  | 1x8                          | 3-8d common nails (4-8d box nails)  | 4-8d common nails (6-8d box nails)                |                |                    |                |      |
|                                  | 2x6                          | 2-16d common nails (3-16d box nails)                                      | 3-16d common nails (5-16d box nails)              |                |                    |                |      |
| Diagonal Lumber Sheathing        | 2x8                          | 3-16d common nails (4-16d box nails)                                      | 4-16d common nails (6-16d box nails)              | 600            | 6.0                | 840            |      |
|                                  | 1x6                          | 2-8d common nails (3-8d box nails)  | 3-8d common nails (5-8d box nails)                |                |                    |                |      |
|                                  | 1x8                          | 3-8d common nails (4-8d box nails)  | 4-8d common nails (6-8d box nails)                |                |                    |                |      |
| Double Diagonal Lumber Sheathing | 2x8                          | 3-16d common nails (4-16d box nails)                                      | 4-16d common nails (6-16d box nails)              | 1200           | 9.5                | 1680           |      |
|                                  | 1x6                          | 2-8d common nails (3-8d box nails)  | 3-8d common nails (5-8d box nails)                |                |                    |                |      |
|                                  | 1x8                          | 3-8d common nails (4-8d box nails)  | 4-8d common nails (6-8d box nails)                |                |                    |                |      |

1. Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.2 for diaphragms diagonally sheathed with a single-layer of lumber, see 4.2.7.3 for diaphragms diagonally sheathed with a double-layer of lumber, and see 4.2.7.4 for diaphragms horizontally sheathed with a single-layer of lumber. See Appendix A for common and box nail dimensions.

