HOW TO USE THIS PLAN SET

A. Before you begin:

1. Familiarize yourself with the contents of this plan set and the South Napa Earthquake Recovery Advisory (FEMA-0913). Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings. This plan set is intended for use by a general contractor or homeowner without necessarily having to hire an engineer or architect.

2. Contact your local authorities having jurisdiction (AHJ) to understand the building permit application process. Inquire about:
   a. how many copies of the plans must be submitted
   b. how much are fees
   c. which inspections are required

3. The AHJ may also be able to assist with assessing the applicability of this plan set to a home. See Eligibility For Use, Sheet S0.

B. Complete the Eligibility For Use questionnaire to determine if this plan set is applicable. A "no" answer to any question disqualifies the home from using this plan set, unless a licensed engineer or architect is involved.

C. Review the details included in this plan set (Sheets D1-D7). Note 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 for:
   a. The foundation sill to concrete foundation connection (Sheet D1).
   b. The floor framing to foundation sill connection (Sheet D2).
   c. Floor framing to cripple wall connection (Sheet D3).

D. Complete your plans:

1. Using the information from the Earthquake Strengthening Schedule, add the following to complete your Foundation and Strengthening Layout Plan:
   a. Indicate the details used for the connections as noted above. Indicate the connection type, minimum number of connectors each wall line. Conform to Sections C and D of Sheet S1.

2. Indicate the details used for the plywood brace panel (Sheets D4 or D5).

3. Indicate the details used for the tie-down, (Sheet D4).

4. Indicate the details used for the top plates spikes (Sheet D7).

5. Indicate the details used for retrofitting and/or outside (Sheet D7).

E. Submit your plans:

1. Submit a permit application and the required number of completed plan sets (Sheets S0 through S7) to the AHJ for review. Photographs of the foundation sill, cripple wall, and floor framing conditions may assist the review process.

2. Before starting work, the permit holder may be required to schedule a preconstruction inspection with the AHJ to verify that field conditions are consistent with the information provided on the approved plan.

3. Inspect(s) by the AHJ are required for:
   a. Foundation Anchor bolts / Anchor Plate installation,
   b. Blocking installation,
   c. Plywood brace panel on cripple wall, sheathing and nailing,
   d. Metal hardware “connectors” installation,
   e. Tie-downs, and
   f. Final inspection.

4. Special inspection by a testing agency may be required in conjunction with Note C.1 from Table H-1 on Sheet S2.

5. No work requiring inspection shall be covered until it has been inspected and approved by the Authority Having Jurisdiction (AHJ).
PURPOSE

1. The intent of work scope illustrated within these prescriptive drawings is to promote public safety and welfare by reducing the risk of earthquake-related damage to existing wood-frame residential dwellings with a crawl space below the bottom floor. These drawings are intended to improve the seismic performance of residential buildings but will not necessarily prevent earthquake damage, nor make a home "earthquake proof".

2. Garages or other portions of the residence built on concrete slabs on grade are not within the scope of this document. However, this plan set does apply to those portions of a dwelling that are adjacent to a portion supported on a slab-on-grade foundation but which have a raised floor framing system (crawl space).

3. This plan set for strengthening is intended to be approved by the authority having jurisdiction (AHJ) without requiring additional plans or calculations. The project-specific plan set may rely in part on this plan set, and may require design by a licensed engineer or architect as required by the AHJ.

4. When isolated conditions differ from those shown on the plan set, a supplemental engineered solution (including project-specific details and calculations) shall be developed and shall be issued as an addendum to this plan set. The project-specific details and calculations must be prepared by a licensed engineer or architect.

5. Where conditions fall outside of the scope of this plan set as defined within "Eligibility for Use," or where the AHJ determines that conditions exist that are beyond the prescriptive provisions of this plan set, an alternative engineered solution (including a complete project-specific plans and calculations) shall be developed. The project-specific plan set may rely in part on this plan-set, and may require design by a licensed engineer or architect as required by the AHJ.

6. Work performed under permit according to this plan set does not legalize any previous work performed without a permit.

LIMIT OF LIABILITY

Earthquake strengthening constructed according to this Plan Set is intended to reduce the risk of earthquake-related damage to existing wood-frame residential dwellings with wood-frame cripple walls. The content of this document is based on the experience and judgment of practicing engineers and limited research. All circumstances, forms, and types of construction have not necessarily been contemplated in the preparation of this Plan Set. It is not possible to predict or test all conditions that may occur during an earthquake or control the quality of construction among other things. No party associated with the preparation of the Plan set makes any representation, warranty, or convenient, express or implied, with respect to the design, condition, quality, durability, operation, fitness for use, or suitability of earthquake strengthening based on this Plan Set in any respect whatsoever. The authors of this Plan Set shall not be obligated or liable for accidents, incidental, consequential, or other damages of or to users of the Plan Set, or any other person or entity arising out of or in connection with the use, condition, and/or performance of the earthquake strengthening according to this Plan Set or from the maintenance thereof.

SHEET INDEX

S0 Cover Sheet
S1 Technical Notes
S2 Supplemental Technical Notes
S3 Construction Data and Earthquake Strengthening Schedule
S4 Foundation and Strengthening Layout Plan
D1 Foundation Still to Concrete Foundation Connection Details
D2 Floor Framing to Foundation Still Connection Details
D3 Floor Framing to Cripple Wall Vail Connection Details
D4 Tie-down Installation Details
D5 Plywood Braced Panel Installation Details
D6 Foundation Replacement Details
D7 Panel Nailing and Top Plate Details

FOR JURISDICTION USE

To determine if a home qualifies, answer the following:

1. Is the home a duplex or a single family residence?
2. Is the home two stories or less?
3. Are all the floors in each story at the same elevation? (Excluding slabs-on-grade)
4. Is the home constructed of wood framing?
5. Does the home have a continuous perimeter concrete foundation? (This plan set does not apply to homes supported on foundations of masonry, stone, or brick.)
6. Does the home have a crawl space?
7. Are the cripple walls less than seven feet in height? (See Sheet X3 for an example of how to measure a cripple wall height)
8. Is all brick or stone veneer covering exterior walls, excluding chimneys, less than four feet in height? (If the home does not have any brick or stone veneer, check "YES")
9. Is the weight of the home’s roof covering (tiles, shingles, etc) less than 11 pounds per square foot?
10. Is the difference in cripple wall height between the shortest and tallest walls less than 4’-2”? (Note that perimeter locations with no cripple wall are to be indentified as zero foot height and included in this comparison)
11. Is the site seismicity less than S = 2.34 and S = 0.97?

If you answered "YES" to each of these questions, proceed to Sheet S3.
If you answered "NO" to any of these questions, the home is not eligible to apply this plan set. See PURPOSE, Note 5.

ABBREVIATIONS

AHJ Authority Having Jurisdiction (Building Department)
(E) Existing
(N) New
min. Minimum
max. Maximum
NTS Not to Scale
typ. Typical

MAR 2015

Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings FEMA Plan Set

Revised 1/23/15, 12:14 PM
GENERAL

1. All existing concrete, steel anchor bolts, and wood material that will be part of the strengthening work shall be in reasonably sound condition and free from defects that would substantially reduce the capacity of the material. Any deteriorated material that is repaired or replaced shall comply with the minimum Building Code requirements for new construction. New foundations shall be as detailed on Detail 1D6.

2. All metal connectors and hardware shall be installed per manufacturer's instructions and in accordance with the requirements of this document.

3. Due to the corrosive interaction of new metallic hardware in contact with preserved treated wood, all new metal fasteners shall be hot-dipped galvanized and meet ASTM A653, and new metal connectors shall meet ASTM A 653 class G185, or better.

4. New lumber placed in contact with new or existing concrete shall be preserved-pressure treated with Disodium Octaborate Tetrahydrate (commonly known as ‘DOT’) or Sodium Octa-Borate (commonly known as ‘SBx’). This preservative treatment does not require stainless steel connectors or fasteners. Hot-dipped galvanized connectors and fasteners are sufficient. Connectors and fasteners used for any present preservative pressure treated lumber installed since 1990 (such as for prior repairs to termite or decay damage) shall be stainless steel. This includes all concrete anchors, washers, nails, and steel metal connectors in contact with the treated lumber. Isolation membranes are not adequate. Exception: If definitive evidence is available showing that the lumber was treated with CCA (chromated copper arsenate) or DOT/SBX, hot-dipped galvanized connectors and fasteners may be used.

5. The Owner or Contractor shall verify that existing framing conditions and those earthquake strengthening methods shown generally conform to this prescriptive plan set. Special attention should be given to any unique areas which may be present due to recent repairs for damaged conditions noted above, the home is not eligible to be strengthened according to this building. The owner must seek consultation from a licensed architect or engineer to develop a strengthening design.

B. DESIGN BASIS

1. This plan set has been developed in accordance with the 2012 International Existing Building Code (IEBC) and the California Existing Building Code (CEBC). Section A301.13 Alternate Design Procedures, assuming the following:
   - Seismic Design Category D
   - Sill Class D
   - Seismic Importance Factor = 1.0
   - Spectral Response Acceleration, S = 2.34g; S = 0.973g
   - Spectral Response Coefficients, S = 0.156g; S = 0.097g
   - 75% factor per A301.3 of the 2012 IEBC (2013 CEBC)
   - Response Modification Factor, R = 6.5
   - Design Base Shear, V = 0.156g, where F = seismic weight of building.

2. Where project site seismic spectral response accelerations exceed values noted above, the home is not eligible to be strengthened according to this plan set and the owner must seek consultation from a licensed architect or engineer to develop a strengthening design.

C. FOUNDATION CONNECTIONS

1. See Sheet D1 for foundation connections.

2. New anchor bolts or connectors required by the Earthquake Strengthening Schedule (Detail D23) shall be installed within the required length of strengthening as follows:
   - a. one anchor bolt or connector at each end,
   - b. space remainder of required anchor bolts or connectors as equally as possible, but not more than 32" on center nor less than 16" on center.
   - c. Where the required number of anchor bolts or connectors cannot be achieved at the 16" on center minimum spacing or by placing them adjacent and outside of the required length of strengthening due to wall length limitations or obstructions, the spacing for anchors or connectors may be reduced to 10" on center.

3. All new foundation bolts shall have a 3” x 3” x 0.322” plate washer installed between the foundation sill (or blocking) and the nut. Plate washer shall be galvanized per ASTM A53.

4. New bolts shall be a minimum of 1-3/4” from the edges of the foundation sill or ledger, and from the ends of the foundation sill or ledger.

5. Plow bolts and ledges 1/16” larger than anchor diameter to prevent splitting. Larger holes are not permitted.

6. Existing anchor bolts may not be reliable and should not be considered as meeting the requirements of this plan set within the length of strengthening. The existing anchor bolts may be used to satisfy minimum anchor requirement outside the length of strengthening.

7. New foundation sill plates shall be hot-dipped galvanized Disodium Octaborate Tetrahydrate (“DOT”), Sodium Octa-Borate (“SBx”), or DOT/SBX, foundation grade redwood.

8. Threaded not for adhesive anchors shall conform to ASTM A36 hot-dipped galvanized or stainless steel. Adhesive or screw type anchors shall be installed per manufacturer's instructions.

9. Anchors or connectors outside of required length of strengthening shall be spaced 6'0" on center minimum along perimeter foundations. Provide new anchors or connectors where existing anchorage does not exist or does not meet this requirement.

D. FLOOR TO CRIPPLE WALL OR FLOOR TO FOUNDATION SILL CONNECTION

1. See Sheets D2 and D3 for required connection details.

2. New connectors required by the Earthquake Strengthening Schedule (Detail D23) shall be installed within the length of required strengthening as follows:
   - a. one connector at each end, and
   - b. space remainder of connectors as equally as possible, but not more than 32" on center nor less than 16" on center.

3. Where the required number of connectors cannot be achieved at the 16” on center minimum spacing or by placing them adjacent and outside of the required length of strengthening due to wall length limitations or obstructions, the spacing for connectors may be reduced to 8" on center.

4. More than one connector per existing floor joist bay unless jacks are spaced 32" on center.

5. Increase length of nails 1/2" when attaching connectors through plywood.

6. If splices in double top plates do not have a minimum 48" laps, provide a new metal strap at joint. See Detail D1D7.

7. Existing single top plates shall be reinforced with a metal strap at the joint. See Detail D2D1.

8. Where plate straps occur within a plywood braced panel, the strap shall be placed over the plywood and the plywood nails omitted where the strap is installed.

9. Where an existing continuous rim joist, end joist, or solid blocking between joints, does not exist above the perimeter cripple wall or foundation sill, new blocking and/or supplemental connections shall be provided per Sheet D3.

10. All blocking shall be installed with two 16d tee nails at each end.

E. PLYWOOD BRACED PANEL INSTALLATION

1. See Earthquake Strengthening Schedule (Detail D23) for the required length of new seismic strengthening along each wall line.

2. Install plywood braced panels at each end of wall line where possible and space additional panels, as needed, along wall line.

3. Plywood braced panels closed to the ends of wall lines shall be located as near to the ends as practicable. Panels may be located away from the ends of a wall line when existing obstructions or limited clearances necessitate such relocations.

4. Plywood braced panels along the length of a wall line should be nearly equal in length and should be nearly equal in spacing where possible. Using increments of existing stud spacing is expected.

5. The length of each plywood braced panel shall not be less than 48 inches. The length of braced panels without ties down should be equal to or exceed twice the height of the cripple wall. Exceptions are permitted when obstructions do not allow braced panels to be placed lengthwise.

6. The length of braced panels with ties down should be equal to or exceed the height of the cripple wall.

7. Nails for plywood shall be 2d common x 2-1/2” long with a minimum shank diameter of 0.131” (0.213 x 2-1/2”).

8. Plywood braced panels shall be 15/32” Structural rated sheathing, Exposure 1, 5-PLY (S = 3 or 4-Ply is not acceptable).

9. Maintain a minimum edge distance of 3/8” from center of nail to edges of plywood, studs, or top and all plates. See Sheet D3 for double stud at plywood jacks.

10. Do not overdrive, countersink, or otherwise damage the outermost ply of plywood when installing nails. Nails are over-driven when it breaks the surface ply. Install one additional nail for each over-driven nail.

11. Nails must be firmly embedded in framing behind plywood without causing splitting. Pressure must be conserved for installing nails in framing and blocking to avoid splitting.

F. NEW FOUNDATIONS

1. REINFORCING STEEL


b. Reinforcing steel shall conform to the following standards: Deformed Bars, #3; ASTM A615; Grade 40 or Grade 60 Deformed Bars, #4, and larger: ASTM A615, Grade 60

2. All bars shall have a minimum “Lap Splice” per Table F-1, unless noted otherwise.

3. All reinforcing steel shall be securely wired and properly supported above ground and away from the form.

4. Do not weld reinforcing steel.

5. Do not field bend reinforcing without equipment to ensure proper bending radii.

6. CONCRETE

a. The minimum 28 days strength five-ea. minimum, 2500psi

b. Dimensions shown for location of reinforcing are to the face of main bars, ties, etc., and denote clear coverage.

c. Forms shall be properly constructed conforming to concrete surface as shown on the drawings, sufficiently strong and braced to maintain their shape and alignment until no longer needed to support the concrete.

d. Forms and shores shall not be removed until the concrete has obtained sufficient strength to withstand all loads to be imposed without excessive stress, creep, or deflection.

3. All items to be cast in concrete such as reinforcing, dowels, bolts, anchors, joists, sills, etc. shall be securely positioned in the forms before placing the concrete.

4. Bars shall be clean of rust, grease or other materials likely to impair bond. All reinforcing bar ends shall be made cold.
G. PURPOSE OF SUPPLEMENTAL TECHNICAL NOTES

1. These Supplemental Technical Notes provide guidance for the installation of plywood braced panels that employ tie-downs and/or new foundation systems. They are to be used where there is insufficient length to install the specified length of plywood braced panels as specified in the Earthquake Strengthening Schedule (Detail 2/S3) and tie-downs must be used.

2. Where "With Tie-down" (as specified on the Earthquake Strengthening Schedule, Detail 2/S3) is used to determine the amount of strengthening required along each wall length, proof load testing of the installed anchor is required. Special procedures are also required for the installation of the required tie-downs and for installation of the plywood braced panels. See Section H for foundation requirements. See Sheet D4 for tie-down installation details and plywood sheathing requirements.

H. EXISTING FOUNDATION REQUIREMENTS & TESTING

1. Where tie-downs are proposed to strengthen any existing cripple walls, additional visual verification and testing of the existing foundation system is required as noted below prior to commencing any work. Tie-downs can only be used once this verification process has been completed and the size and strength of the existing foundation system has been verified. The Owner or Contractor shall complete Table H-1 which will be reviewed by the authority having jurisdiction. This may require local excavation of soil.

2. The size of existing foundation systems shall be verified to be at least 15" high ("D") and 8" wide ("W") as indicated by Detail 1/04. The use of pictures to document these conditions is encouraged.

3. The quality of the existing concrete foundation adjacent to the installation of new tie-downs shall be verified by tension tests. This verification shall be achieved by 3a below. Torque tests as specified in 3b below, may be used to verify the anchorage capacity of existing concrete foundations where required by Note A.6 on Sheet S1. Also see Note A.6 on Sheet S1 for general requirements for existing foundation systems.

   a. TENSION TESTS

   A minimum of one tension test shall be made along each wall line. If the test is performed on an anchor other than the tie-down, it shall not be more than 18" from the location of a proposed tie-down. These tests shall consist of installing 1/2" or 5/8" diameter threaded rod and adhesive anchors as specified by the applicable manufacturer. Minimum acceptable test values are listed in Table H-2. Tension tests shall be performed by a special inspection company hired by the owner and as approved by the AHJ.

   or:

   b. TORQUE TESTS

   A minimum of two sacrificial torque tests shall be made along each wall line. 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 H-2 can be achieved. Torque tests can be performed either by the owner, a general contractor, or a special inspection company hired by the owner and as approved by the AHJ.

4. The Owner (Owner performing the work) or Contractor shall complete the Table H-1 acknowledging that the existing foundation system has been visually reviewed and tested and conforms to the requirements of this section.

I. TIE-DOWN REQUIREMENTS

1. Tie-downs shall be Simpson HDU2-SDS2.5, KC Metals ADS2, USP Structural Connectors PHD2A, or an equivalent able to withstand an allowable tensile load of 3075 lbs or more, installed per manufacturer’s instructions.

2. End studs(s) to which tie-downs are installed, shall be 3x minimum or double 2x. For nailing at double studs, see Sheet D5.

3. All tie-downs shall use 5/8" x (A36) threaded rod adhesive-type anchors with minimum embedment per Detail 1/04.

---

Table H-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 The size of the existing foundation is greater than or equal to that specified in Section H, Item 2a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.1 The existing foundation has generally been verified to be in good condition at locations where strengthening was done.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.1 The capacity of the existing anchors have been verified by passing the tension tests specified in Section H, Item 3a. and:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The quality of the existing foundation is in reasonably good condition as noted in Note A.6 on Sheet S1. Where the quality of the concrete is questionable, it can be verified by passing the torque tests specified in Item Section H, Item 3b or by tension test as specified in Section H, Item 3a.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table H-2: Foundation Testing Requirements

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Torque (R-lbs)</th>
<th>Tension Load (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>50</td>
<td>900</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>80</td>
<td>1100</td>
</tr>
</tbody>
</table>
Earthquake Strengthening of Wood-Frame Dwellings
FEMA Plan Set

Construction Data and Earthquake Strengthening Schedule

EARTHQUAKE STRENGTHENING SCHEDULE

1. Tie-downs: If your foundation meets the criteria, you may make the use of Types "D" or "E" impractical.

Check the box that applies to the home.

1. New MudSill Anchorage used: (check all that apply)
   - BOLTS: Diameter_______
     - Adhesive          Screw
       - Type "A" Connector                Type "C" Connector
       - Type "B" Connector
       - Type "D"                         Type "F"
       - Type "E"                         Type "G"
   - 3. Floor Framing Connectors to MudSill or Top Plate used: (check all that apply)
   - Type "D"                        Type "E"                     Type "F"
   - 4. Check this box if SUPPLEMENTAL TECHNICAL NOTES were used. (Required where tie-downs were used.)

DEFINITIONS. "HEAVY OR LIGHT" CONSTRUCTION

HEAVY CONSTRUCTION: Includes any of the following:
- Roofing: Concrete or clay tiles weighing up to 11 pounds per square foot.
- Exterior Wall Finishes: Wood panel siding; or similar lightweight board.
- Roofing: Wood shakes; wood or asphalt shingles; composition roofing; or metal roofing weighing five pounds per square foot or less.

LIGHT CONSTRUCTION: Is limited to the following:
- Roofing: Concrete or clay tiles weighing up to 11 pounds per square foot.
- Exterior Wall Finishes: Wood panel siding; or similar lightweight board.
- Roofing: Wood shakes; wood or asphalt shingles; composition roofing; or metal roofing weighing five pounds per square foot or less.

Notes:
- Anchor bolts and Connectors shown in schedule are 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 technical notes.
- 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.)
- Plywood braced panel may be omitted where cripple wall is less than 1'-0" in height. Use length of strengthening for required connectors.

1. Foundation Sill Anchorage (To be done after frame construction):
   - Foundation Sill Anchorage Details: (Sheet S1), Section B
   - Tie-downs: (Sheet S1), Section D
   - Instructions for Section A
   - Instructions for Section B

2. Supplementary Technical Notes, Sheet S2 to verify the strengthening, without tie-downs, are preferred. (See Supplemental Technical Notes, Sheet S2, Section I.) Note: Manufacturer’s model numbers and installation instructions are subject to change. Verify and follow manufacturer’s written instructions.

1. Square footage calculation
   - a. Number of stories above cripple wall: ______
   - b. Approximate 1st floor area over crawl space:
     - (Do not include areas built over slab-on-grade.)
   - c. Approximate 2nd floor area over crawl space:
     - (Do not include areas where 1st floor is built over slab-on-grade.)
   - Total approximate square footage: ______

2. Is the home HEAVY or LIGHT construction? (See below for definition)
   - Check one:
     - HEAVY Construction
     - LIGHT Construction

A: GENERAL HOME INFORMATION

Instructions for Section A

Using the home’s total square footage, number of stories, and “HEAVY” or “LIGHT” construction type; mark the square footage closest to, but not less than the values listed in the Total Floor Area column of the Earthquake Strengthening Schedule.

1. Tie-downs
   - 1/2" or 5/8" diameter bolts may be used. Connectors type A, B, or C may be used where there is no cripple wall or the foundation sill is inaccessible.

2. About the home
   - HEAVY or LIGHT construction?
   - Check one:
     - HEAVY Construction
     - LIGHT Construction

B: SUMMARY OF WORK

Instructions for Section B

1. Floor framing details: (Sheet S1), Section E
   - Min. No. of Foundation Connectors or Anchors Along Each Perimeter Wall Line
   - Minimum Required per Wall Line
   - In-Clent: (Sheet S1), Section A
   - Min. No. of Anchors: (Sheet S1), Section A

C: CONSTRUCTION DATA

1. Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Tie-downs: (Sheet S1), Section D
   - Instructions for Section A
   - Instructions for Section B

Notes:
- Anchor bolts and Connectors shown in schedule are 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 technical notes.
- 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.)
- Plywood braced panel may be omitted where cripple wall is less than 1'-0" in height. Use length of strengthening for required connectors.

1. Foundation Sill Anchorage Details: (Sheet S1), Section B
   - Min. No. of Foundation Connectors or Anchors Along Each Perimeter Wall Line
   - Minimum Required per Wall Line
   - In-Clent: (Sheet S1), Section A
   - Min. No. of Anchors: (Sheet S1), Section A

C: CONSTRUCTION DATA

1. Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Tie-downs: (Sheet S1), Section D
   - Instructions for Section A
   - Instructions for Section B

Notes:
- Anchor bolts and Connectors shown in schedule are 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 technical notes.
- 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.)
- Plywood braced panel may be omitted where cripple wall is less than 1'-0" in height. Use length of strengthening for required connectors.

1. Foundation Sill Anchorage Details: (Sheet S1), Section B
   - Min. No. of Foundation Connectors or Anchors Along Each Perimeter Wall Line
   - Minimum Required per Wall Line
   - In-Clent: (Sheet S1), Section A
   - Min. No. of Anchors: (Sheet S1), Section A

C: CONSTRUCTION DATA

1. Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Tie-downs: (Sheet S1), Section D
   - Instructions for Section A
   - Instructions for Section B

Notes:
- Anchor bolts and Connectors shown in schedule are 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 technical notes.
- 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.)
- Plywood braced panel may be omitted where cripple wall is less than 1'-0" in height. Use length of strengthening for required connectors.

1. Foundation Sill Anchorage Details: (Sheet S1), Section B
   - Min. No. of Foundation Connectors or Anchors Along Each Perimeter Wall Line
   - Minimum Required per Wall Line
   - In-Clent: (Sheet S1), Section A
   - Min. No. of Anchors: (Sheet S1), Section A

C: CONSTRUCTION DATA

1. Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Foundation Sill Anchorage Details: (Sheet S1), Section A
   - Tie-downs: (Sheet S1), Section D
   - Instructions for Section A
   - Instructions for Section B

Notes:
- Anchor bolts and Connectors shown in schedule are 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 technical notes.
- 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.)
- Plywood braced panel may be omitted where cripple wall is less than 1'-0" in height. Use length of strengthening for required connectors.
Foundation Sill to Concrete Foundation Connection Details

NEW BLOCKING INSTALLATION

Anchor through Foundation Sill Only

Anchor through Blocking and Foundation Sill

Foundation Sill Connectors

Detail used where cripple wall studs are too short to allow drilling for new anchor bolts.
Floor Framing to Foundation Sill Connection Details

**1. FLOOR FRAMING-TO-NEW LEDGER CONNECTION**

- See table for anchor bolt size and embedment.

**Notes:**
1. Install (N) 2x blocking at 4'-0" on center in the first joist space perpendicular to the (E) floor joists.
2. See table for anchor bolt size and embedment.
3. See table for anchor bolt size and embedment.

**2. FLOOR FRAMING-TO-FOUNDATION SILL CONNECTION**

- See table for anchor bolt size and embedment.

**Notes:**
1. Install (N) 2x blocking at 4'-0" on center in the first joist space perpendicular to the (E) floor joists.
2. See table for anchor bolt size and embedment.
3. See table for anchor bolt size and embedment.

**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>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; (8 penny)</td>
<td>0.192&quot; x 4&quot; long common</td>
</tr>
<tr>
<td>1.5&quot; (10 penny)</td>
<td>0.162&quot; x 3.5&quot; long sinkers</td>
</tr>
<tr>
<td>2&quot; (20 penny)</td>
<td>0.148&quot; x 2-1/2&quot; long common</td>
</tr>
<tr>
<td>3&quot; (25 penny)</td>
<td>0.148&quot; x 1-1/2&quot; long</td>
</tr>
<tr>
<td>4&quot; (30 penny)</td>
<td>0.131&quot; x 2-1/2&quot; long common</td>
</tr>
<tr>
<td>5&quot; (40 penny)</td>
<td>0.131&quot; x 1-1/2&quot; long</td>
</tr>
</tbody>
</table>

**PROPERTY ADDRESS:**

[Image] 

**ADDRESS:**

Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings

**MAR 2015**

**FEMA Plan Set**

**D2**
Floor Framing to Cripple Wall Connection Details

1. **FLOOR-TO-CRIPPLE WALL CONNECTION**
   - (E) First floor wall framing
   - (E) Rim joint or (E) blocking
   - (E) Cripple wall top plate(s)
   - (E) Cripple stud
   - (N) 2x blocking End-nail with two 16d nails (20d for joists 1-3/4" to 2" thick) through each joint or the nail to joists with two 8d nails at each end
   - (N) Plywood braced panel See Sheet S4 or S5 for installation

2. **FLOOR-TO-CRIPPLE WALL CONNECTION**
   - (E) First floor wall framing
   - (E) Rim joint or (E) blocking
   - (E) Cripple top plate(s)
   - (E) Cripple stud
   - (N) 2x blocking or floor joist
   - (N) Connector Type "G" attach with 8d nails
   - (N) Plywood braced panel See Sheet S4 or S5 for installation

3. **FLOOR-TO-CRIPPLE WALL CONNECTION**
   - (E) First floor wall framing
   - (E) Rim joint or (E) blocking
   - (E) Cripple wall top plate(s)
   - (E) Cripple stud
   - (N) 2x blocking or floor joist
   - (N) Connector Type "D" attach with 8d nails
   - (N) Plywood braced panel See Sheet S4 or S5 for installation

4. **FLOOR-TO-CRIPPLE WALL CONNECTION**
   - (E) First floor wall framing
   - (E) Rim joint or (E) blocking
   - (E) Cripple wall top plate(s)
   - (E) Cripple stud
   - (N) 2x blocking or floor joist
   - (N) Connector Type "B" at (E) blocking or Type "E" at (E) rim joint
   - (N) Plywood braced panel See Sheet S4 or S5 for installation

**Note:**
- Use detail where no joist blocks exist above cripple wall top plate
- Use "reverse block" method as shown in Detail 4/D3

**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:

**Term**
- Connector Type
- Nail
- Screw
- Screw
- Screw
- Plywood
- LVL
- Plate Washer
- Flashing Tape
- Pipe

**Description**
- “Gold Insulation.”
- Simpson Strong-Tie 1/4" SDS.
- USP Mitek 1/4" WS
-握
- GRK 3/8" RSS
- Typar, Tyvek, Vycor, Fortiflash, Orange Peel-n-Seal
- Laminated Veneer Lumber
- Georgia-Pacific "GP-Lam"
- Boise-Cascade "VersaLam"
- Weyerhauser "Microllam"
- 5-Ply.
- "Reverse Block" Method
- "Peel & Stick"
- "Self-Stick"
- "Connectors" table

For Connector types see Earthquake Strengthening Schedule and "Connectors" table (Detail 2/S3).

**PROPERTY ADDRESS:**

**Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings**

**MAR 2015**

**FEMA Plan Set**
TIE-DOWN INSTALLATION

MINIMUM CONCRETE FOUNDATION DEPTH
See Technical Notes, Sheet S2, Section H

CRIPPLE STUD, WHERE REQUIRED
Fasten to all cripple studs with 8d nails at 8" on center, max. 4" from ends

TIE-DOWN CENTERED ON STUD
Anchor may be located in end bay or bay adjacent to tie-down

PARKING REQUIREMENTS
Foundation sill anchor bolt
See Detail 1/D1 or 2/D1
Anchor may be located in end bay or bay adjacent to tie-down

NOTES:
1. For strapping at top plate splices, see Details 1/D7 or 2/D7.
2. At crawlspace vents or similar cripple-wall blockouts, see Detail 3/D7.
3. Prior to installing plywood, see Detail 4/D7 where pipes or conduits pass through cripple studs or top plates.

For Connector types see Earthquake Strengthening Schedule and "Connectors" table (Detail 2/S3).
**Plywood Braced Panel Installation Details**

**FOUNDATION SILL SAME WIDTH AS CRIPPLE WALL**

1. Joint at abutting plywood braced panels (1/8" gap between plywood sheets).
2. Fasten with 8d nails at 8" on center.
3. See Sheet D3 for floor framing to cripple wall connections.
4. (Framing may vary from condition shown in this detail)

**Foundation sill anchor bolt**

- Fasten to existing stud with two 16d 3-1/2" long sinkers.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.

**Cripple stud**

- Min 1" clear above (N) 2x blocking.

**Plywood braced panel**

- 6" screw 6" long structural wood screw.

**Joint at abutting plywood braced panels (1/4" gap between plywood sheets).**

- Fasten with 8d nails at 8" on center.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.

**Cripple stud**

- Min 1" clear above (N) 2x blocking.

**Plywood braced panel**

- 4" screw 4" long structural wood screw.

**Joint at abutting plywood braced panels (1/8" gap between plywood sheets).**

- Fasten with 8d nails at 8" on center.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.

**Cripple stud**

- Min 1" clear above (N) 2x blocking.

**Plywood braced panel**

- 4" screw 4" long structural wood screw.

**Joint at abutting plywood braced panels (1/4" gap between plywood sheets).**

- Fasten with 8d nails at 8" on center.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.

**Cripple stud**

- Min 1" clear above (N) 2x blocking.

**Plywood braced panel**

- 4" screw 4" long structural wood screw.

**Joint at abutting plywood braced panels (1/8" gap between plywood sheets).**

- Fasten with 8d nails at 8" on center.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.

**Cripple stud**

- Min 1" clear above (N) 2x blocking.

**Plywood braced panel**

- 4" screw 4" long structural wood screw.

**Joint at abutting plywood braced panels (1/4" gap between plywood sheets).**

- Fasten with 8d nails at 8" on center.

**Cripple wall top plate(s)**

- Use (N) 2x blocking between (E) cripple studs.

**Concrete foundation** (shape may vary)

- If (E) foundation sill is embedded in (E) footing, provide (N) blocking as shown in Detail 2/D5.
Foundation Replacement Details

SECTION

1-1/2" to 2" from center of anchor bolt to plywood
Anchor hole diameter shall be 1/16" larger than anchor diameter
If possible, (N) sill should be same width as cripple studs

(N) or (E) Cripple stud
(N) Plywood braced panel, where required

(N) Plywood braced panel, where required
1 1/2" clear
3" clear min.
8" min.
embedment
7" min.

(N) Foundation sill and anchor bolt with plate washer
Note: "J" bolts may be used as an alternate

(N) #4 continuous rebar
(N) #4 at 24" on center, alternate hooks
1-1/2" to 2" from center of anchor bolt to plywood
Anchor hole diameter shall be 1/16" larger than anchor diameter
If possible, (N) sill should be same width as cripple studs

Notes:
1. Contact AHJ to verify applicability.
2. Where frost conditions occur, the minimum depth shall extend below the frost line.
3. Footing to be deepened as required to bear on firm soils.
4. When expansive soil is known to exist, the foundation depth and reinforcement shall be as approved by the AHJ.
5. The ground surface along the interior side of the foundation may be excavated to the elevation of the top of the footing.
6. Where (N) foundations are placed adjacent to (E) foundations, connect (N) and (E) foundations with three #4 x 3'-6" dowels. Embed dowels 8" minimum into the (E) foundation with adhesive.
7. A soils report or modified foundation may be required at locations with expansive or liquefiable soils or sites with potential for sliding.

CONCRETE FOUNDATION FOR SECTION REPLACEMENT

Footing Replacement Details

Foundation Specifications

<table>
<thead>
<tr>
<th>Footing Depth</th>
<th>Footing Thickness</th>
<th>Footing Width</th>
<th>Stemwall Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-story</td>
<td>12&quot; min.</td>
<td>6&quot; min.</td>
<td>6&quot; min.</td>
</tr>
<tr>
<td>Two-story</td>
<td>18&quot; min.</td>
<td>7&quot; min.</td>
<td>8&quot; min.</td>
</tr>
</tbody>
</table>

Soil

Cold joint where footing and stem wall are poured separately

(N) #4 at 24" on center, alternate hooks
1-1/2" to 2" from center of anchor bolt to plywood
Anchor hole diameter shall be 1/16" larger than anchor diameter
If possible, (N) sill should be same width as cripple studs

(N) or (E) Cripple stud
(N) Plywood braced panel, where required

(N) Foundation sill and anchor bolt with plate washer
Note: "J" bolts may be used as an alternate

(N) #4 continuous rebar
(N) #4 at 24" on center, alternate hooks
(N) Foundation sill and anchor bolt with plate washer
Note: "J" bolts may be used as an alternate

Screw Details

Screws

- Simpson Strong-Tie 1/4" SDS
- GRK 3/8" RSS "Climatek"
- USP Mitek 1/4" WS "Gold Coat", or equivalent.

Plywood Details

(Plywood braced panel)

15/32" Structural I, Exposure 1, 5-Ply.

LVL (Laminated Veneer Lumber)

- Weyerhauser "Microlam"
- Boise-Cascade "Vermiclad"
- Georgia-Pacific "GP-Lam"
- LP "Solid Start", or equivalent.

Plate Washer Details

3" x 3" square x 0.229" thick.

Foil & Stic Flashing Tape Details

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

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>
</tr>
</thead>
<tbody>
<tr>
<td>Nails</td>
<td>8d (8 penny) 0.131&quot; x 2-1/2&quot; long common</td>
</tr>
<tr>
<td>Screws</td>
<td>10d (10 penny) 0.148&quot; x 3-1/2&quot; long sinkers</td>
</tr>
<tr>
<td>Plywood</td>
<td>10d (10 penny) 0.148&quot; x 3&quot; long structural wood screw</td>
</tr>
<tr>
<td>LVL</td>
<td>16d (16 penny) 0.162&quot; x 3-1/2&quot; long structural wood screw</td>
</tr>
<tr>
<td>Plate Washer</td>
<td>20d (20 penny) 0.192&quot; x 4&quot; long structural wood screw</td>
</tr>
<tr>
<td>Flashing Tape</td>
<td>&quot;Peel &amp; Stick&quot;</td>
</tr>
</tbody>
</table>

PROPERTY ADDRESS:

4/16/2015 4:32:04 PM

D6

MAR 2015

Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings
FEMA Plan Set

FEMA Plan Set
Notes:
1. Do not cover existing vents.
2. Increase plywood braced panel length a distance equal to the length of blockout(s) or one stud bay width whichever is greater.

Panel Notching and Top Plate Details

1. TOP PLATE SPlice AT EXISTING DOUBLE TOP PLATES

- (N) Connector Type "S1" centered at (E) upper top plate splice location
- Install with fourteen 8d nails each side of the joint (eighteen total)
- Center nails vertically on the top plates (pre-drill)
- Joint at (E) lower top plate

2. TOP PLATE SPlice AT (E) SINGLE TOP PLATE

- (N) Connector Type "S1" centered at (E) upper top plate splice location
- Install with nine 8d nails each side of the joint (eighteen total)
- Joint at (E) lower top plate

MATERIAL KEY:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nails</td>
<td></td>
</tr>
<tr>
<td>B1 (8 penny)</td>
<td>0.131&quot; x 2-1/2&quot; long common</td>
</tr>
<tr>
<td>B2 (at Connectors attached over plywood)</td>
<td>0.131&quot; x 2-1/2&quot; long common</td>
</tr>
<tr>
<td>B3 (at Connectors attached directly to framing)</td>
<td>0.131&quot; x 1-1/2&quot; long</td>
</tr>
<tr>
<td>B4 (10 penny)</td>
<td>0.148&quot; x 2&quot; long common</td>
</tr>
<tr>
<td>B5 (at Connectors attached over plywood)</td>
<td>0.148&quot; x 2&quot; long common</td>
</tr>
<tr>
<td>10d (at Connectors attached directly to framing)</td>
<td>0.148&quot; x 1-1/2&quot; long</td>
</tr>
<tr>
<td>16d (10 penny)</td>
<td>0.162&quot; x 3-1/2&quot; long common</td>
</tr>
<tr>
<td>20d (20 penny)</td>
<td>0.192&quot; x 4&quot; long common</td>
</tr>
</tbody>
</table>

Screws

- Simpson Strong-Tie 1/4" SDS
- GRK 3/8" RSS "Climatek"
- USP Mitek 1/4" WS "Gold Coat", or equivalent.
- 3" screw 3" long structural wood screw
- 4" screw 4" long structural wood screw
- 6" screw 6" long structural wood screw

Plywood

- Plywood braced panel
- Structural I, Exposure 1, 5-Ply.
- Weyerhauser "Microlam"
- Boise-Cascade "VersaLam"
- LP "Solid Start" or equivalent.
- Plate Washer 3" x 3" square x 0.229" thick.
- "Peel & Stick" Flashing Tape
- Fortiflash, Orange Peel-n-Seal, Typar, Tyvek, Vycor, HardieWrap, or equivalent.

For Connector types see Earthquake Strengthening Schedule and "Connectors" table (Detail 2/S3).

Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings

PROPERTY ADDRESS: 4/16/2015 4:32:04 PM
This sample is a 1407 square foot, one-story home of "Light" construction.

**EXAMPLE OF CALCULATING TOTAL STRENGTHENING REQUIREMENTS**

1. **Wall Line**: 44'-6"  
   - **Plywood Strengthening Length**: 20'-0" (Provided 10'-8" + 9'-4" = 20'-0"

2. **Plywood Strengthening Length** must be at least the greater of: two times the maximum cripple wall height of 24" or 4'-0" for each section along this wall line. This requirement only occurs at wall lines without tie-downs.

3. **Strengthening**: Foundation and/or cripple wall work intended to yield improved performance during an earthquake.

**Notes**
- **Required length values are rounded up to be at 16" typical stud space increments.**
- **Foundation sill anchor bolt or connector**
- **Typ. this wall line**
- **Indicate the direction and spacing of existing floor joists**
- **Floor joists at 16" on center**

**Minimum required length of strengthening**

- **Wall line**: 38'-0"  
  - **Maximum cripple wall height**: 36"

**Example**

- **Wall line**: 38'-0"  
  - **Plywood Strengthening Length**: 20'-0" (Provided 9'-4" + 10'-8" = 20'-0"

**Definitions**
- **Plywood panels**: New plywood installed to a length of cripple wall to provide strengthening.
- **Wall line**: All wall segments forming the overall building dimension on one side.
This sample is a 2392 square foot, two-story home of "Light" construction. (Excludes porch). Not all wall lines of this home allow enough length to use plywood braced panels without tie-downs, therefore plywood braced panels both with and without tie-downs will be used. The row for 2400 square feet in the Earthquake Strengthening Schedule Sheet S3 was used to determine the needed length of 33'-4" on each wall line without tie-downs and 21'-4" for wall lines with tie-downs. This example chooses to use 5/8"ø Anchor Bolts, and Type "E" Connectors, to determine lengths and quantities.

Notes:
1. Plan shows typical notation. Instructional notes are in italics and should not be included on submittal drawing. Refer to Sheet 01 for additional instructions.
2. Detail Number (Homeowner or Contractor to choose most appropriate detail) - Sheet Number

Definitions:
- Plywood braced panels: New plywood installed to a length of cripple wall to provide strengthening.
- Strengthening: Foundation and/or cripple wall work intended to yield improved performance during an earthquake.
- Wall line: All wall segments forming the overall building dimension on one side.

Example - Foundation Plan
Earthquake Strengthening of Cripple Walls in Wood-Frame Dwellings

Example - Cripple Wall Strengthening

Notes:
1. This detail is to show an example of cripple wall that has gone through an earthquake retrofit and to identify terms and details used in this plan set.
2. This detail is not intended to supersede requirements contained in the specific installation details on Sheets D1 through D7.
3. This view is looking from the interior of the crawl space.

Definitions
- Plywood braced panels: New plywood installed to a length of cripple wall to provide strengthening.
- Strengthening: Foundation and/or cripple wall work intended to yield improved performance during an earthquake.
- Wall line: All wall segments forming the overall building dimension on one side.
Example - Strengthening - No Cripple Wall

Notes:
1. This detail is to show an example of an earthquake retrofit where there is no cripple wall, and to identify terms and details used in this plan set.
2. This detail is not intended to supersede requirements contained in the specific installation details on Sheets D1 through D7.
3. This view is looking from the interior of the crawl space.

Definitions
- Plywood braced panels: New plywood installed to a length of cripple wall to provide strengthened.
- Strengthening: Foundation and/or cripple wall work intended to yield improved performance during an earthquake.
- Wall line: All wall segments forming the overall building dimension on one side.

Condition where (E) joist is too close to allow access to mudsill

(E) Rim joist

(N) Connector where minimum number cannot be achieved within the required length of strengthening

(E) Foundation sill

(E) or (N) Anchor bolt at 6'-0" on center outside of required length of strengthening

8" min. and 12" max. edge distance to centerline of bolt

(N) Ledger See Detail S/D2

(N) Connector "G" See Detail S/D2

(E) Floor joist (Floor framing)

(E) Rim joist or (E) blocking

(N) Connector where minimum number cannot be achieved within the required length of strengthening

(N) Connector "D" or "E" See Detail 1/D2

(N) Connector "A", "B", or "C" See Detail 4/D1

(E) Concrete foundation

Required length of strengthening

See Earthquake Strengthening Schedule (Detail 2/S3)