Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings

Volume 2B - Plan Set for Living-Space-Over-Garage Dwellings

FEMA P-1100-2B / October 2019
Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings
Volume 2B – Plan Set for Living-Space-Over-Garage Dwellings

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Notice

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Cover photograph – Photograph showing living-space-over-garage dwellings.
Purpose and Scope

This Plan Set is for retrofit of living-space-over-garage dwellings and is provided as a supplement to FEMA P-1100, Vulnerability-Based Seismic Assessment and Retrofit of One-and Two-Family Dwellings, Volume 1 – Prestandard. The Plan Set presents prescriptive, pre-engineered plans for a suggested minimum level of retrofit design for use by a general contractor or homeowner without necessarily having to involve a registered design professional. Use of this Plan Set is limited to dwellings that are compliant with eligibility statements presented in Table 1 on Sheet S0. The extent of the scope of this Plan Set is described on Sheet S0.

The Plan Set is intended to contain all of the necessary supplemental technical information and guidance for preparation of a complete set of plans for submittal to the local building department and for use during construction; however, supplemental information may be required by some building departments. Note that building permits are always required when performing the work described in this Plan Set.

The Plan Set does not attempt to address all potential deficiencies in a home and does not eliminate the risk of potential damage in future earthquakes.

Instructions for use are provided on Sheet 01.

Limitation of Liability

Earthquake strengthening constructed in accordance with this Plan Set is intended to reduce the risk of earthquake-related damage to existing residential wood-frame dwellings with living-space-over-garage configurations. The content of this Plan Set is based on the experience and judgment of practicing engineers and limited research. All circumstances, forms, or types of construction have not necessarily been contemplated in the preparation of this Plan Set, and it is not possible to control the quality of construction or predict or test all conditions that may occur during an earthquake. No party associated with the preparation of this Plan Set makes any representation, warranty, or covenant, expressed or implied, with respect to the design, condition, quality, durability, operation, fitness for use, or suitability of earthquake strengthening based on this Plan Set.
A. Before you begin:
1. This Plan Set is intended for use by a general contractor or homeowner without necessarily having to involve a Registered Design Professional.
2. Contact your local Building Official, often known as the Building Department, to understand the building permit application. Inquire about:
   a. Fees
   b. How many copies of the plans must be submitted
   c. Which inspections are required
3. The Building Official may also be able to assist with assessing the applicability of the Plan Set to a home, see Eligibility For Use, Sheet S0.
4. Complete the Eligibility For Use questionnaire on Sheet S0 (Table 1), to determine if this Plan Set is applicable. A "non-compliant" answer to any question disqualifies the home from using this Plan Set, unless a Registered Design Professional is involved.

B. Determine your Seismic Design Category (SDC), Building Retrofit Configuration Type and Weight Classification
   a. Refer to Sheet S0.
   b. First Seismic Design Category (SDC) will inform what S0 value to use for the dwelling.
   c. Determine building retrofit configuration type (see descriptions and the figures on Sheet S0 for guidance).
   d. After you have obtained S0 and configuration type, use Figure 1 on Sheet S0 to determine which retrofit schedules are applicable to use.
   e. Determine weight classification for use in the selected schedules.

C. Prepare your plans:
   a. Show a plotted plan of the perimeter of the home in the graph layout area provided on Sheet S4, Foundation and Retrofit Layout Plan. Your plan should include the following:
      i. The location of any obstructions along the perimeter of the foundation that make the retrofitting work difficult or impossible such as fireplaces, water heaters, utilities. If the dwelling has a Ground Floor Residential Unit retrofit, this will apply to the perimeter line for the extent of the retrofit. (See Figures 4 and 5 on Sheet S0). These areas should be avoided when laying out the required retrofitting work.
      ii. An arrow to indicate the direction of the span of your second floor joists above plus the spacing such as "second floor joists at 16" on center."
      iii. This will be helpful when selecting the appropriate details shown on Sheets D1 - D8.1.
      iv. Dimensions for each length of perimeter wall segment and interior ground floor walls in the area of work and overall dimensions of wall lines.
      v. An arrow pointing to North.
      vi. Label the street side (front) of the home.
   b. See Sheet S4-ex for an example of a Plan Set submittal.
   c. See Sheet S1 for additional example and instructions for selecting and documenting the final retrofit. Note that the example shown is for the case with a Ground Floor Residential Unit, but the same process should be applied for dwellings with a Ground Floor without Residential Unit.
   d. Review Sheet S0 for clarity on extent/location of the retrofit based on your building retrofit configuration type (i.e. with or without a Foundation Floor Residential Unit).

D. Gather information to complete the plans:
1. Review General Notes on Sheets S1 and S2 for guidance on materials and installation for the required work.
2. Review the Detail Sheets included in this Plan Set (Sheets D1 - D8.1). Locate the details that most substantially match a home’s framing conditions. Not all details or Sheets will apply. As a minimum, you should have one detail each for:
   a. The foundation sill to concrete foundation connection (Sheet D1).
   b. Upper floor framing to wood structural panel wall connection (Sheet D0).
   c. Differences in existing conditions from those illustrated on the details that result in changes to these drawings will need to be reviewed by a Registered Design Professional. See “Purpose” on Sheet S0 for additional information.
3. Once you have selected the correct (applicable) Earthquake Retrofit Schedule Sheets (S3.1 thru S3.6), follow the Sheet instructions provided to determine the amount and type of earthquake retrofitting required along each wall line. Once Steps 1 through 7 of the Instruction Sheet are completed, document the results within the Retrofit Table as explained in Step 8.
4. Review Supplemental Technical Notes, on Sheet S2 where tie-downs are required.

E. Complete your plans:
1. Using information from the appropriate Earthquake Retrofit Schedule(s) (Sheets S3.1 - S3.6), add the following to complete your Foundation and Retrofit Layout Plan on Sheet S4:
   a. Indicate and dimension the total length of shear wall required at each wall line where wood structural panel retrofits occur. Also indicate any steel column or proprietary wall retrofit systems if they occur at the front or back walls.
   b. Identify the details used for the connections as noted in D.2. Indicate the connection type and the minimum number of connectors for each wall line. Consent to Sections L and M of Sheet S1.
   c. Identify the details used for the wood structural panel retrofits (Sheets D4 or D5).
   d. If tie-downs are used, identify the details used (Sheet D0).
   e. Identify the details used for the top plate splice (Sheet D6).
   f. Identify the details used for notching and/or cutouts (Sheet D6).
2. If steel column retrofits are to be applied at the front or back walls, identify the details used (Sheets D7 and D7.1).
3. If Prestressed Shear Wall retrofits are to be applied at the front or back walls, identify the details used (Sheets D8 and D8.1).
4. If tie-downs are to be applied at the front or back walls, identify the details used (Sheets D7 and D7.1).
5. If Proprietary Shear Wall retrofits are to be applied at the front or back walls, identify the details used (Sheets D8 and D8.1).

F. Submit your plans:
1. Submit a permit application and the required number of complete sheets (Sheets S0 through S3.1) to the Building Official for review.
2. Photographs of the foundation sill, the walls to be retrofitted, and second floor framing conditions may assist the review process.
3. Before starting work, the permit holder may be required to schedule a preconstruction inspection with the Building Official to verify that field conditions are consistent with the information provided on the approved plan.
4. Inspections (by the Building Official may be required for:
   a. Foundation anchor bolts / anchor plate installation,
   b. Building installation,
   c. Wood structural panel wall; sheathing and nailing,
   d. Steel column installation,
   e. Proprietary Shear Wall installation,
   f. Metal hardware "connections" installation,
   g. Tie-downs, and
   h. Final inspection.
PURPOSE
The purpose of this Plan Set is to promote public safety and welfare by reducing earthquake-induced damage to existing Living-Space-Over-Garage Dwellings. The prescriptive designs provided in this Plan Set, which is being published as FEMA P-1100, Volume 2, are deemed to comply with Chapter 5 of the FEMA P-1100 Prestandard. The provisions of this Plan Set address a single vulnerability; see the FEMA P-1100 Prestandard for assessment and retrofit methodologies. Use of this Plan Set is anticipated to improve earthquake performance but is not intended to prevent earthquake damage. For additional information, see https://www.fema.gov/media-library/assets/documents/175158.

SCOPE
This Plan Set provides prescriptive provisions for retrofit of Ground Story Bracing in Living-Space-Over-Garage Dwellings.

ELIGIBILITY
Living-Space-Over-Garage Dwellings are permitted to use the prescriptive retrofit provisions of this Plan Set when all questions in Table 1 can be answered with "compliant." For dwellings not eligible to use this Plan Set, see the FEMA P-1100 Prestandard, section 5.5 for the Simplified Engineered Procedure.

DIFFERING CONDITIONS
Where a dwelling's actual conditions require modification of the vulnerability-based prescriptive retrofit solutions identified within this Plan Set, additional or modified details may be generated by a Registered Design Professional and used to supplement the prescriptive procedures of this Plan Set. These supplemental details shall be stamped and signed by a Registered Design Professional and approved by the Building Official in accordance with the FEMA P-1100 Prestandard, Section 5.5.

DESIGN BASIS
This set is deemed to comply with Chapter 5 of FEMA P-1100 Prestandard. Specific design assumptions are as follows:

- R = 5.0; \(S_D = 1.5\); \(S_B = \) Varies (between 1 and 1.5) Site Class C

GENERAL
Living-Space-Over-Garage Dwellings include several types of dwellings in which living space occurs over a garage or a portion of the dwelling constructed as a garage. This term captures the dwellings in which all of the living space occurs at an upper level over a garage story, as seen in Figure 1. In this dwelling type the garage story may be unfinished and still used as a garage and utility area, or may have been partially or fully converted to a ground story residential unit. This term also captures dwellings where a portion of an upper level living space occurs over the garage, as seen in Figure 2.

Earthquake Retrofits Schedules in this plan set include a variety of options for retrofitting each of these configurations, including:

- Wood Structural Panel Shear Walls, with a single length of shear wall along a given wall line.
- Structural Panel Shear Walls, with two sections of shear wall per wall line.
- Retrofits including Steel Columns or Proprietary Shear Wall options for front and back walls.

For Ground Story Bracing in Living-Space-Over-Garage Dwellings retrofit in accordance with this Plan Set, retrofit elements shall be provided as follows:

Configurations without a Ground Floor Residential Unit:

- The retrofit shall include bracing elements at the dwelling front, back and side walls (See Figure 3). Bracing elements at the side walls are to be wood structural panel shear walls; bracing elements at the front and back walls are permitted to be of any of the bracing element types listed above.

Configurations with a Ground Floor Residential Unit:

- The retrofit shall include bracing elements at the garage front and side walls, and wall separating the garage use from the residential use (See Figures 4 and 5). Bracing elements at the front wall are to be wood structural panel shear walls; bracing elements at the side and back walls are permitted to be of any of the bracing element types listed above.

ASSESSMENT
The retrofit provisions of this Plan Set are intended to apply to dwellings that have been assessed using the FEMA P-1100 methodology and found to have a Living-Space-Over-Garage Vulnerability.

TABLE 1: ELIGIBILITY FOR USE

<table>
<thead>
<tr>
<th>Non-Compliant</th>
<th>Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The dwelling is a one or two-family detached structure or the dwelling is a unit in a townhouse and assessment and retrofit will occur for each attached townhouse.</td>
<td>The dwelling is a wood light-frame dwelling and has a maximum of one story above the garage story.</td>
</tr>
<tr>
<td>2. The dwelling is a wood light-frame dwelling and has a maximum of one story above the garage story.</td>
<td>The dwelling is a wood light-frame dwelling and has a maximum of one story above the garage story.</td>
</tr>
<tr>
<td>3. The dwelling is a living-space-over-garage dwelling as defined in Chapter 2 of the FEMA P-1100 Prestandard.</td>
<td>The dwelling is a living-space-over-garage dwelling as defined in Chapter 2 of the FEMA P-1100 Prestandard.</td>
</tr>
<tr>
<td>4. The dwelling perimeter (not including porches or other appurtenances) is supported on continuous concrete foundations, concrete stem walls or thickened slab edge footings.</td>
<td>The dwelling perimeter (not including porches or other appurtenances) is supported on continuous concrete foundations, concrete stem walls or thickened slab edge footings.</td>
</tr>
<tr>
<td>5. The lower (garage) level floor is constructed of conventionally reinforced concrete slab on grade (or at least the portion of the floor that bounds the garage).</td>
<td>The lower (garage) level floor is constructed of conventionally reinforced concrete slab on grade (or at least the portion of the floor that bounds the garage).</td>
</tr>
<tr>
<td>6. Weight of roofing material shall not exceed 12 psf (measure on slope).</td>
<td>Weight of roofing material shall not exceed 12 psf (measure on slope).</td>
</tr>
<tr>
<td>7. Weight of exterior wall finish shall not exceed 8 psf, except that masonry fireplace surrounds of not more than 4 inches thick and up to 100 square feet are permitted to exceed this weight.</td>
<td>Weight of exterior wall finish shall not exceed 8 psf, except that masonry fireplace surrounds of not more than 4 inches thick and up to 100 square feet are permitted to exceed this weight.</td>
</tr>
<tr>
<td>8. Weight of interior wall finish shall not exceed 8 psf, except that masonry fireplace surrounds of not more than 4 inches thick and up to 100 square feet are permitted to exceed this weight.</td>
<td>Weight of interior wall finish shall not exceed 8 psf, except that masonry fireplace surrounds of not more than 4 inches thick and up to 100 square feet are permitted to exceed this weight.</td>
</tr>
<tr>
<td>9. Weight of upper floor finish shall not exceed 5 psf, except that heavier flooring finishes of up to 10 psf are acceptable where limited to 25% of the total floor area of each level.</td>
<td>Weight of upper floor finish shall not exceed 5 psf, except that heavier flooring finishes of up to 10 psf are acceptable where limited to 25% of the total floor area of each level.</td>
</tr>
<tr>
<td>10. Floors in each story are at the same level and not split level, excluding slab on grade portions.</td>
<td>Floors in each story are at the same level and not split level, excluding slab on grade portions.</td>
</tr>
<tr>
<td>11. The home floor area, calculated as (B) times (L), as defined in Figures 3, 4 or 5 shall not exceed 2,000 square feet.</td>
<td>The home floor area, calculated as (B) times (L), as defined in Figures 3, 4 or 5 shall not exceed 2,000 square feet.</td>
</tr>
<tr>
<td>12. No part of the foundations is constructed of unreinforced masonry or stone.</td>
<td>No part of the foundations is constructed of unreinforced masonry or stone.</td>
</tr>
<tr>
<td>13. Clear floor to ceiling heights at any occupied level does not exceed 9’.</td>
<td>Clear floor to ceiling heights at any occupied level does not exceed 9’.</td>
</tr>
</tbody>
</table>

If you answered “Non-compliant” to any of these questions, the home is not eligible to apply this Plan Set, unless a Registered Design Professional has addressed non-compliant issues in accordance with P-1100 Prestandard, Section 5.5. See Differing Conditions section on this sheet.

Submittal Index

- 00 Cover Sheet
- 01 General Notes
- 02 Supplemental Technical Notes Where Tie-downs are Required at Existing Foundations
- 03 Earthquake Retrofit Schedule General Instructions, Weight Category, and Connectors
- 03.1-1.0 Earthquake Retrofit Schedule - Wood Structural Panel Retrofit with two sections of wall
- 03.3-1.0 Earthquake Retrofit Schedule - Wood Structural Panel Retrofit with two sections of wall
- 03.3-1.0 Alternate Earthquake Retrofit Schedule (Steel Column or Proprietary Shear Wall)
- 03.3-1.0 Alternate Earthquake Retrofit Schedule at front of garage only in dwelling with Ground Floor Residential Unit
- 03.5-1.0 Earthquake Retrofit Schedule at front of garage only in dwelling with Ground Floor Residential Unit
- 03.5-1.0 Alternate Earthquake Retrofit Schedule at front of garage only in dwelling with Ground Floor Residential Unit
- 04 Foundation and Retrofit Layout Plan
- 05 Foundation Plan at Front of Garage
- 06 Floor Plan Panel Infill Details
- 07 Wood Structural Panel Infill Details at Shear Walls without Tie- downs
- 08 Wood Structural Panel Infill Details at Shear Walls with Tie- downs
- 09 Wood Structural Panels with Tie- downs
- 10 Vent Openings and Top Plate Details
- 11 Structural Details at Steel Retrofit Column
- 12 Foundation Details at Steel Retrofit Column
- 13 Foundation Details at Proprietary Shear Wall Retrofit
- 14 Foundation Details at Steel retrofit Wall Retrofit

(* Retrofit schedules sheet 6's list above sheets S3.1-1.0 thru S3.3-1.0 are for \(S_B = 1.0\) only. See sheet S3, Figure 3 for sheet numbers for Earthquake Retrofit Schedules for \(S_B = 1.2\) and \(S_B = 1.5\).)
A. CODE

1. All work not otherwise specified shall conform to the locally adopted version of the building code or residential code. Contractor shall comply with all locally adopted building codes and ordinances.

B. GENERAL

1. The contractor is responsible for maintaining a safe work environment, including adequate ventilation and work space. Contractor shall be responsible for the means and methods for accomplishing the work shown in this Plan Set, including any shoring and bracing of existing construction as required to safely install new work. Exercise caution working around existing utilities, locate underground utilities before excavating, and arrange for temporary disconnection of utilities if necessary.

C. EXISTING CONDITIONS

1. Contractor shall confirm that existing conditions match plans and details prior to start of work. Modify or change details as required prior to start of work. Contractor shall verify that existing concrete, anchor bolts, wood framing, and other materials that will become part of the work to which retrofit construction is attached is in reasonably sound condition and free of defects that would substantially reduce the capacity of the material. Where possible, damaged or deteriorated elements shall be replaced in place or supplemented with new elements. Where possible, damaged or deteriorated elements shall be replaced. Repair or replacement shall be in accordance with the adopted building or residential code.

2. The Owner or Contractor shall verify that the existing concrete within all areas to receive new anchor bolts is in reasonably good condition. Examples of poor concrete quality would include excessive spalling, large rock pockets, cracks extending completely through the footing greater than 1/4", or low strength concrete cement or mortar easily scrapeable with a metal knife or trowel. Strengthening should be avoided in local areas of poor quality. Where these areas cannot be avoided, or where locations of poor quality are widespread, the new anchors are to be tested in accordance with Table C-1. Where torque tests continue to fail, the existing foundation system shall be replaced locally for a minimum of 30 inches on each side of the proposed anchor location.

D. NOTCHING, BORING AND CUTTING

1. Do not cut, bore or notch structural members except as shown in these drawings or as specifically permitted by the building inspector. Exception: Notching and boring of framing shall be permitted as per Chapter 6 of the International Residential Code (IRC).

2. A. When drilling in concrete, do not drill through existing reinforcing steel. If reinforcing steel is to be drilled, move a minimum of one inch and drill relocated hole. Fill original hole with non-shrink grout.

3. B. Concrete shall have a strength of not less than 3000 psi at 28 days (design based upon 2800 psi). Concrete mixed on site shall be mixed and placed in accordance with the manufacturer's instructions using potable water.

F. REINFORCING STEEL (REBAR)

1. Reinforcing steel shall conform to ASTM A615 Grade 40 or 60, ASTM A706, or ASTM A691 Type R.

2. Reinforcing steel bend radii and other relevant detailing shall be in accordance with Concrete Reinforcing Steel Institute.

3. Minimum concrete cover over reinforcing steel:
   a. Concrete cast against and permanently exposed to soil: 3 inches
   b. Formed concrete exposed to weather: 2 inches
   c. Concrete not exposed to weather or in contact with preservative treated wood shall be provided with a minimum 0.062" hot-dipped galvanized coating or 0.050" coating in accordance with ASTM A653, and fasteners shall conform to ASTM A153.

4. Connectors shall conform to the type and size specified in these drawings.

D. CONCRETE

1. Concrete shall have a strength of not less than 3000 psi at 28 days (design based upon 2800 psi). Concrete mixed on site shall be mixed and placed in accordance with the manufacturer's instructions using potable water. Where these areas cannot be avoided, or where locations of poor quality are widespread, the new anchors are to be tested in accordance with Table C-1. Where torque tests continue to fail, the existing foundation system shall be replaced locally for a minimum of 30 inches on each side of the proposed anchor location.

C. TABLE C-1: Foundation Verification Requirements

<table>
<thead>
<tr>
<th>Diameter Ø</th>
<th>Torque (ft-lbs) Torque (ft-lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5&quot;</td>
<td>35</td>
</tr>
<tr>
<td>2&quot;</td>
<td>55</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>75</td>
</tr>
<tr>
<td>3&quot;</td>
<td>115</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>160</td>
</tr>
<tr>
<td>4&quot;</td>
<td>230</td>
</tr>
</tbody>
</table>

D. FASTENERS

1. General
   a. All bolts, nails and other fasteners in contact with preservative treated wood or exposed to weather shall be hot dip galvanized or stainless steel.

2. Nails
   a. Unless otherwise noted, all nails specified are to be common nails.
   b. Special care is required when installing nails in existing framing. Where required to avoid splitting of framing, predrill to 75% of nail shank diameter.

3. Fasteners for wood structural panel sheathing shall be full length 6d common nails (0.113” x 2.125”). Drive sheathing nail head flush with face of sheathing.

4. Do not overtighten, overtighten, or otherwise damage the overlapped edge or wood panel sheathing during installation. The nail is driven over when it breaks the surface of the panel. Where nails are overtightened to the point that the plywood veneer is fractured, add one new nail for every (2) overtightened nails. Space new nails between existing.

3. Anchor Bolts
   a. P fred bolt holes to not more than 1/16th larger than bolt or anchor bolt to be placed.
   b. At each perimeter wall line, proves a minimum quantity of Foundation Sill Anchors as required by the Earthquake Retrofit Schedule. Place new anchors between 6 and 12 inches from the end of each foundation sill plate and distribute the remaining anchors as evenly as practical along the wall line.
   c. Provide steel plate washers 0.229 x 3 x 3 inch minimum at all anchor bolts. Centerline of washer should be 1-1/2" to 2" from face of sheathing.
   d. Anchor bolts shall be a maximum spacing of 48” on center for the entire portion of all exterior walls, except as noted in Section J.
   e. For braced wall sections without tie-downs, provide one of the required anchor bolts within 8” of each end and one additional anchor bolt at each end as noted on Sheet C4.
   f. For braced wall sections with tie-downs, provide one additional anchor bolt within 8” minimum and 12” maximum from tie-down as noted on Sheet C5.

I. WOOD STRUCTURAL PANEL SHEATHING

1. Wood structural panels shall be 1/2” plywood, sheathing, all veneer, conforming to US- voluntary Product Standard PS1-1. Exposure 1 or Exterior Exposure, manufactured with exterior glue, and minimum 4-ply.

2. Oriented Strand Board (OSB) shall be 15/32” thick and conform to US Voluntary Product Standard PS 2 with an exposure rating of Exposure 1 or Exterior Exposure, manufactured with exterior glue, and minimum 4-ply.

3. Provide 1-5/8-inch minimum gap at all sheathing panel ends and edges.

4. Maintain a minimum edge distance of 8” from center of nail to edges of sheathing, studs, or top and sill plates. See Sheet D4 for double stud at sheathing panel joints.

J. WOOD FRAMING

1. Framing shall be Douglas Fir-Larch, or an approved species having a greater or equal specific gravity.

2. Framing in contact with foundations or exposure to weather shall be preservative treated in accordance with AWPA U (Commodity Specification A, Use Category 4B). Field treat all outs, boards and notches per AWPA M-4.

K. CONNECTOR DEVICES

1. Connectors shall be pre-engineered pre-manufactured devices, approved by the Building Official and installed in accordance with the manufacturer's instructions.

2. Connectors protected from weather shall be provided with a minimum of G90 zinc coating in accordance with ASTM A653. Connectors exposed to weather or in contact with preservative treated wood shall be provided with a minimum hot-dipped galvanized coating or 0.050" coating in accordance with ASTM A653, and fasteners shall conform to ASTM A153.

3. Connectors shall conform to the type and size specified in these drawings.

4. Connectors required by the Earthquake Retrofit Schedule shall be distributed equally along the length of each wall line or within the length of the braced wall panel.

5. Connector spacing shall not be less than 8” on center.

6. Reinforce nail or screw 1/2-inch minimum when installing connectors over wood structural panels.

L. POST-INSTALLED ANCHORS

1. Post-installed anchors shall be installed in accordance with the manufacturer's installation instructions.

2. Adhesive anchors shall be Simpson Strong-Tie S-TP, H-171 RE 500 50, C-64 EL 7000U, or approved equivalent.

3. Concrete screws shall be Simpson Strong-Tie Titan HD, KC Metak Willie-HUS-EZ, or Powers Fasteners Wedge-It, or approved equivalent.

4. See for a list of additional anchor bolt requirements.

M. PROPRIETARY SHEAR WALLS

1. Proprietary shear walls shall be prefabricated wood shear panels or prefabricated cold-formed steel shear panels complying with the requirements of ICC-ES AC495, FEMA P-795, or shall have been tested in accordance with ST-198 in a manner and with documentation acceptable to the building official.

2. Proprietary Shear Walls shall be installed in accordance with the manufacturer’s installation instructions and the provisions of this Plan Set.

N. PERMITS

1. All work required by this Plan Set shall be permitted through the building department.

O. INSPECTIONS

1. Contractor shall coordinate with the building inspector to ensure that work is acceptable for Building Department inspections, and shall correct non-compliant work as identified by the inspector.

P. SPECIAL INSPECTIONS

1. Special inspection by a third party inspector approved by the Building Official shall be provided for the following:
   a. Welding of structural steel
   b. Special inspection by a third party inspector is not required for the following:
      a. Concrete or reinforcing steel for foundations. Design is based on an ultimate concrete strength of 2500 psi or less.
      b. Installation of cast-in-place or post-installed anchor bolts.
      c. Installation of adhesive anchors for tie-down devices, provided that each anchor is torque-tested in accordance with Table R2, Sheet 52.
      d. Nailing of wood structural panel sheath walls, provided a building department inspection is performed.

Title: Sheet: S1

FEMA P-1100, Volume 2 - Plan Sets
Issued: SEP 2019

Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings (Plan Set)
Q. PURPOSE OF SUPPLEMENTAL TECHNICAL NOTES
1. These Supplemental Technical Notes provide guidance for the installation of wood structural panel shear walls that use tie-downs at existing foundation systems. Tie-downs shall be used where specified in the Earthquake Retrofit Schedules.
2. Where “New Fdn Req’d?” response is NO but a “Tie-down” TD1 is listed in the Earthquake Retrofit Schedules - Wood Structural Panel Shear Walls sheets, additional visual verification and testing of the existing foundation system is required to be completed by the owner or general contractor and approved by the Building Official and documented in Table R-1 prior to commencing any work. Visual verification and testing shall be as noted in Section R.
3. Where these requirements are not met, a new foundation system will be required in accordance with Sheet D2.

R. EXISTING FOUNDATION REQUIREMENTS AND TESTING
1. The size of existing foundation systems at the location of new tie-down anchors shall be verified to be at least 15” deep (“D”) and 8” wide (“W”). The dimension “D” shall be measured from the bottom of footing to the underside of the existing mudsill. The dimension “W” shall be measured from the top outside face of footing to the inside top face of footing. See Table R-1, item A.1.
2. Verification of the overall quality of concrete along any wall line requiring tie-downs shall be made and documented within Table R-1, item B.1. This verification shall be made by use of a minimum of two sacrificial torque tests along each wall line where tie-downs are used. These tests shall consist of installing 1/2” or 5/8” diameter screw-type bolts into the existing concrete and verifying that a value per Table R-2 can be achieved. Torque tests can be performed either by the owner, a general contractor, or a special inspection company or testing agency hired by the owner and as approved by the Building Official.
3. Where “Tie-downs” are used to determine the sheathed panel length required along a wall line, each adhesive anchor shall be torque tested in accordance with Table R-2.

S. TIE-DOWN REQUIREMENTS
1. Tie-downs shall be Simpson HDU2-SDS2,5, KC Metals ADST2, USP Structural Connectors PHD2A, or an equivalent with an allowable tensile load of 3075 lbs or more, installed per manufacturer’s instructions.
2. End stud(s) to which tie-downs are installed, shall be 3x minimum or double 2x. For nailing at double studs, see Sheet D4.
3. All tie-downs shall use 5/8” (A36) threaded rod adhesive-type anchors with minimum embedment per Detail 1, Sheet D5.

T. MINIMUM INSTALLATION REQUIREMENTS FOR TIE-DOWN ANCHORS
1. All holes shall be drilled to the specified diameter and depth.
2. All holes shall be blown clean of dust with oil-free compressed air for a minimum of 4 seconds.
3. All holes shall be cleaned with a nylon brush for a minimum of 4 cycles.
4. Blow holes clean of dust with oil-free compressed air for a minimum of 4 seconds.
5. Check adhesive cartridge expiration date, open and install per the manufacturer’s instructions.
6. Fill the holes 1/2 to 2/3 full, starting at the bottom of the hole to prevent air pockets and withdraw the nozzle as the hole fills up.
7. Insert a clean and oil-free anchor turning slowly until the anchor contacts the bottom of the hole.
8. Do not disturb the anchor until fully cured. See manufacturer’s instructions.

Table R-1: Verification of Existing-Foundation System

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Yes or N/A</th>
<th>Signature of Owner or Contractor (Owner performing work)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.1</td>
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<tr>
<td>C.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table R-2: Foundation Verification Requirements

<table>
<thead>
<tr>
<th>Diameter ø</th>
<th>Screw Anchor Torque (ft-lbs)</th>
<th>Adhesive Anchor Torque (ft-lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8”</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>1”</td>
<td>50</td>
<td>30</td>
</tr>
</tbody>
</table>
Seismic Design Category (SDC) and Building Retrofit/Configuration Type

1. Determine the Seismic Design Category (SDC) of your property based on the appropriate Earthquake Strengthening:
   a. Site seismicity or S
   b. Building retrofit configuration type

2. To find appropriate S
   a. Go to the USP Structural Connectors:
   b. Locate your SDC (SDC 3, 4, 5) by the color contrast shown on the map which corresponds to the % g values shown.
   c. For SDC D, use S
   d. For SDC E, use S
   e. For SDC F, use S
   f. Note: Where your location is on, or close to, the border of two SDCs, it is prudent to choose the higher value.

3. Determine building retrofit/configuration type: Does the dwelling have a ground floor residential unit? See Figure 3.
4. Find the corresponding S
   a. Site seismicity or S
   b. Building retrofit/configuration type
   c. Use Figure 3 to determine the appropriate retrofit schedule.

5. The USP Structural Connectors listed within a particular group (e.g. Type B) may be used for strengthening the particular condition.
6. The connectors listed within the applicable Earthquake Retrofit Schedules will not fit within a particular wall line due to limitations in length, alternate configurations may be substituted but shall be designed and selected by a Registered Design Professional and approved by the Building Official.

**Weight Classification**

This worksheet is used to determine the general weight classification of your home's construction:
1. Check the box of the material that most closely matches your home’s finishes.
2. Note the Weight Classification result for use in the Earthquake Retrofit Schedules, Sheets D1 thru D8.1
3. Any of the connectors listed within a particular group (e.g. Type B) may be used for strengthening the particular condition.
4. This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group.

**TIE-DOWNS**

(Supplemental Technical Notes, Sheet S2, Section S)

- **Type S1**
  - Simpson Strong-Tie
  - KC Metals
  - USP Structural Connectors

- **Type S2**
  - Simpson Strong-Tie
  - KC Metals
  - USP Structural Connectors

**ANCHOR BOLTS**

- **Type S1**
  - Simpson Strong-Tie
  - KC Metals
  - USP Structural Connectors

- **Type S2**
  - Simpson Strong-Tie
  - KC Metals
  - USP Structural Connectors
**EARTHQUAKE RETROFIT SCHEDULE (S3.0-1.0) for Single Section of Wall**

**MINIMUM REQUIRED LENGTH OF A SINGLE SECTION OF WALL OF WOOD STRUCTURAL PANEL SHEAR WALLS** (at each wall line)

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>8d Nail Spacing</th>
<th>Wall Length</th>
<th>Tie-down</th>
<th>New Fm'd Req'd?</th>
<th>Wall Length</th>
<th>Tie-down</th>
<th>New Fm'd Req'd?</th>
<th>Wall Length</th>
<th>Tie-down</th>
<th>New Fm'd Req'd?</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>6 16'-0&quot; 12'-6&quot;</td>
<td>TDI</td>
<td>No</td>
<td>5'-0&quot;6'-6&quot;</td>
<td>TDI</td>
<td>No</td>
<td>5'-0&quot;6'-6&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>5'-0&quot;6'-6&quot;</td>
</tr>
<tr>
<td>1000</td>
<td>6 19'-0&quot; 15'-6&quot;</td>
<td>TDI</td>
<td>No</td>
<td>6'-6&quot;7'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>6'-6&quot;7'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>6'-6&quot;7'-0&quot;</td>
</tr>
<tr>
<td>1200</td>
<td>6 22'-0&quot; 18'-6&quot;</td>
<td>TDI</td>
<td>No</td>
<td>7'-0&quot;8'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>7'-0&quot;8'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>7'-0&quot;8'-0&quot;</td>
</tr>
<tr>
<td>1500</td>
<td>6 25'-0&quot; 23'-0&quot;</td>
<td>TDI</td>
<td>No</td>
<td>8'-0&quot;9'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>8'-0&quot;9'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>8'-0&quot;9'-0&quot;</td>
</tr>
<tr>
<td>2000</td>
<td>4 31'-0&quot; 31'-0&quot;</td>
<td>None</td>
<td>No</td>
<td>21'-6&quot;25'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>21'-6&quot;25'-0&quot;</td>
<td>TDI</td>
<td>Yes</td>
<td>21'-6&quot;25'-0&quot;</td>
</tr>
</tbody>
</table>

**FOUNDATION SILL ANCHORAGE**

- Min. No. of Foundation Connectors or Anchors at Each Wall Panel
- Min. No. of Connectors at Each Wall Panel

**FLOOR FRAMING TO WALL CONNECTION**

- Type "A" or "B" Connector
- Type "C" Connector

**INSTRUCTIONS**

1. Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine "Weight Category".
2. Find the home's Area "B" x "L" (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
3. Determine the weight of, or "Category". Where "None" occurs, no tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.

**Connectors at Each Wall Panel**

- Type "A" Connector
- Type "B" Connector
- Type "C" Connector

- Minimum required number of Fm "Anchor Anchors per wall line ______

- 3. Foundations: Where new foundations are required at front and back walls, see Sheet D3 for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provides foundation that extend the full depth of the garage in Figures 4 and 5 on Sheet S0 and for Figure 3 conditions (living-space-over-georges dwelings without ground floor residential unit) consult a Registered Design Professional for remedial action.

- 4. Connector Type "F" should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.

- Any of the connectors listed within a particular group and shown on Sheet S3 may be used for strengthening the particular condition.

- This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group. Cells marked "NO" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable space where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

- Wall lengths are total length of a single wall section required on each side of the building. See Sheet S3.2-1.0 for 2 section of wall options.

- See Sheet S3.3-1.0 for Alternates Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

- See Sheets S3.4-1.0 thru S3.6-1.0 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.

**Notes**

- 1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.

- 2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.

- 3. Foundations: Where new foundations are required at front and back walls, see Sheet D3 for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provides foundation that extend the full depth of the garage in Figures 4 and 5 on Sheet S0 and for Figure 3 conditions (living-space-over-georges dwelings without ground floor residential unit) consult a Registered Design Professional for remedial action.

- 4. Connector Type "F" should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.

- Any of the connectors listed within a particular group and shown on Sheet S3 may be used for strengthening the particular condition.

- This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group. Cells marked "NO" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable space where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

- Wall lengths are total length of a single wall section required on each side of the building. See Sheet S3.2-1.0 for 2 section of wall options.

- See Sheet S3.3-1.0 for Alternates Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

- See Sheets S3.4-1.0 thru S3.6-1.0 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.
### EARTHQUAKE RETROFIT SCHEDULE (S_DS = 1.0) Two Sections of Wall

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>Minimum Total Required Length of Each Section of Wood Structural Panel Shear Wall</th>
<th>Min. No. of Foundation Connectors or Anchors at Each Section of Wall</th>
<th>Min. No. of Connectors at Each Section of Wall</th>
<th>Type “A” Connector</th>
<th>Type “B” Connector</th>
<th>Type “C” Connector</th>
<th>Type “D” Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>9’-6” TDI No 3’-0” TDO Yes</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1000</td>
<td>9’-0” TDI No 3’-6” TDO Yes</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>1200</td>
<td>8’-6” TDI No 4’-0” TDO Yes</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>1500</td>
<td>12’-0” TDI No 5’-0” TDO Yes</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>2000</td>
<td>15’-0” None No 6’-6” TDO Yes</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2000</td>
<td>8’-0” TDI No 3’-6” TDO Ys</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>1000</td>
<td>10’-0” TDI No 4’-6” TDO Yes</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1500</td>
<td>12’-0” TDI No 5’-0” TDO Yes</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>2000</td>
<td>15’-0” TDI No 6’-0” TDO Yes</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>2000</td>
<td>20’-0” None No 8’-0” TDO Yes</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>9</td>
<td>11</td>
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</tr>
<tr>
<td>2000</td>
<td>16’-0” None No 11’-0” TDO Yes</td>
<td>7</td>
<td>11</td>
<td>15</td>
<td>12</td>
<td>8</td>
<td>19</td>
</tr>
</tbody>
</table>

**Notes:**
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per section of wall, placed within the length of strengthening where possible. Total number of anchor bolts and connectors shall equal the number shown in the schedule. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where “None” occurs, no tie-down is required.
3. Foundations: Where new foundations are required at front and back walls, see Sheet S2 for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, professional engineers that extend the full depth of the garage in Figures 4 and 5 on Sheet S0 and for Figure 3 conditions (live-spar under-garage dowels without ground floor residential unit), consult a Registered Design Professional for remedial direction.
4. Connector Type “F” should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types “D” or “E” impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set developed using the lowest rated manufacturer’s capacity within a particular group. Casts marked “NOS” on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are total length of wall required on each side of the building. You may use 2 sections of wall per line based on existing building conditions but each section must be at least 3 feet long and each individual section shall not be greater than 55% of the total required length. (See Figure D-6 on Sheets S0).
8. See Sheet S3.3-1.0 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where structural panel shear wall retrofit installations are otherwise prohibited.
9. See Sheets S3.4-1.0 thru S3.6-1.0 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S5, Figure 2.

### RETROFIT SUMMARY

1. Retrofit requirements at each section of wall, per wall line: (check box if tie-down and/or new footing will be used on that line)
   - Front Wall
   - Back Wall
   - Left Side Walls
   - Right Side Walls
   - Nailing
   - Type “A” Connector
   - Type “B” Connector
   - Type “F” Connector
   - Type “G” Connector

2. New Foundation Sill Anchorage to be used: (check all that apply)
   - Bolt Diameter: 5/8” or 7/8”
   - Adhesive or Screw
   - Type “A” Connector
   - Type “B” Connector
   - Type “C” Connector
   - Type “D” Connector
   - Minimum required number of Sill Anchors at each section of wall, per wall line ________

3. Floor Framing Connectors (to Top Plates) to be used: (check all that apply)
   - Type “D” Connector
   - Type “F” Connector
   - Type “E” Connector
   - Minimum required number of Floor Framing Connectors at each section of wall, per wall line ________

4. Check this box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

### Supplemental Earthquake Retrofit Schedule

- Check if this Sheet is supplemental to sheet S3.1, otherwise check if additional retrofit schedules are required:
  - S3.2-1.0
  - S3.4-1.0
  - S3.6-1.0
  - S3.3-1.0
  - S3.5-1.0
# Earthquake Retrofit Schedule ($S_{DS} = 1.0$)

## Steel Column Retrofit

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>Steel Column</th>
<th>Column Connection Type (per detail 2 on sheet D7 at Upper Floor)</th>
<th>Minimum Required at Allowable Shear Capacity (Pounds)</th>
<th>Edge Nail Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>W8x21</td>
<td>C1</td>
<td>3250</td>
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<tr>
<td>1200</td>
<td>W8x28</td>
<td>C1</td>
<td>4870</td>
<td>6</td>
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<td>2000</td>
<td>W10x30</td>
<td>C2</td>
<td>8120</td>
<td>6</td>
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</table>

## Proprietary Shear Wall Retrofit

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>Proprietary Shear Wall</th>
<th>Minimum Required at Allowable Shear Capacity (Pounds)</th>
<th>Edge Nail Spacing</th>
</tr>
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<tbody>
<tr>
<td>800</td>
<td>W8x28</td>
<td>4200</td>
<td>6</td>
</tr>
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<td>1000</td>
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<td>1200</td>
<td>W10x35</td>
<td>6300</td>
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</tr>
<tr>
<td>2000</td>
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<td>10,500</td>
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## Diaphragm Nailing

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>Diaphragm Nailing</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
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</tr>
<tr>
<td>1000</td>
<td></td>
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<tr>
<td>1200</td>
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<tr>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 4 & 5 on Sheet D7 for footing details at proprietary shear wall.
5. See details 1 & 2 on Sheet D8 for footing details at proprietary shear wall.

---

**INSTRUCTIONS**

1. Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine “Weight Category”.
2. Find the home's Floor Area “B” x “L” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
   a. Approximate floor area: _____________
3. Check the box that matches your home's area per (3). You will use information in this row of the schedule to select the steel column size and connection type or proprietary shear wall required.
4. Determine minimum required allowable shear capacity to be used in selection of a proprietary shear wall. Note that more than one shear wall panel may be needed to obtain the required shear capacity. Consult manufacturer’s load tables for final selection.
5. See details 1 & 2 on Sheet D7 for steel column connections at upper floor. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.
6. Complete retrofit summary below.

---

**Retrofit Summary**

- Steel Column
  - At front wall: _____________
  - Column Size: _____________
  - Connection: _____________
  - Diaphragm Nailing: _____________
  - At back wall: _____________
  - Column Size: _____________
  - Connection: _____________
  - Diaphragm Nailing: _____________

- Proprietary Shear Wall
  - At front wall: _____________
    - Required Capacity: _____________
    - MFR Size: _____________
    - Diaphragm Nailing: _____________
  - At back wall: _____________
    - Required Capacity: _____________
    - MFR Size: _____________
    - Diaphragm Nailing: _____________

---

**Additional Earthquake Retrofit Schedule (Steel Column or Proprietary Shear Wall)**

- S3.1-1.0
- S3.2-1.0
- S3.3-1.0
- S3.4-1.0
- S3.5-1.0

---

**Supplemental Earthquake Retrofit Schedule**

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - S3.1-1.0
   - S3.2-1.0
   - S3.3-1.0
   - S3.4-1.0
   - S3.5-1.0
**EARTHQUAKE RETROFIT SCHEDULE (Sds = 1.0) for Single Section of Wall at Front of Garage - Only**

**Instructions**

1. Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine "Weight Category".
2. Find the home's Floor Area "B" x "L" (See Figures D3 thru D5) in the schedule, this number should be as large as the number listed below. Do not use a smaller number, even if it is closer.
   - a. Approximate floor area ________ ft
3. Determine the length of wall framing required. The columns contain the length of required framing, including options for bracing without tie-downs, with tie-downs into existing foundations and tie-downs to new foundations, see schedule note 3.
4. Determine the number of Foundation Sill Connectors or Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2" or 5/8" anchor bolts. (d = diameter of the bolts) See Sheet S3.
5. Determine the number of Floor to Wall Connectors. The columns indicate how many framing connectors are required, depending on whether you use Types D, E, F, or G. See Sheet S3.
6. Complete the Retrofit Summary for your project. Fill in the lengths found in the schedule notes 6 and 7. If no option is available, see Schedule Notes 6 and 7. Check the boxes for tie-downs: If your foundation meets the criteria, you may choose the tie-down type to use. If you intend to use tie-downs, check the box for tie-downs after each wall line you plan to use. Check the box on line 4, and read the Supplemental Technical Notes for additional information.
7. Include Earthquake Retrofit Schedule Sheets S3.1-1.0 thru S3.6-1.0 where applicable. See sheet S3, Figure 2 and schedule notes 6 and 7.

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>No Tie-down</th>
<th>Tie-downs in Existing or New Foundations</th>
<th>Wall Anchorage</th>
<th>Tie-downs to Wall</th>
<th>Wall Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ft</td>
<td>New Fnd Req'd</td>
<td>New Fnd Req'd</td>
<td>New Fnd Req'd</td>
<td>New Fnd Req'd</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>6</td>
<td>10'-4&quot;</td>
<td>6'-0&quot;</td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td>1000</td>
<td>6</td>
<td>11'-4&quot;</td>
<td>8'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td>1200</td>
<td>6</td>
<td>13'-4&quot;</td>
<td>9'-0&quot;</td>
<td>T2D</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td>1500</td>
<td>6</td>
<td>15'-4&quot;</td>
<td>11'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td>2000</td>
<td>6</td>
<td>19'-4&quot;</td>
<td>15'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2D</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes:
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.
3. Foundations: Where new foundations are required, see Sheet S2 for details.
4. Connector Type "F" should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group. Cells marked "N/A" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substituting can only be made by a Registered Design Professional.
7. Wall lengths are total length of a single wall section required. See Sheet S3.5-1.0 for 2 section of wall options.
8. See Sheet S3.6-1.0 for Alternate Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

**RETROFIT SUMMARY**

1. Required length of strengthening at garage front wall line: (check box if tie-downs will be used on that line)
   - Front Wall with Tie-Down Type "A" Connector
   - Front Wall without Tie-Down
2. New Foundation Sill Anchorage to be used: (check all that apply)
   - Type "A" Connector
   - Type "B" Connector
   - Minimum required number of Sill Anchors per wall line
3. Floor Framing Connectors (to Foundation Sill or to Top Plate) to be used: (check all that apply)
   - Type "D"
   - Type "E"
   - Minimum required number of Floor Framing Connectors per wall line
4. □ Check this box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

**Supplemental Earthquake Retrofit Schedule**

1. Check boxes if additional Earthquake Retrofit Schedules are included:
   - S3.2-1.0
   - S3.4-1.0
   - S3.6-1.0
   - S3.9-1.0
   - S3.9-1.0
EARTHQUAKE RETROFIT SCHEDULE (SDF = 1.0) Two Sections of Wall at Front of Garage - Only

MINIMUM TOTAL REQUIRED LENGTH OF EACH SECTION OF WOOD STRUCTURAL PANEL SHEAR WALLS For a Two Section of Wall Option

<table>
<thead>
<tr>
<th>Bld at 6’ O.C.</th>
<th>Bld at 24” O.C.</th>
<th>Type “A”</th>
<th>Type “B”</th>
<th>Type “C”</th>
<th>1/2” Bolt</th>
<th>5/8”a” Bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Length</td>
<td>Tie-down</td>
<td>New Fdn</td>
<td>Tie-down</td>
<td>New Fdn</td>
<td>Rod’d?</td>
<td>Rod’d?</td>
</tr>
<tr>
<td>800</td>
<td>3’-6”</td>
<td>TD1</td>
<td>No</td>
<td>2’-8”</td>
<td>TD2</td>
<td>Yes</td>
</tr>
<tr>
<td>1000</td>
<td>4’-0”</td>
<td>TD1</td>
<td>No</td>
<td>2’-8”</td>
<td>TD3</td>
<td>Yes</td>
</tr>
<tr>
<td>1200</td>
<td>4’-0”</td>
<td>TD1</td>
<td>No</td>
<td>2’-8”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>1500</td>
<td>6’-0”</td>
<td>TD1</td>
<td>No</td>
<td>3’-0”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>2000</td>
<td>8’-0”</td>
<td>TD1</td>
<td>No</td>
<td>3’-0”</td>
<td>TD5</td>
<td>Yes</td>
</tr>
<tr>
<td>800</td>
<td>4’-0”</td>
<td>TD2</td>
<td>Yes</td>
<td>2’-8”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>1000</td>
<td>5’-0”</td>
<td>TD2</td>
<td>Yes</td>
<td>2’-8”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>1200</td>
<td>6’-0”</td>
<td>TD2</td>
<td>Yes</td>
<td>3’-0”</td>
<td>TD4</td>
<td>Yes</td>
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<tr>
<td>1500</td>
<td>7’-6”</td>
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<td>3’-6”</td>
<td>TD5</td>
<td>Yes</td>
</tr>
<tr>
<td>2000</td>
<td>10’-0”</td>
<td>TD2</td>
<td>Yes</td>
<td>4’-0”</td>
<td>TD5</td>
<td>Yes</td>
</tr>
<tr>
<td>800</td>
<td>5’-8”</td>
<td>TD1</td>
<td>No</td>
<td>2’-8”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>1000</td>
<td>6’-0”</td>
<td>TD1</td>
<td>No</td>
<td>3’-6”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>1200</td>
<td>8’-0”</td>
<td>TD1</td>
<td>No</td>
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<td>TD4</td>
<td>Yes</td>
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<tr>
<td>1500</td>
<td>10’-0”</td>
<td>None</td>
<td>No</td>
<td>4’-0”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
<tr>
<td>2000</td>
<td>13’-0”</td>
<td>None</td>
<td>No</td>
<td>5’-6”</td>
<td>TD4</td>
<td>Yes</td>
</tr>
</tbody>
</table>

MINIMUM TOTAL REQUIRED LENGTH

<table>
<thead>
<tr>
<th>Wall Length</th>
<th>Tie-down</th>
<th>New Fdn</th>
<th>Tie-down</th>
<th>New Fdn</th>
<th>Rod’d?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bld at 6’ O.C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1’-0”</td>
<td>Yes</td>
<td>1’-0”</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>1500</td>
<td>1’-0”</td>
<td>Yes</td>
<td>1’-0”</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>2000</td>
<td>1’-0”</td>
<td>Yes</td>
<td>1’-0”</td>
<td>Yes</td>
<td>2</td>
</tr>
</tbody>
</table>

Minimum required number of Sill Anchors per wall line ______________

Minimum required number of Floor to Wall connectors ______________

Minimum required number of Foundation Sill Connectors or Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2” or 5/8” anchor bolts. (d = diameter of the bolts.) See Sheet S3.

Determine the number of Sill Anchors or Connectors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2” or 5/8” anchor bolts. (d = diameter of the bolts.) See Sheet S3.

2. TD1 - TD5: Foundation Sill Anchorage to be used: (check all that apply)
   - Type “A” Connector
   - Type “B” Connector
   - Type “C” Connector
   - Type “D” Connector
   - Type “E” Connector
   - Type “F” Connector
   - Type “G” Connector

3. Foundation: Where new foundations are required, see Sheet D2 for details.

4. Connector Type “F” should be used as an alternative only if data is blocked on both sides and where accessibility makes the use of Types “D” or “E” impractical.

5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.

6. This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked “ND” on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

7. Wall lengths are minimum length of each wall section required on the garage front wall line.

8. See Sheet S3.6-1.0 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

INSTRUCTIONS

1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category”.

2. Find the home’s Floor Area “B” x “C” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
   - Approximate floor area ________

3. Check the box that matches your home’s area per INSTRUCTIONS-1. You will use information in this row of the schedule to determine length of plywood bracing panels, railing requirements, quantities of hardware, etc.

4. Determine the length of plywood bracing required. The columns contain the length of required bracing, including options for bracing without tie-downs, with tie-downs, and as shown on Sheet S3 (Refer to Step 1 of the Earthquake Retrofit Schedule at front of garage only in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when designing or constructing a building for an earthquake, and a level of uncertainty when designing or constructing a building for an earthquake, and a level of uncertainty when designing or constructing a building for an earthquake.

5. Determine the number of Foundation Sill Connectors or Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2” or 5/8” anchor bolts. (d = diameter of the bolts.) See Sheet S3.

6. Complete the Retrofit Summary for your project. Fill in the lengths found in the table for each line. If a Foundation Sill Anchor is required, check the box on line 4, and read the Supplemental Technical Notes for additional information.

7. Include Earthquake Retrofit Schedule Sheets S3.1-1.0 thru S3.6-1.0 where applicable. See sheet S3, Figure 2 and schedule note 6 and 7.

RETROFIT SUMMARY

1. Required length of each section of strengthening wall line: check box if tie-downs will be used on that line
   - Front Wall ___ ft with Tie-Down Type ______
   - Front Wall ___ ft without Tie-Down

2. New Foundation Sill Anchors to be used: (check all that apply)
   - Bolts: Diameter: _____ Adhesive: _____ Screw: _____
   - Type “A” Connector
   - Type “B” Connector
   - Type “C” Connector
   - Minimum required number of Sill Anchors per wall line ______

3. Floor Framing Connectors to Foundation Sill or to Top Plate to be used: (check all that apply)
   - Type “D”
   - Type “E”
   - Minimum required number of Floor Framing Connectors per wall line ______

4. Check box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

Supplemental Earthquake Retrofit Schedule

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - S3.1-1.0
   - S3.3-1.0
   - S3.6-1.0
INSTRUCTIONS

1. Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine "Weight Category".

2. Find the home's Floor Area "B" x "L". (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
   a. Approximate floor area

3. Check the box that matches your home's area per \( S \). You will use information in this row of the schedule to steel column size and connection type or proprietary shear wall required.

4. Determine size of steel column and connection detail or see \( D \) on Sheet D7 for steel column connections at upper floor.

5. Determine minimum required allowable shear capacity to be used in selection of a proprietary shear wall. Consult manufacturer’s load tables for final selection. Note that more than one shear wall panel may be needed to obtain the required shear capacity. Consult manufacturer’s load tables for final selection.

6. See details 1 & 2 on sheet D7 for steel column connections at upper floor. See details 1 & 2 on sheet D8 for upper floor connection at proprietary shear wall.

7. Complete retrofit summary below.

EARTHQUAKE RETROFIT SCHEDULE ($S_{DR} = 1.0$) at front of Garage

<table>
<thead>
<tr>
<th>WEIGHT CLASSIFICATION</th>
<th>Floor Area in Square Feet</th>
<th>Steel Column Type</th>
<th>Minimum Required at Allowable Shear Capacity (lbs)</th>
<th>Edge Nail Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Construction</td>
<td>800 W8x21 C1</td>
<td>1620</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Light Construction</td>
<td>1000 W8x21 C1</td>
<td>2030</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1200 W8x21 C1</td>
<td>2440</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1500 W8x21 C1</td>
<td>3050</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2000 W8x21 C1</td>
<td>4060</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Heavy Construction</td>
<td>800 W8x21 C1</td>
<td>2100</td>
<td>6</td>
<td></td>
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<td></td>
<td>1000 W8x21 C1</td>
<td>2630</td>
<td>6</td>
<td></td>
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<td></td>
<td>1200 W8x21 C1</td>
<td>3150</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1500 W8x21 C1</td>
<td>3940</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2000 W8x28 C1</td>
<td>5250</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 1, 2 & 4 on Sheet D7 for footing details at proprietary shear wall.
5. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.

Retrofit Summary

Steel Column
- At front wall
  - Column Size
  - Connection
  - Diaphragm Nailing
- At back wall
  - Column Size
  - Connection
  - Diaphragm Nailing

Proprietary Shear Wall
- At front wall
  - Req'd Capacity
  - MFR/ Size
  - Diaphragm Nailing
- At back wall
  - Req'd Capacity
  - MFR/ Size
  - Diaphragm Nailing

Supplemental Earthquake Retrofit Schedule

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - S3.1-1.0
   - S3.3-1.0
   - S3.5-1.0
   - S3.2-1.0
   - S3.4-1.0
## Earthquake Retrofit Schedule (S_Ds = 1.2) for Single Section of Wall

### Instructions
1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category.”
2. Find the home’s Floor Area “F” x “L” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
   - A. Approximate floor area

### Foundation Sill Anchorage
- The minimum number of Foundation Anchors or Connectors at each Wall Panel is required. Check the box that matches your home’s area per line 4, and read the Supplemental Technical Notes for additional information.

### Floor Framing Connections
- The minimum number of Connectors at each Wall Panel is required. Check the box that matches your home’s area per line 4, and read the Supplemental Technical Notes for additional information.

### BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS
- New Foundation Sill Anchors to be used: (check all that apply)

### RETROFIT SUMMARY

## Earthquake Retrofit Schedule - Wood Structural Walls

### Retrofit of Existing Single-Story Wood Structural Walls

- BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS

<table>
<thead>
<tr>
<th>Foundation Sill Anchorage</th>
<th>Min. No. of Anchors/Connectors at Each Wall Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. No. of Anchors/Connectors</td>
<td>Check the box that matches your home’s area per line 4, and read the Supplemental Technical Notes for additional information.</td>
</tr>
</tbody>
</table>

### Foundation Sill Anchors

#### New Foundation Sill Anchors to be used:
- (check all that apply)

### Tie-Downs

#### Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.

### RETROFIT SUMMARY

- New Foundation Sill Anchors to be used: (check all that apply)
- Type “A” Connector
- Type “B” Connector
- Type “C” Connector
- Type “D” Connector
- Type “E” Connector
- Minimum required number of Sill Anchors per wall line

### Foundation Tie-Downs

- New Foundation Tie-Downs: (check all that apply)
- Type “A”
- Type “B”
- Type “C”
- Type “D”
- Minimum required number of New Foundation Connectors per wall line

### Additional Earthquake Retrofit Schedule

- Check boxes if additional Earthquake Retrofit Schedules are included.

### Notes
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where “None” occurs, no tie-down is required.
3. Foundations: Where new foundations are required at front and back walls, see Sheet D2 for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provide foundations that extend the full depth of the garage in Figures 4 and 5 on Sheet S0 and for Figure 3 conditions (two-story or multi-story residential buildings). Note: See Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where “None” occurs, no tie-down is required.
4. Connector Type “F” should be used as an alternative only if posts are blocked on both sides and where accessibility makes the use of Types “D” or “E” impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked “None” on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are total length of a single wall section required on each side of the building. See Sheet S3.1-1.2 for 2 section of wall options.
8. See Sheet S3.1-1.2 for Alternate Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel sheath wall retrofit installations are otherwise prohibited.
9. See Sheets S3.1-1.2 thru S3.6-1.2 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.
EARTHQUAKE RETROFIT SCHEDULE (S = 1.2) Two Sections of Wall

1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per section of wall, placed within the length of strengthening where possible. Total number of anchor bolts and connectors shall equal twice the number shown in the schedule. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.

2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to increase the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-downs are required.

3. Foundations: Where new foundations are required at front and back walls, see Sheet S2D for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provide foundations that extend the full depth of the garage in Figures 4 and 5 on Sheet S2D for Figure 3 conditions (driveway-over-garage dwellings without ground floor residential unit), consult a Registered Design Professional for remedial direction.

4. Connector Type "F" should be used as an alternative if tie-downs are required at the outside joints between the garage and driveway and where accessibility permits the use of Type "D" or "E" impractical.

5. Any of the connectors listed within a particular group and shown on Sheet S3 may be used for strengthening the particular condition.

6. This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group. Cables marked "NO" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

7. Wall lengths are total length of wall required on each side of the building. You may use 2 sections of wall per line based on existing building conditions but each section must be at least 3 ft long and each individual section shall not be greater than 55% of the total required length. (See Figures D-6 on Sheets S3.

8. See Sheet S3.3-1.2 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

9. See Sheets S3.4-1.2 thru S3.4-1.2 for Earthquake Retrofit Schedules for front wall only at dwellings with a ground story residential unit. See also Sheet S5, Figure 2.

MINIMUM TOTAL REQUIRED LENGTH OF EACH SECTION OF WOOD STRUCTURAL PANEL SHEAR WALL FOR A Two Sections of Wall Option

Length per Section for a Two Section Option

Wall Length Tie-down New Fdn Req’d? Wall Length Tie-down New Fdn Req’d?

800 7’4” TDI No 3’6” TDI Yes

1000 9’4” TDI No 4’2” TDI Yes

1200 11’6” TDI No 4’8” TDI Yes

1500 14’0” TDI No 6’0” TDI Yes

2000 19’0” None No 7’4” TD4 Yes

2000 19’0” None No 8’0” TD4 Yes

5 12’0” TDI No 5’0” TD4 Yes

1000 16’0” None No 6’4” TD4 Yes

2000 24’6” None No 10’0” TD4 Yes

800 12’6” None No 5’0” TD4 Yes

1000 16’0” None No 6’4” TD4 Yes

1200 19’6” None No 8’0” TD4 Yes

1500 24’0” None No 9’4” TD4 Yes

2000 “NO” None No 13’0” TD3 Yes

Min. No. of Foundation Connectors or Anchors at Each Section of Wall

Type “A” Type “B” Type “C” 1/2”Ø Bolt 5/8”Ø Bolt Type “E” or “F” Type “G”

8 21 22 Yes

3 6 3 Yes

2 6 6 6 Yes

4 7 7 7 Yes

2 6 4 6 Yes

4 6 6 5 5 Yes

5 9 11 9 9 Yes

7 10 14 11 11 Yes

9 13 18 15 15 Yes

10 16 17 15 15 Yes

21 23 28 21 21 Yes

INSTRUCTIONS

1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category”.

2. Find the home’s Floor Area “B” x “L” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.

   a. Approximate floor area

3. Check the box that matches your home’s area per (a). You will use information in this row of the schedule to determine length of plywood/structural panel, nailing requirements, quantities of hardware, etc.

4. Determine the length of plywood bracing required. The columns contain the length of required bracing, including options for bracing without tie-downs, with tie-downs into existing foundations and tie-downs w/ new foundations, see schedule Note 3. Follow the row across from the total floor area that you checked for your home (in Step 3) to find the bracing length for each side of the house (front, back, left side, right side).

5. Determine the number of Foundation sill Connectors or Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2”Ø or 5/8”Ø anchor bolts. (ø = diameter of the bolt.) See Sheet S3.

6. Determine the number of Floor to Wall connectors. The columns indicate how many framing connectors are required, depending on whether you use Types D, E, F, or G. See Sheet S3.

7. Complete the Retrofit Summary for your project. Fill in the lengths found in (b) for each wall. If no option is available, see Schedule notes 6 & 7. Check the box for the anchor and connector types you plan to use. If you intend to use tie-downs, check the box for floor to down anchors on each wall line you plan to use them for. Check the box on line 4, and read the Supplemental Technical Notes for additional information.

8. Include Earthquake Retrofit Schedule Sheets S3.1-1.2 thru S3.6-1.2 where applicable. See sheet S3. Figure 2 and schedule notes 6 thru 8.

RETROFIT SUMMARY

1. Retrofit requirements at each section of wall, per wall line (check box if tie-downs and/or new footing will be used on that line)

   a. Front Wall _______f □ Nailing: 6d at ___ O.C. □ Tie-Down Type ________g□ New Fig

   b. Back Wall _______f □ Nailing: 6d at ___ O.C. □ Tie-Down Type ________g□ New Fig

   c. Left Side Walls _______f □ Nailing: 6d at ___ O.C. □ Tie-Down Type ________g□ New Fig

   d. Right Side Walls _______f □ Nailing: 6d at ___ O.C. □ Tie-Down Type ________g□ New Fig

2. New Foundation Sill Anchors to be used (check all that apply)

   a. Type "A" Connector □ Type "B" Connector

   b. Type "D" Connector □ Type "E" Connector

   c. Adhesive □ Screw

3. Floor Framing Connectors (to Top Plate) to be used (check all that apply)

   a. Type “G” □ Type “P”

   b. Type “E” □ Type “F”

4. Minimum required number of Floor Framing Connectors at each section of wall, per wall line

   a. [Supplemental Earthquake Retrofit Schedule

   b. Sheet S3.1-1.2

   c. Supplemental Technical Notes will be used.
**INSTRUCTIONS**

1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category”.

2. Find the home’s Floor Area “B” x “L” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.

   a. Approximate floor area ____________

3. Check the box that matches your home’s area per ____________. You will use information in this row of the schedule to select the steel column size and connection type or proprietary shear wall required.

4. Determine size of steel column and connection detail or see ____________.

5. Determine minimum required allowable shear capacity to be used in selection of a proprietary shear wall. Note that more than one shear wall panel may be needed to obtain the required shear capacity. Consult manufacturer’s load tables for final selection.

6. See details 1 & 2 on sheet D7 for steel column connections at upper floor.

7. See details 1 & 2 on sheet D8 for upper floor connection at proprietary shear wall.

8. Complete retrofit summary below.

**Notes:**

1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.

2. See detail 4 on sheet D7 for footing detail at steel column retrofit.

3. See details 1 & 2 on Sheet D8 for footing details at proprietary shear wall.

4. See details 1 & 2 on sheet D7 for steel column connections at upper floor.

5. See details 1 & 2 on sheet D8 for upper floor connection at proprietary shear wall.

---

**EARTHQUAKE RETROFIT SCHEDULE (S₀ₛ = 1.2)**

<table>
<thead>
<tr>
<th>Weight Classification</th>
<th>Floor Area in Square Feet</th>
<th>Steel Column</th>
<th>Column Connection Type (pair detail 2 on sheet D7) at Upper Floor</th>
<th>Minimum Required at Allowable Shear Capacity (lbs)</th>
<th>Edge Nail Spacing</th>
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<tbody>
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<td>Light Construction</td>
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<td>C3</td>
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<td></td>
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</table>

**Steel Column**

- Column Size
- Connection
- Diaphragm Nailing

**Proprietary Shear Wall**

- Column Size
- Connection
- Diaphragm Nailing

**Proprietary Shear Wall**

- MFR/ Size
- Diaphragm Nailing

---

**RETROFIT SUMMARY**

Check box if selected

- Steel Column
- At front wall
- Column Size
- Connection
- Diaphragm Nailing

- At back wall
- Column Size
- Connection
- Diaphragm Nailing

- Proprietary Shear Wall
- At front wall
- Required Capacity
- MFR/ Size
- Diaphragm Nailing

- At back wall
- Required Capacity
- MFR/ Size
- Diaphragm Nailing

---

**Supplemental Earthquake Retrofit Schedule**

1. Check boxes if additional Earthquake Retrofit Schedules are included.

- S3.1-1.2
- S3.2-1.2
- S3.3-1.2
- S3.4-1.2
- S3.5-1.2
### RETROFIT SUMMARY

1. **BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS**

   - 1. Required length of strengthening at garage front wall line: (check box if tie-downs will be used on that line)
     - Front Wall □ with Tie-Down Type __________
     - Front Wall □ without Tie-Down

   - 2. New Foundation Sill Anchorage to be used: (check all that apply)
     - Bolts: Diameter □ Adhesive □ Screw
     - Type "A" Connector □ Type "C" Connector
     - Type "B" Connector
     - Minimum required number of Sill Anchors per wall line

   - 3. Floor Framing Connectors to Foundation Sill or to Top Plate to be used: (check all that apply)
     - Type "D" □ Type "F" □ Type "G" □ Type "E" □
     - Minimum required number of Floor Framing Connectors per wall line

   - 4. □ Check this box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

### Supplemental Earthquake Retrofit Schedule

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - □ S3.1-2 □ S3.4-1.2 □ S3.5-1.2

### Notes

1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.

2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria) Where "None" occurs, no tie-down is required.

3. Foundations: Where new foundations are required, see Sheet S2 for details.

4. Connector Type "P" should be used as an alternative only if joints are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.

5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.

6. The Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked "None" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

7. Wall lengths are total length of a single wall section required. See Sheet S3.5-1.2 for 2 section of wall options.

8. See Sheet S3.6-1.2 for Alternate Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.
**MINIMUM TOTAL REQUIRED LENGTH OF EACH SECTION OF WOOD STRUCTURAL PANEL SHEAR WALLS**

For a Two Section of Wall Option

<table>
<thead>
<tr>
<th>Wall Length</th>
<th>Tie-</th>
<th>New Fdn</th>
<th>Wall Length</th>
<th>Tie-</th>
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<tr>
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<td>3'-0&quot;</td>
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</tr>
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<td>2'-6&quot;</td>
<td>TD4 Yes</td>
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<td>5'-0&quot;</td>
<td>TD6 Yes</td>
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**FLOOR FRAMING TO WALL CONNECTION**

<table>
<thead>
<tr>
<th>Min. No. of Foundation Connectors or Anchors at Each Section of Wall</th>
<th>Min. No. of Connectors at Each Section of Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type “A”</td>
<td>Type “B”</td>
</tr>
<tr>
<td>1/2”Ø Bolt</td>
<td>5/8”Ø Bolt</td>
</tr>
<tr>
<td>Type “E”</td>
<td>Type “F”</td>
</tr>
</tbody>
</table>

**Notes:**

1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per section of wall, placed within the length of strengthening where possible. Total number of anchor bolts and connectors shall equal twice the number shown in the schedule. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.

2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.

3. Foundations: Where new foundations are required, see Sheet D2 for details.

4. Connector Type “F” should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.

5. Any of the connectors listed in a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.

6. This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked "NG" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.

7. Wall lengths are minimum length of each wall section required on the garage front wall line.

8. See Sheet S3.6-1.2 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

**INSTRUCTIONS:**

1. **Choose the alternative that matches your home’s use of Types “D” or “E” impractical.**
2. **Check the box that matches your home’s area per .** You will use information in this row of the schedule to determine the length of plywood bracing panels, nailing requirements, quantities of hardware, etc.
3. **Check the box that matches your home’s area per .** You will use information in this row of the schedule to determine "Weight Category".
4. **Check the box if additional Earthquake Retrofit Schedules are included.**
5. **Complete the Retrofit Summary for your project. Fill in the lengths found in for each line.** If no option is available, see Schedule notes 6 and 7. Check the boxes for each wall line you plan to use. If you intend to use tie-downs, check the box for tie-downs after each wall line you plan to use them for, check the box on line 4, and read the Supplemental Technical Notes for additional information.
6. **Include Earthquake Retrofit Schedule Sheets S3.1-2 thru S3.6-1.2 where applicable.** See sheet S3, Figure 2 and schedule notes 6 and 7.
### EARTHQUAKE RETROFIT SCHEDULE (SDS = 1.2) at front of Garage

<table>
<thead>
<tr>
<th>STEEL COLUMN RETROFIT</th>
<th>PROPRIETARY SHEAR WALL RETROFIT</th>
<th>DIAPHRAGM NAILING</th>
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<tr>
<td>(2) (3)</td>
<td>(4) (5)</td>
<td>(3) (5)</td>
</tr>
<tr>
<td>Floor Area in Square Feet</td>
<td>Column Connection Type</td>
<td>Minimum Required at Allowable Shear Capacity (lbs)</td>
</tr>
<tr>
<td>800</td>
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**Notes:**
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.
5. See details 4 & 5 on Sheet D8 for footing details at proprietary shear wall.

### RETROFIT SUMMARY
- Steel Column
  - Column Type
  - Connection
  - Diaphragm Nailing
- Proprietary Shear Wall
  - Column Type
  - Connection
  - Diaphragm Nailing

### INSTRUCTIONS
- Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine "Weight Category".
- Find the home's Floor Area "A" x "L". (See Figures D-3 thru D-5) in the schedule; this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
  - Approximate floor area
- Check the box that matches your home's area per . You will use information in this row of the schedule to steel column size and connection type or proprietary shear wall required.
- Determine size of steel column and connection detail or see .
- Determine minimum required allowable shear capacity to be used in selection of a proprietary shear wall. Consult manufacturer's load tables for final selection. Note that more than one shear wall panel may be needed to obtain the required shear capacity. Consult manufacturer's load tables for final selection.
- See details 1 & 2 on sheet D7 for steel column connections at upper floor.
- See details 1 & 2 on sheet D8 for upper floor connection at proprietary shear wall.
- Complete retrofit it summary below.

### Notes:
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 4 & 5 on Sheet D8 for footing details at proprietary shear wall.
5. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.
**EARTHQUAKE RETROFIT SCHEDULE (S_{DS} = 1.5) for Single Section of Wall**

**MINIMUM REQUIRED LENGTH OF A SINGLE SECTION OF WALL OF WOOD STRUCTURAL PANEL SHEAR WALLS**

(All wall section)

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>6&quot; O.C.</th>
<th>9&quot; O.C.</th>
<th>12&quot; O.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>1000</td>
<td>8&quot;</td>
<td>11&quot;</td>
<td>14&quot;</td>
</tr>
<tr>
<td>1200</td>
<td>10&quot;</td>
<td>13&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
<td>1500</td>
<td>12&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
</tr>
<tr>
<td>2000</td>
<td>14&quot;</td>
<td>18&quot;</td>
<td>25&quot;</td>
</tr>
</tbody>
</table>

**FOUNDATION SILL ANCHORAGE**

<table>
<thead>
<tr>
<th>Min. No. of Foundation Connectors or Anchors at Each Wall Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

**FLOOR FRAMING TO WALL CONNECTION**

<table>
<thead>
<tr>
<th>Min. No. of Connectors at Each Wall Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

**INSTRUCTIONS**

1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category”.
2. Find the home’s Floor Area “B” x “L” (See Figures D-3 thru D-5) in the schedule; this number should be at least as large as the number listed below. Do not use a smaller number, even if it’s closer.
3. Determine the number of Foundation Sill Connectors or Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or number of 1/2”Ø or 5/8”Ø anchor bolts. (ø = diameter of the bolts.) See Sheet S3.
4. Complete the Retrofit Summary for your project. Fill in the lengths found in the columns under for each type. No option is available, see Note 6 & 7. Check the boxes for the anchor and connector types you plan to use. If you intend to use tie-downs, check the box for tie-downs after each wall line you plan to use them for, check the box on line 4, and read the Supplemental Technical Notes for additional information.
5. Include Earthquake Retrofit Schedule Sheets S3.1-1.5 thru S3.6.1.5 where applicable. See sheet S3, Figure 2 and schedule notes 6 thru 8.

**Notes:**

1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Conditions.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation has a suitable connector that could handle the load.) Where "None" occurs, no tie-down is required.
3. Foundations: Where new foundations are required at front and back walls, see Sheet S2-D2. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provide foundations that extend the full depth of the garage in Figures 4 and 5 on Sheet S0 and for Figure 3 conditions (living-space over-garage dwellings without ground floor residential unit), consult a Registered Design Professional for remedial direction.
4. Connector Type “F” should be used as an alternative only if joists are blocked on both sides and accessibility makes the use of Types “D” or “E” impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked "None" on the applicable Earthquake Retrofit Schedule may be found to have a acceptable space where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are total length of a single wall section required on each side of the building. See Sheet S3.2-1.5 for 2 section of wall options.
8. See Sheet S3.1-1.5 for Alternate Earthquake Retrofit Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.
9. See Sheets S3.4-1.5 thru S3.6.1.5 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.

**RETROFIT SUMMARY**

**BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS**

1. Retrofit requirements per wall line: (check box if tie-down and/or new footing will be used on that line)
   - **Front Wall**
     - Nailing: 8d at ___ O.C.
   - **Back Wall**
     - Nailing: 8d at ___ O.C.
   - **Tie-Down Type**
   - **New Ftg**
   - **Left Side Walls**
     - Nailing: 8d at ___ O.C.
   - **Right Side Walls**
     - Nailing: 8d at ___ O.C.

2. New Foundation Sill Anchors to be used: (check all that apply)
   - **Type "A" Connector**
   - **Adhesive**
   - **Screw**
   - **Type "B" Connector**
   - **Type "C" Connector**
   - **Minimum required number of Sill Anchors per wall line**

3. Floor Framing Connectors (In Top Plate) to be used: (check all that apply)
   - **Bolts Diameter**
   - **Type "D"**
   - **Minimum required number of Floor Framing Connectors per wall line**

4. Check this box if new foundations and the SUPPLEMENTAL TECHNICAL NOTES will be used.

**Supplemental Earthquake Retrofit Schedule**

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - **S3.2-1.5**
   - **S3.4-1.5**
   - **S3.6-1.5**
   - **S3.3-1.5**
### Earthquake Retrofit Schedule (S3 = 1.5) Two Sections of Wall

<table>
<thead>
<tr>
<th>Weight Classification</th>
<th>Floor Area in Square Feet</th>
<th>Min. No. of Foundation Connectors or Anchors at Each Section of Wall</th>
<th>Min. No. of Connectors at Each Section of Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Sill Anchorage</td>
<td></td>
<td>8d at 6&quot; O.C.</td>
<td>8d at 2&quot; O.C.</td>
</tr>
<tr>
<td>800</td>
<td>9'-6&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1000</td>
<td>12'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1200</td>
<td>14'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1500</td>
<td>17'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>2000</td>
<td>27'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1000</td>
<td>15'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1200</td>
<td>18'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>2000</td>
<td>23'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1000</td>
<td>16'-0&quot;</td>
<td>T1D</td>
<td>No</td>
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<tr>
<td>2000</td>
<td>20'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>2000</td>
<td>24'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1000</td>
<td>17'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1200</td>
<td>20'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>1500</td>
<td>23'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>2000</td>
<td>26'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
<tr>
<td>2000</td>
<td>27'-0&quot;</td>
<td>T1D</td>
<td>No</td>
</tr>
</tbody>
</table>

**Notes:**
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per section of wall, placed within the length of strengthening where possible. Total number of anchor bolts and connectors shall equal twice the number shown in the schedule. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to increase the required length of strengthening. This may be required where the length of the wall where necessary tie-downs are required in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.
3. Foundations: Where new foundations are required at front and back walls, see Sheet D2 for details. At side walls, select retrofit options that do not require new foundations whenever possible. Otherwise, provide foundations that extend the full length of the garage in Figures 4 and 5 on Sheet S5 and for Figures 3 conditions (live-space-over-garage dwellings without ground floor residential unit), consult a Registered Design Professional for remedial design.
4. Connector Type "F" shall be used as an alternative in only if joists are blocked on both sides and where accessibility makes the use of Types "D" or "E" impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest least manufacturer’s capacity within a particular group. Cables marked "None" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable space where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are total length of wall required on each side of the building. You may use 2 sections of wall per line based on existing building conditions but each section must be at least 3 feet long and each individual section shall not be greater than 55% of the total required length. (See Figure G-2 and Sheets S5).
8. See Sheet S3.3-1.5 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.
9. See Sheets S3.4-1.5 thru S3.6-1.5 for Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.

### INSTRUCTIONS
1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category”.
2. Find the box that matches your home’s area per foundation shown on Sheet D5. This box should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
3. The number of the connector to use is determined by the “Weight Category” for the wall section. See Sheet S3.2 for the “Weight Category” determined by the foundation type and wall section length. Use the Connector Type shown in the Earthquake Retrofit Schedule for the foundation type and wall section length you are retrofitting.
4. Check the box that matches your home’s area per foundation shown on Sheet D5. This box should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
5. Determine the number of tie-downs, if required. The columns indicate how many tie-downs are required, depending on whether you use Types A through C, or number of 1/2"Ø or 5/8"Ø anchor bolts. (ø = diameter of the bolts.) See Sheet S3.
6. Determine the number of Foundation Sill Connectors or Anchors required. The columns indicate how many foundation sill connectors or anchors are required, depending on whether you use Types A through C, or number of 1/2"Ø or 5/8"Ø anchor bolts. (ø = diameter of the bolts.) See Sheet S3.
7. Complete the Retrofit Summary for your project. Fill in the lengths found in 4 for each line. If no option is available, see Schedule Notes 6.7. Check the boxes for the anchor and connector types you plan to use. If you intend to use tie-downs, check the box for tie-downs after each wall line you plan to use them for. Check the box on line 4, and read the Supplemental Technical Notes for additional information.
8. Include Earthquake Retrofit Schedule Sheets S3.1-1.5 thru S3.6-1.5 where applicable. See also Sheet S3, Figure 2 and schedule notes 6 thru 8.

### RETROFIT SUMMARY
- BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS
  - Retrofit requirements at each section of wall per wall line: (check box for tie-downs and/or new footing to be used on that line)
    - Front Wall
    - Back Wall
    - Left Side Walls
    - Right Side Walls
  - New Foundation Sill Anchorage to be used: (check all that apply)
    - Types A Connector
    - Types C Connector
    - Types B Connector
  - Minimum required number of Sill Anchors at each section of wall, per wall line
    - Types D or Type "F"
    - Types E
    - Types G
    - Types H
  - New Footing: If your foundation meets the criteria, you may choose the tie-down option to increase the required length of strengthening. This may be required where the length of the wall where necessary tie-downs are required in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where "None" occurs, no tie-down is required.

### Supplemental Earthquake Retrofit Schedule
1. Check if this Sheet is supplemental to Sheet S3.1, otherwise check partial retrofit schedule only.
2. Use the Earthquake Retrofit Schedules for the front wall only at dwellings with a ground story residential unit. See also Sheet S0, Figure 2.
3. Minimum required number of Floor Framing Connectors at each section of wall, per wall line
4. Additional Anchoring or Bracing Options:
   - Types A Connector
   - Types C Connector
   - Types B Connector
   - Types E
   - Types G
   - Types H
   - Minimum required number of Floor Framing Connectors at each section of wall, per wall line.
**ERTHQUAKE RETROFIT SCHEDULE (S_{DS} = 1.5)**

<table>
<thead>
<tr>
<th>Weight Classification</th>
<th>Floor Area in Square Feet</th>
<th>Steel Column</th>
<th>Minimum Required Allowable Shear Capacity (lbs)</th>
<th>Edge Nail Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Construction</td>
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<td>W8x28</td>
<td>4870</td>
<td>6</td>
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<td></td>
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<td></td>
<td>1200</td>
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<td>7310</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>W12x35</td>
<td>9140</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>C2</td>
<td>12,200</td>
<td>4</td>
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<tr>
<td>Medium Construction</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td>1000</td>
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<td></td>
<td>1500</td>
<td>W12x35</td>
<td>11,800</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>C2</td>
<td>&quot;NG&quot; &quot;NG&quot;</td>
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<tr>
<td>Heavy Construction</td>
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<td>W12x35</td>
<td>13,200</td>
<td>3</td>
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<tr>
<td></td>
<td>1000</td>
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<tr>
<td></td>
<td>1500</td>
<td>2000</td>
<td>20,600</td>
<td>3</td>
</tr>
</tbody>
</table>

**Notes:**
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 4 & 5 on Sheet D8 for footing details at proprietary shear wall.
5. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.

**RETOFIT SUMMARY**

- **Steel Column**
  - At front wall: Column Size, Connection, Diaphragm Nailing
  - At back wall: Column Size, Connection, Diaphragm Nailing

- **Proprietary Shear Wall**
  - At front wall: Required Capacity, MFR Size, Diaphragm Nailing
  - At back wall: Required Capacity, MFR Size, Diaphragm Nailing

**Supplemental Earthquake Retrofit Schedule**

- **Retrofit of Living-Space-Over-Garage Dwellings (Plan Set)**
  - Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings
  - FEMA P-1100, Volume 2 - Plan Sets
  - Issued: SEPT 2019

- **Alternate Earthquake Retrofit Schedule (Steel Column or Proprietary Shear Wall)**
Earthquake Retrofit Schedule (SDS = 1.5) for Single Section of Wall at Front of Garage - Only

### Notes:
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per wall line, placed within the length of strengthening where possible. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs, specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where “none” occurs, no tie-down is required.
3. Foundations: Where new foundations are required, see Sheet S2 for details.
4. Connector Type “F” should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types “D” or “E” impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest listed manufacturer's capacity within a particular group. Cells marked “NO” on the applicable Earthquake Retrofit Schedule may be found to have an acceptable strengthening where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are total length of a single wall section required. See Sheet S3.5-1.5 for 2 section of wall options.
8. See Sheet S3.6-1.5 for Alternate Earthquake Options where sufficient length of wall does not occur or where wood structural panel shear wall retrofit installations are prohibited.

### Minimum Required Length of a Single Section of Wall of Wood Structural Panel, Shear Walls (at each wall line)

<table>
<thead>
<tr>
<th>Floor Area in Square Feet</th>
<th>Nail Spacing</th>
<th>Tie-down w/ Tie-downs in Existing or New Foundations</th>
<th>Bld at 0° O.C.</th>
<th>Bld at 4° O.C.</th>
<th>Bld at 2° O.C.</th>
<th>Type “A”</th>
<th>Type “B”</th>
<th>Type “C”</th>
<th>Type “D”</th>
<th>Type “E”</th>
<th>Type “F”</th>
<th>Type “G”</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>6</td>
<td>No</td>
<td>14'-0&quot;</td>
<td>10'-0&quot;</td>
<td>6'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>9'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>1000</td>
<td>6</td>
<td>No</td>
<td>16'-0&quot;</td>
<td>12'-0&quot;</td>
<td>8'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>11'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>1200</td>
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<td>No</td>
<td>18'-0&quot;</td>
<td>14'-0&quot;</td>
<td>10'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>13'-0&quot;</td>
<td>8'-0&quot;</td>
<td>8'-0&quot;</td>
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<td>8'-0&quot;</td>
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<tr>
<td>1500</td>
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<td>22'-0&quot;</td>
<td>17'-0&quot;</td>
<td>12'-0&quot;</td>
<td>TD1</td>
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<td>10'-0&quot;</td>
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<td>10'-0&quot;</td>
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<tr>
<td>2000</td>
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<td>27'-0&quot;</td>
<td>23'-0&quot;</td>
<td>16'-0&quot;</td>
<td>TD1</td>
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<td>14'-0&quot;</td>
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<tr>
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<td>17'-0&quot;</td>
<td>12'-0&quot;</td>
<td>8'-0&quot;</td>
<td>TD1</td>
<td>No</td>
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<td>15'-0&quot;</td>
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<td>No</td>
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<tr>
<td>1200</td>
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<td>23'-0&quot;</td>
<td>18'-0&quot;</td>
<td>12'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>18'-0&quot;</td>
<td>12'-0&quot;</td>
<td>12'-0&quot;</td>
<td>12'-0&quot;</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>1500</td>
<td>6</td>
<td>No</td>
<td>27'-0&quot;</td>
<td>22'-0&quot;</td>
<td>16'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>22'-0&quot;</td>
<td>15'-0&quot;</td>
<td>15'-0&quot;</td>
<td>15'-0&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>2000</td>
<td>6</td>
<td>No</td>
<td>33'-0&quot;</td>
<td>28'-0&quot;</td>
<td>20'-0&quot;</td>
<td>TD1</td>
<td>No</td>
<td>28'-0&quot;</td>
<td>20'-0&quot;</td>
<td>20'-0&quot;</td>
<td>20'-0&quot;</td>
<td>20'-0&quot;</td>
</tr>
</tbody>
</table>

### Foundation Sill Anchorage to be used: (check all that apply)

- □ Type “A” connector
- □ Type “B” connector
- □ Type “C” connector
- □ Type “D” connector
- □ Type “E” connector
- □ Type “F” connector
- □ Type “G” connector

Minimum required number of Sill Anchors per wall line ______________

### Floor Framing to Wall Connection

Min. No. of Connectors at Each Wall Panel

Min. No. of Foundation Connectors or Anchors at Each Wall Panel

### EARTHQUAKE RETROFIT SUMMARY

1. Required length of strengthening at garage front wall line: (check box if tie-downs will be used on that line)
   - □ with Tie-Down Type
   - □ without Tie-Down Type

2. New Foundation Sill Anchorage to be used: (check all that apply)
   - □ Type “A” Connector
   - □ Type “B” Connector
   - □ Type “C” Connector
   - □ Type “D” Connector
   - □ Type “E” Connector
   - □ Type “F” Connector
   - □ Type “G” Connector

Minimum required number of Sill Anchors per wall line ______________

3. New Foundation Sill Anchorage to be used: (check all that apply)
   - □ Type “D” connector
   - □ Type “F” connector
   - □ Type “G” connector

Minimum required number of Floor Framing Connectors per wall line ______________

4. □ check this box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

### RETROFIT SUMMARY

BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS

1. Required length of strengthening at garage front wall line: (check box if tie-downs will be used on that line)
   - □ with Tie-Down Type
   - □ without Tie-Down Type

2. New Foundation Sill Anchorage to be used: (check all that apply)
   - □ Type “A” Connector
   - □ Type “B” Connector
   - □ Type “C” Connector
   - □ Type “D” Connector
   - □ Type “E” Connector
   - □ Type “F” Connector
   - □ Type “G” Connector

Minimum required number of Sill Anchors per wall line ______________

3. New Foundation Sill Anchorage to be used: (check all that apply)
   - □ Type “D” connector
   - □ Type “F” connector
   - □ Type “G” connector

Minimum required number of Floor Framing Connectors per wall line ______________

4. □ check this box if tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.
EARTHQUAKE RETROFIT SCHEDULE (S\textsubscript{DE} = 1.5) Two Sections of Wall at Front of Garage - Only

### Notes:
1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are the minimum required per section of wall, placed within the length of strengthening where possible. Total number of anchor bolts and connections shall equal twice the number shown in the schedule. Additional anchors and connectors may be necessary to meet the requirements of specific details and General Notes.
2. Tie-downs: If your foundation meets the criteria, you may choose the tie-down option to decrease the required length of strengthening. This may be required where the length of the wall without tie-downs specified in this schedule is longer than can be accommodated by existing conditions. However, there is a level of uncertainty when dealing with existing foundations, therefore, where possible, longer lengths of strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2 to verify the existing foundation is suitable and meets criteria.) Where “None" occurs, no tie-down is required.
3. Foundations: Where new foundations are required, see Sheet D2 for details.
4. Connector Type "F" should be used as an alternative only if joists are blocked on both sides and where accessibility makes the use of Types D or E impractical.
5. Any of the connectors listed within a particular group and as shown on Sheet S3 may be used for strengthening the particular condition.
6. This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked "N/R" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
7. Wall lengths are minimum length of each wall section required on the garage front wall line.
8. See Sheet S3.6-1.5 for Alternate Earthquake Retrofit Options where sufficient length of wall panel does not occur or where wood structural panel shear wall retrofit installations are otherwise prohibited.

### INSTRUCTIONS
1. Locate the section that matches your home’s construction. Use the chart on Sheet S3 to determine “Weight Category.”
2. Find the home’s Floor Area “B” x “L” (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.
   a. Approximate floor area ________
3. Check the box that matches your home’s area per Table. You will use information in this column to determine length of plywood bracing panels, nailing requirements, quantities of hardware, etc.
4. Determine the length of plywood bracing required. The columns contain the length of required bracing, including options for bracing without tie-downs, with tie-downs into existing foundations and tie-downs w/ new foundations, see schedule notes 3. Follow the row across from the total floor area that you checked for your home (in Step 3) to find the bracing length for each side of the house (front, back, left-side, right side).
5. Determine the number of Foundation Sill Anchors or Connectors Required. The columns show the number of anchors required, depending on whether you use Types A through G, or number of 1/2" or 5/8" anchor bolts. (ø = diameter of the bolt.) See Sheet S3.
6. Determine the number of Floor to Wall Connectors. The columns indicate how many framing connectors are required, depending on whether you use Types D, E, F, or G. See Sheet S3.
7. Complete the Retrofit Summary for your project. Fill in the lengths found in Table 3 for each line. No option is available, see Schedule notes 6 & 7. Check the boxes for the anchor and connector types you plan to use. If you intend to use tie-downs, check the box for tie-downs after each wall line you plan to use for, check the box on line 4, and read the Supplemental Technical Notes for additional information.
8. Include Earthquake Retrofit Schedule Sheets S3.1-1.5 thru S3.6-1.5 where applicable. See sheet S3, Figure 2 and schedule notes 6 and 7.

### RETROFIT SUMMARY

#### BRACING, ANCHORS, CONNECTORS, AND TIE-DOWNS

1. Required length of each section of strengthening per wall line: (check box if tie-downs will be used on that line)
   - Front Wall ________ ft
   - Front Wall ________ ft without Tie-Down

2. New Foundation Sill Anchorage to be used: (check all that apply)
   - Bolt: Diameter: ________ Adhesive: ________ Screw
   - Type “A” Connector
   - Type “B” Connector
   - Type “C” Connector
   - Minimum required number of Sill Anchors per wall line ________

3. Floor Framing Connectors (to Foundation Sill or to Top Plate) to be used: (check all that apply)
   - Type “D”
   - Type “E”
   - Minimum required number of Floor Framing Connectors per wall line ________

4. Check this box if it’s tie-downs and the SUPPLEMENTAL TECHNICAL NOTES will be used.

### Supplemental Earthquake Retrofit Schedule

1. Check boxes if additional Earthquake Retrofit Schedules are included.
   - S3.1-1.5
   - S3.3-1.5
   - S3.5-1.5
   - S3.6-1.5

### Foundation Shear Wall Note

- This Plan Set was developed using the lowest listed manufacturer’s capacity within a particular group. Cells marked "N/R" on the applicable Earthquake Retrofit Schedule may be found to have an acceptable spacing where an alternate connector is used. Any such substitution can only be made by a Registered Design Professional.
INSTRUCTIONS

1. Locate the section that matches your home's construction. Use the chart on Sheet S3 to determine "Weight Category".

2. Find the home's Floor Area "B" x "L" (See Figures D-3 thru D-5) in the schedule, this number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer.

   a. Approximate floor area
   
   b. Check the box that matches your home's area per . You will use information in this row of the schedule to steel column size and connection type or proprietary shear wall required.

3. Determine size of steel column and connection detail or see .

4. Determine minimum required allowable shear capacity to be used in selection of a proprietary shear wall. Consult manufacturer's load tables for final selection. Note that more than one shear wall panel may be needed to obtain the required shear capacity. Consult manufacturer's load tables for final selection.

5. See details 1 & 2 on sheet D7 for steel column connections at upper floor.

6. See details 4 & 5 on Sheet D8 for footing details at proprietary shear wall.

7. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.

8. Complete retrofit it summary below.

<table>
<thead>
<tr>
<th>Weight Classification</th>
<th>Floor Area in Square Feet</th>
<th>Steel Column</th>
<th>Column Connection Type (per detail 2 on sheet D7)</th>
<th>Minimum Required at Allowable Shear Capacity (lbs)</th>
<th>Edge Nail Spacing</th>
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</thead>
<tbody>
<tr>
<td>Light Construction</td>
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<td>W8x21</td>
<td>C1</td>
<td>2440</td>
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<td></td>
<td></td>
<td>W8x21</td>
<td>C1</td>
<td>3650</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
<td>W8x21</td>
<td>C1</td>
<td>4570</td>
<td>6</td>
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<td></td>
<td>W8x28</td>
<td>C1</td>
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<td></td>
<td>W8x21</td>
<td>C1</td>
<td>3150</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W8x21</td>
<td>C1</td>
<td>3940</td>
<td>6</td>
</tr>
<tr>
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<td></td>
<td>W8x28</td>
<td>C1</td>
<td>4730</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
<td>W10x30</td>
<td>C2</td>
<td>7880</td>
<td>6</td>
</tr>
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<td></td>
<td></td>
<td>W8x21</td>
<td>C1</td>
<td>4120</td>
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<td>C1</td>
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<td>C1</td>
<td>6170</td>
<td>6</td>
</tr>
<tr>
<td></td>
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<td>W10x30</td>
<td>C2</td>
<td>7720</td>
<td>6</td>
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<td></td>
<td></td>
<td>W12x35</td>
<td>C3</td>
<td>10,300</td>
<td>6</td>
</tr>
</tbody>
</table>

Notes:
1. Steel column and Proprietary Shear Wall Options are provided for front of garage or back of garage or house only.
2. See detail 4 on Sheet D7 for footing detail at steel column retrofit.
3. See details 1 & 2 on Sheet D7 for steel column connections at upper floor.
4. See details 4 & 5 on Sheet D8 for footing details at proprietary shear wall.
5. See details 1 & 2 on Sheet D8 for upper floor connection at proprietary shear wall.

Retrofit Summary:

Steel Column
- At front wall
  - Column Size
  - Connection
  - Diaphragm Nailing

- At back wall
  - Column Size
  - Connection
  - Diaphragm Nailing

Proprietary Shear Wall
- At front wall
  - Req'd Capacity
  - MFR/ Size
  - Diaphragm Nailing

- At back wall
  - Req'd Capacity
  - MFR/ Size
  - Diaphragm Nailing

Supplemental Earthquake Retrofit Schedule

1. Check boxes if additional Earthquake Retrofit Schedules are included.
ONE SQUARE = _____ FEET

Floor to wall framing connector, number per line per the Retrofit Schedule

Foundation sill anchor bolt or connector, number per line per the Retrofit Schedule

Key:
Retrofit shear wall edge nail spacing per the Earthquake Retrofit Schedule. # denotes the edge nail spacing.

#  TD-
Tie-down. # denotes the tie down size per schedule, see sheet S3.

Front Wall
Back Wall
Left Side Wall
Right Side Wall

General Sheet Notes:
1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall stud and top plate penetrations, see Det. 4/D6.
5. For wall top plate splices, see Det. 1/D6 at existing double top plates and Det. 2/D6 at single top plates.

RETROFIT SCHEDULE SUMMARY
See the Retrofit Summary on the Sheet indicated below for additional requirements on each wall line.

Front Wall
Back Wall
Left Side Wall
Right Side Wall

General Sheet Notes:
1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall stud and top plate penetrations, see Det. 4/D6.
5. For wall top plate splices, see Det. 1/D6 at existing double top plates and Det. 2/D6 at single top plates.

RETROFIT SCHEDULE SUMMARY
See the Retrofit Summary on the Sheet indicated below for additional requirements on each wall line.

Front Wall
Back Wall
Left Side Wall
Right Side Wall

General Sheet Notes:
1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall stud and top plate penetrations, see Det. 4/D6.
5. For wall top plate splices, see Det. 1/D6 at existing double top plates and Det. 2/D6 at single top plates.

RETROFIT SCHEDULE SUMMARY
See the Retrofit Summary on the Sheet indicated below for additional requirements on each wall line.

Front Wall
Back Wall
Left Side Wall
Right Side Wall

General Sheet Notes:
1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall stud and top plate penetrations, see Det. 4/D6.
5. For wall top plate splices, see Det. 1/D6 at existing double top plates and Det. 2/D6 at single top plates.
**Retrofit Schedule Summary**

See the Retrofit Summary on the Sheet indicated below for additional requirements on each wall line.

<table>
<thead>
<tr>
<th>Wall Line</th>
<th>TD-#</th>
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<tbody>
<tr>
<td>Front Wall</td>
<td>S3.6-1.2</td>
</tr>
<tr>
<td>Back Wall</td>
<td>S3.2-1.2</td>
</tr>
<tr>
<td>Left Side Wall</td>
<td>S3.1-1.2</td>
</tr>
<tr>
<td>Right Side Wall</td>
<td>S3.1-1.2</td>
</tr>
</tbody>
</table>

**General Sheet Notes:**

1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall top plate penetrations, see Det. 4/D6.
5. For wall top plate options, see Det. 4/D6 at existing double top plates and Det. 2/D6 at single top plates.

**Key:**
- Retrofit shear wall edge nail spacing per the Earthquake Retrofit Schedule. # denotes the edge nail spacing.
- Tie-down. TD-# denotes the tie down size per schedule, see sheet S3.
- Foundation sill anchor bolt or connector, number per line per the Retrofit Schedule.
- Floor to wall framing connector, number per line per the Retrofit Schedule.
- Plywood sheathed ceiling diaphragm above.
- Water Heater.
- TD-4: Second floor joists above at 24" o.c.
- Front wall framing connector per the Retrofit Schedule.
- Roof to wall framing connector per the Retrofit Schedule.

**General Notes:**

1. For Shear Wall Framing at walls without Tie-Downs, see Det. 1/D4.
2. For Shear Wall Framing at walls with Tie-Downs, see Det. 1/D5.
3. For wall sheathing cutouts, see Det. 3/D6.
4. For wall stud and top plate penetrations, see Det. 4/D6.
5. For wall top plate splices, see Det. 1/D6 at existing double top plates and Det. 2/D6 at single top plates.
**Material Key**

Below is a key to common call-outs in the details. Unless specified otherwise in the details, use the sizes and materials as follows:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Nails</td>
<td>8d (8 penny) at Connectors attached over plywood</td>
</tr>
<tr>
<td></td>
<td>8d (8 penny) at Connectors attached directly to framing</td>
</tr>
<tr>
<td></td>
<td>10d (10 penny) at Connectors attached over plywood</td>
</tr>
<tr>
<td>Screws</td>
<td>Simpson Strong-Tie 1/4&quot; SDS, GRK 3/8&quot; RSS &quot;Climatek&quot;, USP Mitek 1/4&quot; &quot;Gold Coat&quot;, or equivalent.</td>
</tr>
<tr>
<td></td>
<td>3&quot; screw 3&quot; long structural wood screw</td>
</tr>
<tr>
<td></td>
<td>4&quot; screw 4&quot; long structural wood screw</td>
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<tr>
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**Foundation Details at Wood Structural Panel Shear Walls**

- **Material Key**: Below is a key to common call-outs in the details. Unless specified otherwise in the details, use the sizes and materials as follows:

<table>
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<table>
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<th>Term</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Nails</td>
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</tr>
<tr>
<td></td>
<td>8d (8 penny) at Connectors attached directly to framing</td>
</tr>
<tr>
<td></td>
<td>10d (10 penny) at Connectors attached over plywood</td>
</tr>
<tr>
<td>Screws</td>
<td>Simpson Strong-Tie 1/4&quot; SDS, GRK 3/8&quot; RSS &quot;Climatek&quot;, USP Mitek 1/4&quot; &quot;Gold Coat&quot;, or equivalent.</td>
</tr>
<tr>
<td></td>
<td>3&quot; screw 3&quot; long structural wood screw</td>
</tr>
<tr>
<td></td>
<td>4&quot; screw 4&quot; long structural wood screw</td>
</tr>
<tr>
<td></td>
<td>5&quot; screw 5&quot; long structural wood screw</td>
</tr>
</tbody>
</table>

**Foundation Details at Wood Structural Panel Shear Walls**

- **Material Key**: Below is a key to common call-outs in the details. Unless specified otherwise in the details, use the sizes and materials as follows:

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</tr>
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<td></td>
<td>5&quot; screw 5&quot; long structural wood screw</td>
</tr>
</tbody>
</table>
Below is a key to common call-outs in the details. Unless specified otherwise in the details, use the sizes and materials as follows:

- **(N)** Connector Type "E". Install with long leg against joist or block.
- **(E)** Connector Type "D" at blocking or rim joist.
- **(E)** Wall framing.
- **(E)** Floor sheathing.
- **(E)** End joist or (E) blocking.
- **(E)** Wall top plate(s).
- **(E)** Stud.
- **(E)** Joist.
- **(E)** Floor joist.
- **(E)** Cripple wall stud.
- **(E)** Cripple stud.
- **(E)** Balloon-framed wall stud.
- **(E)** Fire-blocking.
- **(E)** Wall sheathing.
- **(N)** Continuous 2x blocking to fill stud bays in lieu of 3x6 blocking.
- **(N)** Wood structural panel.
- **(N)** Connector Type "G".
- **(N)** Connector Type "O".
- **(N)** Alternate: Connector Type "F" in lieu of Types "D" or "E", but only if joists are blocked on both sides.
- **(N)** Wood structural panel, where required. See Sheet D4 or D5 for installation.
- **(N)** Blocking shall be installed snug tight with (3) 8d toe nails each end into perpendicular members.

Note:
- Use detail where no joint blocks exist above wall top plates.

See Sheet D3 for Connector types. See Sheet D4 or D5 for installation.

See Detail 1/C3 where joint framing is parallel to (E) wall.
For strapping at top plate splices, see Details 1/D6 or 2/D6.

3" min.

Prior to installing wood structural panels, see Detail 4/D6 where pipes or conduits pass through studs or top plates.

8" max.

At vents or similar wall blockouts, see Detail 3/D6.

8" max.

**MATERIAL KEY:**

- Joint at abutting wood structural panel (1/8" gap between wood structural panel sheets)
- Wall framing
- End plate or Floor sheathing
- Wall top plate(s)
- Wood structural panel
- Blocking where occurs (shape may vary)
- Concrete foundation

**N.T.S.** Not to Scale

**O.C.** On Center

**PL** Plate

**S.O.G.** Slab on ground

**Typ.** Typical

**w/ with**

**FEMA P.160, Volume 2, Plan Sets**

**Issued:** SEPT 2019

**Family Dwellings**

**Issued:** SEPT 2019

**Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings**

**LVL (Laminated Veneer Lumber)**

- Georgia-Pacific "GP-Lam"
- LP "Solid Start", or equivalent.

- Weyerhauser "Microllam", Boise-Cascade "VersaLam",
- Veneer Lumber

- Louisiana-Pacific "GP-Lam" edge nailing on condition shown in this detail).

- "Peel & Stick" Flashing Tape

**Notes:**

1. Provide all required nailing at upper top plate(s) where (E) stud is less than 1-3/4" thick. Fasten to (E) stud with 16d nails at 4" on center, staggered to avoid splitting. Begin nailing 4" to 6" from ends of studs.

2. Provide additional 8d at wall top plate(s) staggered to avoid splitting. Begin nailing 4" to 6" from ends of studs.

3. Prior to installing wood structural panels, see Detail 4/D6 where pipes or conduits pass through studs or top plates.

4. Wood structural panels may be installed vertically (face grain parallel to stud) or horizontally.

5. Provide 2x4 flat blocking at all horizontal panel edges.

---

**FOUNDATION SILL SAME WIDTH AS WALL**

**MATERIAL KEY:**

- Joint at abutting wood structural panels (1/8" gap between wood structural panel sheets)
- Wall framing
- End plate or Floor sheathing
- Wall top plate(s)
- Wood structural panel
- Blocking where occurs (shape may vary)
- Concrete foundation

**N.T.S.** Not to Scale

**O.C.** On Center

**PL** Plate

**S.O.G.** Slab on ground

**Typ.** Typical

**w/ with**

**FEMA P.160, Volume 2, Plan Sets**

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- Veneer Lumber

- Louisiana-Pacific "GP-Lam" edge nailing on condition shown in this detail).

- "Peel & Stick" Flashing Tape

**Notes:**

1. For strapping at top plate splices, see Details 1/D6 or 2/D6.

2. At crawlspaces or similar cripple-wall blockouts, see Detail 3/D6.

3. Prior to installing wood structural panels, see Detail 4/D6 where pipes or conduits pass through studs or top plates.

4. Wood structural panels may be installed vertically (face grain parallel to stud) or horizontally.

5. Provide 2x4 flat blocking at all horizontal panel edges.

---

**FOUNDATION SILL WIDER THAN WALL**
**Minimum (E) concrete foundation depth**

See Technical Notes, Sheet S2, Section R

---

**Wood structural panel**

Fasten with (N) 8d nails at plywood edges at spacing specified on the Earthquake Retrofit Schedules and 12" on center at intermediate supports

---

**Foundation sill anchor bolt**

See Detail 1/D1 or 2/D1

Last anchor may be located in end bay or bay adjacent to tie-down

---

Notes:

1. For strapping at top plate splices, see Details 1/D6 or 2/D6.
2. At vents or similar wall blockouts, see Detail 3/D6.
3. Prior to installing wood structural panels, see Sheet S2, Section R for additional requirements.
4. "W" indicates the width of an existing foundation, or new foundation constructed in accordance with Detail 1/D7.
5. "D" indicates the depth of an existing foundation, or new foundation constructed in accordance with Detail 1/D7.
6. Wood structural panels may be installed vertically (face grain parallel to stud) or horizontally.
7. Provide 2x4 flat blocking at all horizontal panel edges.
**Opening for vents, utility blockouts, etc.**

- (N) Connector Type "S1" centered at (E) upper top plate splice location install with (14) 8d nails each side of the joint (28 total).
- Joint in (E) upper top plate.
- Joint in (E) lower top plate.
- (E) Single wall top plate.
- (E) Wall stud.
- (E) Wood structural panel, where required.

### Notes:
1. Do not cover existing vents.
2. In area of wood structural panels, install strap over sheathing.

---

**Cutout Requirements in Wood Structural Panels**

1. **Joint in (E) upper top plate.**
2. **Opening for vents, utility blockouts, etc.**
   - If top plate splice is less than 8'-0", install Connector Type "S1".
3. **Joint in (E) lower top plate.**

---

**Allowable Notching and Reinforcing for Top Plates and Studs**

1. **Joint at (E) top plate.**
2. **Joint at (E) top plate where required.**
3. **Detail 1/D5 or 2/D5 for installation.**

---

**Top Plate Splice at Existing Single Top Plate**

1. **Top Plate splice at existing double top plates.**
2. **Top plate splice at existing single top plate.**
3. **Top plate splice at existing single top plate.**
4. **Top plate splice at existing single top plate.**
5. **Top plate splice at existing single top plate.**

---

**Notes:**
1. Floor framing not shown for clarity.
2. In area of wood structural panels, install strap over sheathing.
FOOTING AT NEW RETROFIT COLUMN

1. Existing foundation varies (thickened slab edge footing shown)

2. Where slope exceeds 1 vertical to 1 horizontal, contact registered design professional for guidance

3. Existing slab on grade

4. 2'-0" Min.

5. WF Retrofit column

6. (E) Foundation footing shown is generic, actual size and shape varies

7. (F) Column, "hung" in place prior to pouring concrete footing

8. 4" Emb. Typ.

9. Optional end/bearing plate

10. (N) Footing reinforcing

11. (M) Footing shown is generic, actual size and shape varies

TIES FROM NEW TO EXISTING FOUNDATION

1. (2) #3 x 18" adhesive anchors at 18" O.C.

2. Spread footing

3. #4 at 24" O.C.

4. #4 at 48" O.C.

5. (2) #3 x 16" adhesive anchors top and btm.

6. 4" Emb. Typ.

7. 3" Clr Typ.

8. 3" Clr

9. 2'-0" Min.

10. 0.131" x 2-1/2" long

11. 0.131" x 1-1/2" long

12. 0.148" x 2" long

13. 0.148" x 1-1/2" long

14. 0.162" x 1-1/2" long

15. 0.192" x 4" long

16. Simpson Strong-Tie #8, #10, or equivalent

17. USP Mitek 1/4" SDS, GRK 1/4" climatek, or equivalent.

18. 3" screw

19. 4" screw

20. 6" screw

21. 3/8" RSS "Climatek", USP Mitek 1/4" climatek, or equivalent.

22. 3/8" RSS "Climatek", USP Mitek 1/4" climatek, or equivalent.

23. Plate Washer

24. "Peel & Stick" Flashing Tape

25. Fortiflash, Orange Peel-n-Seal, Typar, Tyvek, Vycor, HardieWrap, or equivalent.

26. For Connector types see Sheet E3.

ABBREVIATIONS

- Abbr. Description
- Clr. Clearance
- Conc. Concrete
- Dia. Diameter
- Dia. Diameter
- Dist. Distance
- Emb. Embedment
- Emb. Embedment
- Eq. Equal
- Emb. Embedment
- Eq. Equal
- E.N. Edge Nail
- Emb. Embedment
- Max. Maximum
- Min. Minimum
- Mfr. Manufacturer
- Mfr. Manufacturer
- N.T.S. Not to Scale
- O.C. On Center
- Pl. Plate
- S.O.G. Slab on grade
- Typ. Typical
- Wrightsville "Marine"
FLOOR CONN. AT PROPRIETARY SHEAR WALL
FLOOR FRAMING PARALLEL TO GARAGE FRONT

2x4 Bltg at all panel edges (may be installed flat or on edge)

Diaphragm E.N. per retrofit schedule to each (E) floor joist, typ.

Proprietary shear wall per retrofit schedule

15/32" CDX plywood w/ E.N. per retrofit schedule, extend to a min. of (2) (E) floor joists each side of column

Front of Garage

PLYWOOD CEILING SOFFIT DIAPHRAGM AT COLLECTOR BEAM
PLAN VIEW AT CEILING

2x4 Bltg at all panel edges (on edge or flat)

Diaphragm E.N. per retrofit schedule to each (E) floor joist, typ.

Proprietary shear wall per retrofit schedule

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</tr>
<tr>
<td>#8 (8 penny)</td>
<td>0.131&quot; x 1&quot;-1/2&quot; long at Connectors attached directly to framing</td>
</tr>
<tr>
<td>#10 (10 penny)</td>
<td>0.148&quot; x 2&quot; long at Connectors attached over plywood</td>
</tr>
<tr>
<td>#10 (10 penny)</td>
<td>0.148&quot; x 1-1/2&quot; long at Connectors attached directly to framing</td>
</tr>
<tr>
<td>#16 (16 penny)</td>
<td>0.192&quot; x 3-1/2&quot; long</td>
</tr>
<tr>
<td>#16 (16 penny)</td>
<td>0.192&quot; x 4&quot; long</td>
</tr>
<tr>
<td>Screws</td>
<td>Simpson Strong-Tie &quot;Hi-T&quot; BSS, &quot;Hi-T&quot; DSS, &quot;Hi-T&quot; FHR, or equivalent.</td>
</tr>
<tr>
<td>Plywood</td>
<td>&quot;Climatek&quot;, USP Mitek &quot;1/4&quot; &quot;Gold Coat&quot;, or equivalent.</td>
</tr>
<tr>
<td>Hardware</td>
<td>&quot;Peel &amp; Stick&quot; Flashing Tape, such as Fortiflash, Orange Peel-n-Seal.</td>
</tr>
<tr>
<td>Plate Washer</td>
<td>3&quot; x 3&quot; square x 0.229&quot; thick</td>
</tr>
<tr>
<td>ABBREVIATIONS</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
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<tr>
<td>Conc.</td>
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</tr>
<tr>
<td>Dia.</td>
<td>Diameter</td>
</tr>
<tr>
<td>(E)</td>
<td>Existing</td>
</tr>
<tr>
<td>EQ.</td>
<td>Equal</td>
</tr>
<tr>
<td>E.N.</td>
<td>Edge Nail</td>
</tr>
<tr>
<td>Emb.</td>
<td>Embedment</td>
</tr>
<tr>
<td>(N)</td>
<td>New</td>
</tr>
<tr>
<td>Max.</td>
<td>Maximum</td>
</tr>
<tr>
<td>Min.</td>
<td>Minimum</td>
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<tr>
<td>S.O.G.</td>
<td>Slab on ground</td>
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<tr>
<td>S.O.G.</td>
<td>slab-on-ground</td>
</tr>
<tr>
<td>Typ.</td>
<td>Typical</td>
</tr>
<tr>
<td>w/</td>
<td>with</td>
</tr>
</tbody>
</table>
4" Emb.
3" Clr typ.
3" Clr typ.
2'-6" min.

Width per Mfr.
2'-0" min.

Existing slab on grade

Proprietary shear wall "hang" in place prior to pouring concrete curb
Anchors per refi
Proprietary shear wall beyond

Where slope exceeds 1 vertical to 1 horizontal, contact registered design professional for guidance

Continuous spread footing

#3 x 18" adhesive anchors, typ. at 18" O.C.

Continuous spread footing

(4) #6 top and btm continuous through widened footing at shear panel beyond

Typ.

Roughen joint to 1/4" amplitude

For Connector types see Sheet S3.

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8d (8 penny) at Connectors attached directly to framing
10d (10 penny) at Connectors attached over plywood
10d (10 penny) at Connectors attached directly to framing

Screws | Simpson Strong-Tie 1/4" SDS, GRK 3/8" RSS "Climatek", USP Mitek 1/4" "GoldCoat", or equivalent.

3" screw | 3" long structural wood screw
4" screw | 4" long structural wood screw
6" screw | 6" long structural wood screw


Plate Washer | 3" x 3" square x 0.229" thick.

Flash Joint | Fortiflash, Orange Peel-n-Seal

ABBREVIATIONS:

Clr. | Clearance
Conc. | Concrete
Dia. | Diameter
E (E) | Existing
E.Q. | Equal
E.N. | Edge Nail
Emb. | Embedment
N | New
Max. | Maximum
Min. | Minimum
Mfr. | Manufacturer
N.T.S. | Not to Scale
O.C. | On Center
PL | Plate
S.O.G. | Slab on ground
Typ. | Typical
w/ | with
Per the earthquake retrofit schedule on Sheet S3.2-1.2, a shear wall retrofit with two wall segments, nailed with 8d at 2" o.c. requires: (2) 4'-0" min. length shear walls with 8d at 2" o.c. edge nailing. Each wall segment requires TD-4 tie-downs, (5) 1/2" Dia. anchor bolts and (7) type 'E' floor to wall connectors.

A new foundation is required per the Earthquake Retrofit Schedule, see the details on Sheet D2.

New anchor bolts as required by the Earthquake Retrofit Schedule.

Where length of wall piers does not permit a retrofit with wood structural panel sheathing, alternate retrofit options are provided, see note 2. This example includes a steel cantilever column retrofit for the front wall.

Per the earthquake retrofit schedule on Sheet S3.6-1.2, a steel cantilever column retrofit requires: A W8x21 column with a type "TD" tie connection. A plywood sheathed ceiling diaphragm is required with 8d at 6" o.c. edge nailing.

Typical all wall lines except where existing conditions vary and a different detail is used.