RECONSTRUCTION AND REPLACEMENT OF EARTHQUAKE DAMAGED MASONRY CHIMNEYS

This City of San Luis Obispo Building & Safety Bulletin provides prescriptive details to facilitate the reconstruction of an earthquake damaged masonry chimney using a new factory-built metal chimney or replacement of an earthquake damaged masonry firebox and chimney with a new masonry firebox and a factory-built metal chimney. The information provided herein is based on guidelines established by the City of Los Angeles Department of Building and Safety and is hereby deemed appropriate for damage repair in the City of San Luis Obispo. Any reference to an "LAMC Section" contained herein shall mean an appropriate provision of the California Building Code. The reconstruction methods contained in this bulletin are titled:

1. RECONSTRUCTION OF EARTHQUAKE DAMAGED MASONRY CHIMNEY USING A NEW FACTORY-BUILT METAL CHIMNEY; and,

2. REPLACEMENT OF EARTHQUAKE DAMAGED MASONRY FIREBOX AND CHIMNEY WITH A NEW MASONRY FIREBOX AND A FACTORY-BUILT METAL CHIMNEY.

Masonry chimneys are required to be designed in accordance with LAMC Section 91.3102.7 and must be either free standing or supported from the attached structure. Reconstruction or replacement of a damaged masonry chimney is not allowed with masonry unless completely removed, redesigned and constructed to current code requirements. This will require structural plans and calculations prepared by a civil engineer, structural engineer, or architect licensed by the State of California. These structural plans and calculations must be reviewed prior to permit issuance at the plan check counter of a LADBS Construction Services Center.

A building permit is required for either method. Method 1, reconstruction of the chimney, does not require plan check and the permit can be issued at the City of San Luis Obispo Building & Safety Division Counter - 990 Palm Street, SLO. Method 2, replacement of the firebox and chimney, does require plan check and the permit can only be issued at the City of SLO Building & Safety Division Counter. For Method 2, provide the following indelible plans:

1. A plot plan drawn to scale showing the shape of the parcel, the perimeter of the building, and the setback of the building and fireplace perimeter to all parcel boundaries.
2. A floor plan drawn to a scale of 1/4 inch to 1 foot showing the existing use of each room adjacent to the fireplace.
RECONSTRUCTION OF EARTHQUAKE DAMAGED MASONRY CHIMNEY USING A NEW FACTORY-BUILT METAL CHIMNEY

Unreinforced Masonry Chimneys
Damaged unreinforced masonry chimneys shall be repaired by:

C Utilizing Section "B" of this standard.
C Removal down to the throat of the nearest undamaged firebox.
C Construction of a concrete bond beam on top of the remaining firebox.
C The concrete bond beam need not be anchored to the building.

Reinforced Masonry Chimneys

Reinforced masonry chimneys shall be repaired based on the following damage cases:

CASE 1 - Damaged above the Ceiling/Roof Line

• Section "A" of this standard shall be utilized for repair.
C The old reinforced masonry shall be removed down to the roof line.
C A concrete bond beam shall be constructed on top of the remaining reinforced masonry chimney.
C The concrete bond beam shall be anchored to the building.

CASE 2 - Damaged below the Ceiling/Roof Line of a One-Story Building

C Section "B" of this standard shall be utilized for repair.
C The old masonry shall be removed down to the throat of the firebox.
C A concrete bond beam shall be constructed on top of the remaining firebox.
C The concrete bond beam need not be anchored to the building.
CASE 3 - Damaged below the Ceiling Line of the First Floor of a Two-Story Building

- **Section "C"** of this standard shall be utilized for repair.
- The old masonry shall be removed down to the throat of the firebox.
- A concrete bond beam shall be constructed on top of the remaining firebox.
- The concrete bond beam need not be anchored to the building.

CASE 4a - Damaged Between the Ceiling/Roof Line and the Second Floor of a Two-Story Building

- **Section "D"** of this standard shall be utilized for repair.
- The old reinforced masonry shall be removed down to the second floor-line.
- A concrete bond beam shall be constructed on top of the remaining masonry chimney.
- The concrete bond beam shall be anchored to the second floor diaphragm.

CASE 4b - Damaged Between the Ceiling/Roof Line and the Second Floor of a Two-Story Building

*(Firebox Located at Second Floor)*

- **Section "B"** of this standard shall be utilized for repair.
- The old masonry shall be removed down to the throat of the second floor firebox.
- The remaining portion below the second floor is undamaged.
- A concrete bond beam shall be constructed on top of the remaining firebox.
- The concrete bond beam need not be anchored to the building.

REPLACEMENT OF EARTHQUAKE DAMAGED MASONRY FIREBOX AND CHIMNEY WITH A NEW MASONRY FIREBOX AND A FACTORY-BUILT METAL CHIMNEY

Metal chimney/masonry fireplace combinations for new construction are allowed provided the firebox construction complies with LAMC Section 91.3102.7 for new construction and the bond beam firebox transition does not extend more than seven (7) feet above grade and the construction complies with the details in this standard.

The prescriptive details provide that the concrete footing/masonry firebox combination is self supporting and does not rely on or provide support to the building. The following conditions shall apply:

- All mortar and grout shall be sack mix only; no on site mixing of cement, sand and lime shall be permitted.
- Reinforcing steel shall be minimum grade 40 with main vertical bars continuous from footing to bond beam.
- Tack welding shall not be permitted.
- All voids within the masonry shall be solidly grouted.
CHIMNEY SPECIFICATIONS

1. All factory-built chimney assemblies (pipes, spark arrester, and anchor plates) shall be tested to U.L. Standard 103 by a testing laboratory approved by the City of Los Angeles.

2. Chimneys shall be listed by the testing laboratory as "Residential Type and Building Heating Appliance Chimney" when used for wood burning fireplaces. Chimneys listed as only a "Building Heating Appliance Chimney" are for installation in other than one-or-two-family dwellings.

3. Chimneys for fireplaces with a closed air-tight combustion chamber shall be designated "Type HT".

4. Factory-built chimney assemblies shall be used and installed in accordance with the terms of their listing and the manufacturer's instructions.

5. The masonry to metal chimney transition shall be accomplished through the use of a 12 gage steel adapter cone which is imbedded in the concrete bond beam as detailed in this standard plan. A "paroc" basalt insulation gasket shall be installed between the adapter cone flange and the metal chimney anchor plate.

ADDITIONAL REQUIREMENTS

Maximum Height
The height of the chimney above the roof shall be limited to ten feet under this standard.

Diameter of Metal Chimney
The diameter of the factory-built metal chimney assembly shall be based upon the manufacturer's specifications and instructions for the least dimension of the existing flue, whichever is greater.

Draft Stop
A draft stop consisting of drywall or plywood shall be provided to separate the chase from wood members of the existing building.

Inspection
The firebox, chimney, and other undamaged areas MUST be carefully visually inspected for cracks or voids, which may permit the access of flames or smoke to the surrounding wood framing, prior to any construction.
Top of Chimney shall extend a minimum of 2'-0" above all portions of roof within 10'-0" of chimney.

See Detail 4 for construction of steel stud chase.

Clearance to combustible materials shall be in accordance with the manufacturer's listing and instructions.

Factory-built anchor plate

Concrete bond beam

See Detail "1".

Note: Unreinforced masonry chimneys shall be removed down to the throat.

SECTION A
Chimney Damage Above Roof Line

Warning: Install only a properly listed "residential type and building heating appliance Chimney on wood burning fireplaces. Chimneys for fireplaces with a closed air-tight combustion chamber shall be "TYPE HT" designation. Any other type of chimney may create a potential fire or safety hazard.
Top of chimney shall extend a minimum of 2'-0" above all portions of roof within 10'-0" of chimney.

Concrete Bond Beam see Detail "1" (Steel anchor straps not required)

See Detail "4" for construction of steel stud chase.


#4 bar at 14" length, Dowelled 6" and drypacked into remaining masonry, (Total 4).

3/16" x 3" x 3" steel angle

3/16" x 1" x 6' Steel strap. See Detail 2 for anchorage to building

Wood top plate

Plan View

Factory-built Chimney 12 gage Securing Plate
Factory-built anchor plate
1 inch thick Paroc Basalt insulation
12 gage steel Adapter Cone

Min. 2 bolt per side. 12 gage steel Adapter Cone

4" min. embed.

3 - #3 closed loop ties

316" x 1" steel straps

Gypboard shims

Concrete bond beam shall be formed to provide an un-interrupted transition from the existing flue to the new metal chimney. See ADAPTER CONE Detail

Section at Bond Beam

10"
ADAPTER ONE
MATERIAL: 12 GAGE STEEL
FINISH: BLACK PAINT
MEASUREMENT IN INCHES

PAROC BASALT INSULATION
1/2" diam (4) REQUIRED

SECURING PLATE
MATERIAL: 12 GAGE STEEL
FINISH: BLACK PAINT
1/2" diam (4) REQUIRED
DETAIL 2
(Concrete Bond Beam Anchorage Into Building)
Single brace required if chimney is between 4'-0" and 5'-11" above the bond beam. Double brace requires if chimney is between 6'-0" and 10'-0" above bond beam.

See page 13 for blocking details.

2" x 2" x 1/4" angle anchored through steel strap to studs with 1/2" dia. bolt. Length of angle shall equal the width of chase.

DETAIL 3
(Roof Brace)

1 1/4" x 14 gage steel strap
Detail 4.

4 x 4 block with metal clips at ends

30° - 45°
<table>
<thead>
<tr>
<th>Covering Material</th>
<th>Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laths for stucco</td>
<td>No. 8 x 5/8&quot; sheet Metal screws at 6&quot; o.c.</td>
</tr>
<tr>
<td>Plywood</td>
<td>No. 6 Bugle head screws at 6&quot; o.c. at chase and 12&quot; o.c. at interior edges and fields.</td>
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STEEL STUDS
SPECIFICATIONS:

All steel studs shall be either galvanized or factory painted "C" type stud.

Minimum 18 gage
Minimum width 3\½"
Minimum Fy = 33 ksi

COVERING

Steel stud chase may be covered with stucco or adhered veneer.

Note: Adhered veneer shall be a max. 1\" with plywood backing (\(\frac{3}{8}\"\) min.) and shall be installed per division 30 of the L.A. building code.

Diagram:
- Continuous 1\(\frac{1}{4}\"\) x 14\" gage steel strap at floor and ceiling/roof lines
- Horizontal Bracing at floor(s) and ceiling/roof lines, and at roof bracing.
- Blocking of studs at every 4\'-0" vertical distance and at floors(s) and ceiling/roof lines.
- Draft stop to separate chase from wood member of existing building.
- Corner studs shall be anchored into existing building with 1\(\frac{1}{4}\"\) dia. x 2\(\frac{1}{2}\"\) lag screws at 24\" o.c.
- Steel studs max. 16\" o.c.
- 18 gage steel track
- Inspection door lockable 8\" x 8\"
- 14 gage steel held in place by nail or lag bolts
At ceiling/roof line anchor strap across 3 joists with 1 -16d nail into each joist. Joist shall be blocked with 2X member.

Corner studs shall be anchored into existing building with \( \frac{1}{4} \)" dia x 2\( \frac{1}{2} \)" lag screws at 24" o.c.

Horizontal bracing
Brace vertical studs at 8' o.c. vertically w/ stud section, attach with 2 - #8 x \( \frac{5}{8} \)" sheet metal screws

Continuous 1\( \frac{1}{4} \)" x 14 gage steel strap at ceiling/roof and floor lines.

At floor(s) line anchor steel strap with \( \frac{1}{4} \)" dia. x 2\( \frac{1}{2} \)" lag screws Total 3

Strapping & Bracing Detail @ Ceiling/Roof and Floors

Track blocking inverted

Bend shoe in opposite direction on adjacent blocking

Bend shoe on track blocking min. 1\( \frac{1}{2} \)" w/ 2 - #8 screw each side of stud

3" x 3" bent clip angle

Bent Shoe Option

Angle Clip Option

Blocking Details
Inspection Requirements

The permit holder or his agent shall notify the Department when the chimney is ready for each of the following inspections:

1. Concrete Bond Beam: When the form and required reinforcing steel are in place but before any concrete is poured.
2. Framing: When all members including but not limited to bracing, blocking, metal chimney or flashing are in place, but before any covering is in place.
3. Stucco: When the backing and lath is in place ready for stucco.
4. Final: When the chimney is completed.

Splice shall be staggered a minimum of 12" vertically. Maximum one splice per stud.

Track Detail

Splice Detail
6" Typical all around
Adjustable Outside Airvent
#4 Horizontal U-bar at 12" o.c.
Throat
Insulation
Flue
Adapter Kit
Adapter Cone
See Detail "A"

20"
6" Typical all around

Hearth
Maximum 7'-0"

6' x 3' x 18" deep Footing

New Firebox - Cross Section Typical 36" Fireplace
18" Deep Footing Below Extend 6" Beyond Firebox Construction

Firebox Plan

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Detail B

Typical 36" Fireplace

A. #3 Stirrup @ 6" o.c.
B. 4 - #4 Rebar
C. 3 - #4 stirrups in foundation
E. 6 - #4 Tiebars

1. The fireplace foundation at ground level. 6'-0" long x 3'-0" x 1'-6" deep Minimum.

2. The fireplace foundation above ground shall be formed at 5'-4" long x 2'-1" wide x 6" high.

3. The 4 - #4 vertical bars will have a 4' right angle bend extending across the foundation.

4. The four vertical bars will be temporary anchored to the above ground foundation forms placed at 6" from each corner. This will insure the correct placement for the vertical reinforcement steel.